



SM No. CBWO2001540081

PROPOSAL AND CONTRACT DOCUMENTS

FOR THE CONSTRUCTION OF
(EXEMPT)

210

Construction necessary to build a sloped roof and modifications to HVAC for District Two Headquarters at Batesville, known at State Project No. BWO-2001-54(008)/501635, in the County of Panola, State of Mississippi.
Project Completion: December 14, 2007

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: SLOPED METAL ROOF AND MODIFICATIONS TO HVAC FOR DISTRICT TWO AT BATESVILLE, PANOLA COUNTY, MISSISSIPPI

PROJECT NUMBER: BWO-2001-54(008) 501635

DATE: DECEMBER 4, 2006

DESCRIPTION A: This Work shall consist of minor site work and all construction work necessary to construct a Sloped Metal Roof & Modifications to HVAC for District Two Headquarters at Batesville, Panola County, Mississippi., in accordance with these Specifications and conforming with the Drawings.

It is the intention of these Specifications to provide the necessary items and instruction for a complete building including all code compliance. Omission of items or instruction necessary or considered standard good practice for the proper installation and construction of 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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END OF DOCUMENT

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 Sloped Metal Roof & Modifications to HVAC for District Two Headquarters at Batesville, Panola County, Mississippi., known as Project No. BWO-2001-54 (008) 501635.

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 Batesville 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

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

**PRE-BID MEETING
DOCUMENT 00150**

**PROJECT: SLOPED METAL ROOF AND MODIFICATIONS TO
HVAC FOR DISTRICT TWO AT BATESVILLE,
PANOLA COUNTY, MISSISSIPPI**

PROJECT NUMBER: BWO-2001-54(008) 501635

DATE: December 4, 2006

PART 1 GENERAL

1.01 DESCRIPTION

- A. Bidders are hereby advised that this Project provides for a Pre-Bid Meeting.
- B. This Meeting will be held in the Auditorium at the MDOT Project Office Building located at 148 Highway 51N, Batesville, Mississippi, telephone number (662) 563-7708, at **10:00 A.M. on Thursday, January 11, 2007**, with prospective bidders to discuss requirements of the Drawings and Specifications for this Project and to visit the existing Project site.
- C. Addendum to clarify items discussed, if necessary, will be issued by September 19, 2006, to parties holding Proposals and Drawings for this Project.

1.02 ATTENDANCE

- A. Due to the nature and complexity of this project it is **MANDATORY** for the Prime Bidder to attend this pre-bid meeting. and will form the reason for **Rejection Of Their Proposal**.
- B. It is **strongly recommended** the Prime Bidder (Contractor) requires the major Subcontractors (Roofing, Mechanical, Electrical) attend this pre-bid meeting.
- C. It is **strongly recommended** the Owner requires Asbestos Abatement Contractor and Telephone Communication Contractor attend this pre-bid meeting.

PART 2 PRODUCTS
Not Used

PART 3 EXECUTION
Not Used

END OF DOCUMENT

**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 Michael Ellis – Construction Engineer (601) 359-7301
- E. Drawings Michael Ellis – 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 **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.

1.05 **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.

1.06 **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.

1.07 **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 December 14, 2007 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 shall be required and approved prior to any Work allowed.

1.08 **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

Metal Roofing Items
Plumbing Items
Heating, Ventilating and Air Conditioning Items
Electrical Items

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

PART 2 PRODUCTS
Not Used

PART 3 EXECUTION
Not Used

END OF DOCUMENT

**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.

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)

**AGREEMENT
DOCUMENT 00500**

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

CONTRACT FOR: Project No. BWO-2001-54(008) 501635
Sloped Metal Roof & Modifications to HVAC for District
Two Headquarters at Batesville

LOCATED IN THE COUNTY OF: PANOLA
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 BOND FOR: Project No. BWO-2001-54(008) 501635
Sloped Metal Roof & Modifications to HVAC for
District Two Headquarters at Batesville

LOCATED IN THE COUNTY OF: PANOLA

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 on 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)

on Project No. BWO-2001-54(008) 501635 Sloped Metal Roof & Modifications to HVAC for District Two Headquarters at Batesville, Panola, 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)

on Project No. BWO-2001-54(008) 501635 Sloped Metal Roof & Modifications to HVAC for District Two Headquarters at Batesville, Panola, 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

**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-2001-54(008) 501635
SLOPED METAL ROOF AND HVAC MODIFICATIONS
DISTRICT II HEADQUARTERS AT BATESVILLE, MS
PANOLA COUNTY

THE OWNER:
(Name and address):

THE ARCHITECT:
(Name and address):

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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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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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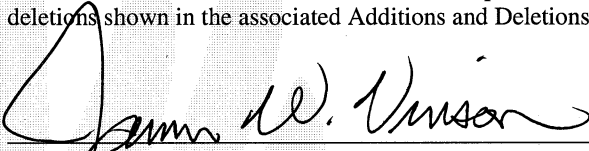
SLOPED METAL ROOF AND HVAC MODIFICATIONS
DISTRICT II HEADQUARTERS AT BATESVILLE, MS
PANOLA COUNTY

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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 16:50:43 on 06/22/2006 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)

7-5-06

(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

6.2 MUTUAL RESPONSIBILITY

6.2.6 Add a new Subparagraph as follows:

Each Contractor involved shall assume all liability, financial and otherwise, in connection with the Contract and shall protect and save harmless the Commission, Department or any of its officers or employees from damages or claims that may arise because of inconvenience, delay or loss experienced because of the presence and operations of the other Contractor(s) working within the same Contract limits.

6.2.7 Add a new Subparagraph as follows:

Failure of either Contractor to abide by the terms of the joint schedule or modified schedule will be justified for termination of the Contract under provisions of Article 14.

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 twelve percent (12%) 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: 7-05-06

**PROJECT: SLOPED METAL ROOF AND MODIFICATIONS TO
HVAC FOR DISTRICT TWO AT BATESVILLE,
PANOLA COUNTY, MISSISSIPPI**

PROJECT NUMBER: BWO-2001-54(008) 501635

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 01100

SUMMARY

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. Work covered by the Contract Documents shall be provided by one (1) General Contractor as one (1) Contract to improve the Mississippi Department of Transportation existing building and adjacent site to construct a Sloped Metal Roof & Modifications to HVAC for District Two Headquarters at Batesville, Panola County, Mississippi.
- 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 6 copies of Schedule of Values as described in Section 01295 of these Specifications to the MDOT Architect. 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 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.
10. Request for Permission to Subcontract: Submit original to Contract Administration Division and two copies to the Project Engineer CAD-720 form - REQUEST FOR PERMISSION TO SUBCONTRACT for each subcontractor before they are allowed to perform any Work.
11. Coordination: The Contractor is responsible for the coordination of the total Project. All subcontractors will cooperate with the Contractor so as to facilitate the general progress of the Work. Each trade shall afford all other trades every reasonable opportunity for the installation of their Work. Refer to Section 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 WORK BY OWNER

- A. Prior to awarding this Contract the Owner has entered into separate Contracts for Asbestos Abatement and Telephone Communications.

1.04 WORK SEQUENCE

- A. Prior to asbestos abatement and under the supervision of the Owner's Asbestos Abatement Contractor / Consultant, the Contractor shall remove the existing lay-in acoustical ceiling and tracks along with lighting fixtures and duct work. Materials containing asbestos (plaster on the underside of concrete floor slab) shall not be disturbed by this Work.

- B. As soon as the ceiling has been removed the Contractor's Electrical Subcontractor and the Owner's Telephone Communications Contractor, under the Owner's Asbestos Abatement Contractor / Consultant supervision, shall begin securing, tagging and labeling all electrical and telephone lines. Materials containing asbestos (plaster on the underside of concrete floor slab) shall not be disturbed by this Work.
- C. After all electrical and telephone lines have been secured the Asbestos Abatement Contractor shall seal that portion of the building and began the asbestos removal. The General Contractor will be able to perform demolition in the remaining portion of the building. After abatement has been completed the Asbestos Abatement Contractor shall unseal that portion of the building and notify the Contractor that he can begin work in this part of the building as well.

1.05 COORPORATION BETWEEN CONTRACTORS

- A. The Contractor shall coordinate the Work with Owner's separate Contractors. Refer to Section 01355 – Renovation Project Procedures for Project coordination, demolition, cutting and patching.

1.05 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.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

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.

1.02 APPLICATION FOR PAYMENT

A. Format:

1. Applications for Payments will be prepared on AIA forms G702-Application and Certificate for payment and G703-Continuation Sheet; or, a computer generated form containing similar data may be used.

B. Preparation of Application:

1. Present required information in type written form.
2. Execute certification by signature of authorized officer.
3. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of Work performed and for stored products.
4. List each authorized Change Order as an extension on continuation sheet, listing Change Order 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 6 copies of each Application for Payment to the Project Engineer.
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, or as may be directed otherwise.

D. Substantiating Data:

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

1.03 STATEMENTS AND PAYROLLS

A. The submission by the Contractor of the actual weekly payrolls showing all employees, hours worked, hourly rates, overtime hours, etc., or copies thereof, is not required to be turned in. However, each Contractor and Subcontractor shall preserve weekly payroll records for a period of three years from the date of Contract completion. All Contractor personnel working at the project site will be paid unconditionally and not less often than once a week without subsequent deduction or rebate on any account, except such payroll deductions as are permitted by regulations, the full amounts of wages and bona fide fringe benefits due at time of payment.

- B. The payroll records shall contain the name, 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.

1.04 BASIS OF PAYMENT

A. This Work will be paid for by Contract Sum for the construction of the Sloped Metal Roof & Modifications to HVAC for District Two Headquarters at Batesville, Panola 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 these improvements, 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:

MDOT Project Number BWO-2001-54(008) 501635

Lump Sum

TOTAL PROJECT CONTRACT SUM

LUMP SUM

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01295

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Scope: Submit 6 copies of the Schedule of Values to the MDOT Architect, with a copy of the Transmittal Letter to the Project Engineer, at least 10 days prior to submitting first Application for Payment. Upon Project Engineer's request, support the values given with data substantiating their correctness. Payment for materials stored on site will be limited to those listed in Schedule of Unit Material Values (refer to Article 9 of the Supplementary Conditions for requirements). Use Schedule of Values only as basis for contractor's Application for Payment.
- B. The 6 copies of the Schedule of Values will be reviewed as Submittal #1. A copy of this submittal will be reviewed by the Architect and Mechanical / Electrical Consultants. One copy will be retained by MDOT Architectural Services, one by Mechanical / Electrical Consultants, one sent to Contract Administration for use in reviewing requests for Permission to Sub-Contract, one sent to the Project Engineer, and two returned to the Contractor. If any extra copies are needed for the Contractor, adjust number submitted.
- C. Form of Submittal: Submit typewritten Schedule of Values on AIA Document G703-1992, using Table of Contents of this Specification as basis for format for listing costs of Work for Sections under Divisions 2- 16. Identify each line item with number and title as listed in Table of Contents of this Specification.
- D. Preparing Schedule of Values:
 - 1. Itemize separate line item costs for each of the following general cost items: Performance and Payment Bonds, field supervision and layout, Contingency Allowance, temporary facilities and controls, and closeout documents.
 - 2. Itemize separate line item cost for Work required by each Section of this specification. Breakdown installed cost with overhead and profit.
 - 3. For each line item, which has installed value of more than \$20,000, break down costs to list major products for operations under each item; rounding figures to nearest dollar. Make sum of total costs of all items listed in schedule equal to total Contract Sum.
- E. Review and Re-submittal: After Project Engineer's review, revise and resubmit schedule in same manner if requested.

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. 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 MDOT Architect 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 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 (Not Used)

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.
 - 5. Indicate date to start demolition so Owner can anticipate date the building has to be vacant. Demolition will not be allowed to start if Contractor anticipates lengthy amount of time before next phase of Work can start.
 - 6. Indicate interruptions in power and telephone / communication services. The telephone service to this building services other buildings in the Complex. Written permission shall be requested by Contractor and coordinated by Project Engineer well in advance of any outages. They shall be scheduled for weekends.
- 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 within 15 days after date of Notice to Proceed.
 - 2. Submit periodically updated schedules accurately depicting progress to first day of each month.
 - 3. Submit 2 copies.
- 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 shop drawings, product data, and samples required by Specification Sections to the MDOT Architectural Services Unit. 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 illustrates actual portions of the Work; showing fabrication, layout, setting or erection details. Reproductions of the Contract Drawings will **NOT** be acceptable. Minimum requirements for shop drawings shall include the following:
1. Prepared by a qualified detailer.
 2. Identify details by reference to sheet and detail numbers shown on Contract Drawings.
 3. Minimum sheet size: 8-1/2 inches by 11 inches.
 4. 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 8 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 MDOT Architectural Services Unit.
- D. Samples: Provide physical examples to illustrate materials, equipment or workmanship and to establish standards by which completed Work is judged.
1. Provide 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 MDOT 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 MDOT Architect 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 MDOT Architect 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's / Consultant's stamp and initials indicating review.
 8. After MDOT Architect's / Consultant's review, distribute copies.
- G. Submission Requirements:
1. Schedule submission with ample time given to review submittals prior to being needed.
 2. Submit 8 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, Mechanical / Electrical Consultant's File, 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. MDOT Architectural Services Unit will forward one copy to the Project Engineer, one copy to the Consultant Engineer (if plumbing, mechanical, or electrical), 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, weekend work required for modifications to utilities, 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 within District Complex.
- 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 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.

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.

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.

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.

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.

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 MDOT Architect 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 / MDOT Architect will consider formal written requests from Contractor for substitution of products in place of those specified. Only **ONE** request per product will be allowed. Refer to Section 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 / MDOT Architect's judgment, the product or material is not equal.

PART 2 PRODUCTS
Not Used

PART 3 EXECUTION
Not Used

END OF SECTION
01630-2

MDOT – 2ND District – Panola

Product Options &
Substitution Procedures

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 Owner 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 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 02225

BUILDING DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

- A. Extent of demolition Work is indicated on Drawings. Demolition requires selective removal and subsequent offsite disposal. Temporary facilities for displaced MDOT personnel will be located in existing buildings within District Two Complex. It will be necessary to coordinate locations of materials stored in and around building, and possibly relocate to different locations during the demolition and construction. Use **EXTREME CARE** to ensure that Owner's computer equipment in building are not damaged.
- B. Types of Demolition Work include, but are not limited to the following items:
1. Portions of building structure indicated on Drawings and as required to accommodate new construction.
 2. Removal of portions of exterior brick veneer as indicated on Drawings.
 3. Removal of all or portions of interior finishes as indicated on Drawings or as shown on Finish Schedule to be replaced.
 4. Removal of all exterior building or site items indicated on Drawings to be removed or replaced.
 5. Removal and protection of existing construction material, fixtures and equipment items indicated "salvage".

1.02 REMOVAL WORK SPECIFIED ELSEWHERE

- A. Cutting non-structural concrete floors and walls for piping, ducts, and conduit is included with the Work of the respective mechanical and electrical Divisions 15 and 16 Specification Sections.
- B. Remodeling and patching is included within the respective Sections of Specifications, including removal of materials for re-use and incorporated into remodeling or new construction.
- C. Relocation or removal of pipes, conduits, ducts, fans, and other mechanical and electrical work are specified by respective trades.

1.03 SUBMITTALS

- A. At least 14 calendar days prior to beginning demolition, submit schedule indicating proposed methods and sequence of operations for selective demolition Work to Project Engineer and MDOT Architect for review prior to commencement of Work. Include coordination for shut-off, capping, and continuation of utility services as required.
- B. Provide detailed sequence of demolition and removal Work to ensure **UNINTERRUPTED** progress of Owner's on-site operations.
- C. Coordinate with Owner's access of portions of existing building and with Owner's other requirements. The Computer Rooms on the second floor shall be accessible by limited authorized MDOT personnel at all times.

1.04 JOB CONDITIONS

- A. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished. Conditions existing at time of commencement of Contract will be maintained by Owner insofar as practicable. However, variations within structure may occur by Owner's operations prior to start of selective demolition Work.

- B. Partial Demolition and Removal: Items indicated to be removed but of salvable value to Contractor may be removed from structure as Work progresses. Items indicated to be removed and turned over to Owner are to be removed from structure as Work progresses and stored as directed by Owner. Items requested at time of Pre-Construction Meeting to be turned over to Owner are to be removed from structure as Work progresses and stored as directed by Owner. Transport salvaged items not indicated to be turned over to Owner from site as they are removed. Storage or sale of removed items not indicated to be turned over to Owner on site will not be permitted.

1.05 PROTECTIONS

- A. Provide temporary barricades and other forms of protection as required to protect Owner's personnel from injury due to selective demolition Work.
- B. Provide protective measures as required providing free and safe passage of Owner's personnel to and from portions of building where computer equipment is to remain.
- C. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished, and adjacent facilities or work to remain.
- D. Protect from damage existing finish Work that is to remain in place, including painted mural on Conference Room wall, and becomes exposed during demolition operations.
- E. Protect walls and floors with suitable coverings when necessary. See Finish Schedule for finishes to be replaced.
- F. Construct temporary insulated solid dustproof partitions where required to separate areas where extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks if required.
- G. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces, and installation of new construction to insure that no water leakage or damage occurs to structure or interior areas of existing building.
- H. Remove protections as Work progresses.

1.06 DAMAGES: Promptly repair damages caused to adjacent facilities by demolition Work at no cost to Owner.

1.07 TRAFFIC

- A. Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, corridors, and other adjacent occupied or used facilities.
- B. Do not close, block or otherwise obstruct streets, drives, walks, entrances, canopies, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by Owner.

1.08 EXPLOSIVES: Use of explosives will not be permitted.

1.09 UTILITY SERVICES

- A. Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.
- B. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and governing authorities.

1.10 ENVIRONMENTAL CONTROLS

- A. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.
- B. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 PRODUCTS
Not Used

PART 3 EXECUTION

3.01 INSPECTION: Prior to commencement of selective demolition work, inspect areas in which Work will be performed. Photograph or video existing conditions to structure surfaces, equipment or to surrounding properties which could be misconstrued as damage resulting from selective demolition Work; file with Project Engineer prior to starting Work.

3.02 PREPARATION

- A. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain. Cease operations and notify the Project Engineer immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
- B. Erect and maintain dust-proof partitions and closures as required preventing spread of dust or fumes to any occupied portions of the building.
- C. Provide weatherproof closures for exterior openings resulting from demolition Work.
- D. Locate, identify, stub out and disconnect utility services that are to remain. Provide by-pass connections as necessary to maintain continuity of service to occupied areas of other buildings on site. Provide minimum of 14 calendar days advance notice to Owner if shutdown of service is necessary during changeover. Schedule electrical shut-offs to begin at 6:00 a.m., Saturdays, unless indicated otherwise by Project Engineer. Fridays may also be allowed, if necessary, but with prior written Project Engineer approval.

3.03 DEMOLITION

- A. Perform selective demolition Work in a systematic manner. Use such methods as required to complete Work indicated on Drawings in accordance with demolition schedule and governing regulations. Schedule demolition at times acceptable to the Owner, which may include after-hours or weekends.
- B. All cutting and patching shall be done in such a manner that at all times the building shall remain dust free and dry at no additional cost to the Owner. All patching upon completion shall meet the following requirements:
 - 1. Blend with the existing materials to remain.
 - 2. Shall be painted.
 - 3. Shall have trim, gaskets, and / or sealant for water and vermin tight construction.
- C. Caution and protective measures shall be used and in place before cutting of any metal or other materials that might spark a fire from combustible oils, dusts, rags, etc.

- D. Demolish concrete in small sections. Cut concrete at junctures with construction to remain using power-driven masonry saw or hand tools. Do not use power-driven impact tools.
 - E. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
 - F. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.
 - G. If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Project Engineer in written, accurate detail. Pending receipt of directive from Owner's representative, rearrange selective demolition schedule as necessary to continue overall job progress without delay.
 - H. Cooperation between Contractors shall be required for asbestos abatement, existing communication / data wiring, and existing electrical wiring. MDOT has contracted with separate Asbestos and Communication Contractors. Contact Project Engineer, in writing, minimum of seven (7) days prior to start of demolition in existing addition. During demolition and before any new construction occurs the Asbestos Abatement Contractor will remove existing ceilings to allow access to plaster on deck above. Communication Contractor will need access to label and roll up all communication wiring in building to centralized confined locations. The Electrical Sub-Contractor will need to disconnect and remove existing ceiling lighting. Allow twenty-one (21) days for this Work to be performed. Notify Project Engineer, in writing, if the wiring is not in acceptable locations for other Work to proceed. Additional wiring uncovered during demolition will be removed within seven (7) days upon notification, in writing, to the Project Engineer.
- 3.04 SALVAGE MATERIALS
- A. Where indicated on Drawings as "Salvage" or "To be Reused", carefully remove indicated items, clean, store as directed, and protect for later reuse and installation.
 - B. As directed in the Pre-Construction meeting as specific items to be salvaged and given to the Owner, carefully remove indicated items and store where directed by Project Engineer.
- 3.05 DISPOSAL OF DEMOLISHED MATERIALS
- A. Remove debris, rubbish and other materials resulting from demolition operations from building site. Transport and legally dispose of materials off site.
 - B. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.
 - C. Burning of removed materials is not permitted on project site.
 - D. Contractor is required to provide a dumpster for this Project and is not to use the Owners dumpster at any time. Location of the Contractor's dumpster is to be coordinated with the Project Engineer.
- 3.06 CLEAN-UP AND REPAIR
- A. Upon completion of demolition Work, remove tools, equipment and demolished materials from site. Remove protections and leave interior areas broom clean.
 - B. Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition Work. Repair adjacent construction or surfaces soiled or damaged by selective demolition Work.

END OF SECTION

SECTION 02315

EXCAVATION, FILLING AND GRADING FOR BUILDING

PART 1 GENERAL.

- 1.01 SECTION INCLUDES: The extent of excavation, filling and grading is shown on the Drawings. Preparation of subgrade for building slabs is included as part of this Work. Backfilling of trenches within the building lines is included as part of this Work.
- 1.02 RELATED SECTIONS
- A. Section 01455 – Testing Laboratory Services.
 - B. Section 02300 – Earthwork.
- 1.03 SUBMITTALS: Notification shall be provided to Project Engineer indicating source of borrow material in advance of start of Work and certification provided that proposed soil material is satisfactory for specified use.
- 1.04 QUALITY ASSURANCE
- A. Perform excavation Work in compliance with applicable requirements of governing authorities having jurisdiction.
 - B. Compaction density shall be 95 percent of the maximum dry density value as determined by ASTM D 698 (Standard Proctor Test) of AASHTO T-99.
 - C. Soils compaction control tests shall be performed as specified herein and under Section 01455 – Testing Laboratory Services. Stability is defined as absence of significant yielding or pumping of soils under compaction effort.
 - D. Number of Tests: Make test(s) in accordance with AASHTO T-99 for each class of material. Make in-place density tests in accordance with AASHTO T-238 (Nuclear Method) for density tests, as the fill and backfill work progresses. At least one test per lift of any isolated portions and each footing.
 - E. Work on Non-Tested Areas: Placing permanent construction over fill that has not been tested and approved may require removal of permanent Work, recompacting the fill and replacing the Work at no additional cost to the Owner.
- 1.05 EXISTING UTILITIES
- A. Locate existing underground utilities in the areas of Work. If utilities are to remain in place, provide adequate means of protection during earthwork operations. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the Utility Owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 - B. Do not interrupt existing utilities serving facilities occupied and used by Owner or others except when permitted in writing by Project Engineer and then only after acceptable temporary utility services have been provided. Demolish and completely remove from site existing underground utilities indicated "To Be Removed". Coordinate with utility companies for shut off of services if lines are active.

- 1.06 PROTECTION OF PERSONS AND PROPERTY: Barricade open excavations occurring as part of this Work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction. Protect structures, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
- 1.07 USE OF EXPLOSIVES: The use of explosives is not permitted.

PART 2 PRODUCTS

- 2.01 BACKFILL AND FILL: Select fill shall be an approved select material free from trash, debris, stones larger than 3 inches, roots and other organic matter.
- 2.02 GRANULAR FILL
 - A. Below existing natural grade line: Sandy clay with a liquid limit less than 45 and PI in range of 10 to 22, or clayey sand with PI not less than 7 and liquid limit not greater than 35.
 - B. Above existing natural grade under slabs and footings: Silty or sandy clay as above or clayey-sand with LL less than 35 and PI of 3 to 15.

PART 3 EXECUTION

- 3.01 INSPECTION: Examine the areas and conditions under which excavating, filling, and grading are to be performed and notify the Contractor, in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.
- 3.02 EXCAVATION
 - A. Excavation consists of removal and disposal of material encountered when establishing required grade elevations.
 - B. Earth excavation includes removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.
 - C. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Project Engineer. Unauthorized excavation, as well as remedial Work directed by the Project Engineer, shall be at the Contractor's expense. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Project Engineer.
 - D. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Project Engineer.

- E. Additional Excavation: When excavation has reached required subgrade elevations, notify the Project Engineer who will make an inspection of conditions. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by the Project Engineer. Removal of unsuitable material and its replacement as directed will be paid on the basis of contract conditions relative to changes in work.
 - F. Stability of Excavations. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
 - G. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross braces, in good serviceable condition. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.
 - H. Dewatering: Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrade and foundations.
 - 1. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
 - 2. Convey water removed from excavations and rainwater to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.
- 3.03 MATERIAL STORAGE: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage. Locate and retain soil materials away from edge of excavations. Dispose of excess soil material and waste materials as herein specified.
- 3.04 EXCAVATION FOR STRUCTURES: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete.
- 3.06 EXCAVATION FOR TRENCHES: Dig trenches to the uniform width required for the particular item to be installed, sufficiently wide to provide ample working room. Excavate trenches to the depth indicated or required. Carry the depth of trenches for piping to establish the indicated flow lines and invert elevations. Beyond the building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.
- A. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for the entire body of the pipe. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and which are carried below the bottom of such footings, or which pass under wall footings. Place concrete to the level of the bottom of adjacent footings.

- B. Do not backfill trenches until tests and inspections have been made and backfilling authorized by the Project Engineer. Use care in backfilling to avoid damage or displacement of pipe systems.
- 3.07 COLD WEATHER PROTECTION: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.
- 3.08 COMPACTION: Control soil compaction during construction providing minimum percentage of density specified for each area classification. Mechanical Equipment Slabs: Compact top 12 inches of subgrade and each layer of backfill or fill material at 95 percent maximum dry density.
- 3.09 MOISTURE CONTROL: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
- 3.10 BACKFILL AND FILL: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.
- A. Under buildings use sub-base material, or satisfactory excavated or borrow material, or combination of both. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Acceptance by Project Engineer of construction below finish grade including, where applicable, dampproofing, waterproofing, and soil treatment.
 - 2. Inspection, testing, approval, and recording locations of underground utilities.
 - 3. Removal of concrete formwork, shoring and bracing, and backfilling of voids with satisfactory materials.
 - 4. Removal of trash and debris.
- 3.11 GROUND SURFACE PREPARATION: When existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break up the ground surface, pulverize, moisture condition to the optimum moisture content, and compact to required depth and percentage of maximum density.
- 3.12 PLACEMENT AND COMPACTION: Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- A. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 - B. Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each lift.
- 3.13 GRADING: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

- A. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:
 - B. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2 inch when tested with a 10-foot straightedge.
- 3.14 COMPACTION: After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.
- 3.15 MAINTENANCE
- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
 - B. Reconditioning Compacted Areas: Where subsequent construction operations or adverse weather disturbs completed compacted areas, scarify surface, re-shape, and compact to required density prior to further construction.
- 3.16 DISPOSAL OF EXCESS AND WASTE MATERIALS: Remove waste materials, including unacceptable excavated material, trash and debris, and dispose of it off the Owner's property.

END OF SECTION

SECTION 02775 CONCRETE SIDEWALKS

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Concrete sidewalks.
- 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.
- 2.01 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.
- 2.02 CONCRETE MATERIALS: Comply with requirements of applicable Division 3 Sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.
- 2.03 EXPANSION JOINT MATERIALS: Comply with requirements of Section 07920 for performed expansion joint fillers and sealers.
- 2.04 CONCRETE MIX DESIGN: All concrete shall have 3,500-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 FORMS AND ACCESSORIES

PART 1 GENERAL

- 1.01 SECTION INCLUDES: All concrete formwork and other related items necessary to complete project indicated by Contract Documents unless specifically excluded.
- 1.02 RELATED ITEMS SPECIFIED ELSEWHERE
 - A. Section 03200 – Concrete Reinforcement.
 - B. Section 03300 – Cast-in-Place Concrete.
- 1.03 PROJECT CONDITIONS: Contractor shall examine the substrate over which concrete forms are installed and advise the Project Engineer of conditions detrimental to the installation of concrete formwork. Do not proceed until unsatisfactory conditions have been corrected.

PART 2 PRODUCTS

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

PART 3 EXECUTION

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

3.02 INSERTS AND FASTENING DEVICES FOR OTHER WORK

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

3.03 FORM REMOVAL

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

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

- 1.01 SECTION INCLUDES: All concrete reinforcing and the related items necessary to complete the Project indicated by the Contract Documents unless specifically excluded.
- 1.02 RELATED ITEMS SPECIFIED ELSEWHERE
- A. Section 03100 – Concrete Forms and Accessories.
 - B. Section 03300 – Cast-in-Place Concrete.
- 1.03 SUBMITTALS
- A. Submit reinforcing steel shop drawings and materials list prior to placement for MDOT Architect's approval. Shop drawings shall include complete placing plans, order lists, bend diagrams and details showing dimensions with clearances.
 - B. Furnish mill certificates for steel bar reinforcement, to the Project Engineer certifying that each shipment meets specifications. The fabricator will furnish certificates with bar lists to designate location of shipment and the time steel is delivered to the project.
- 1.04 QUALITY ASSURANCE
- A. Reinforcing bars shall conform to ASTM A 615 "Deformed Billet-Steel Bars for Concrete".
 - B. Mesh reinforcement shall conform to ASTM A 185 "Welded Steel Wire Fabric for Concrete Reinforcement".
 - C. Accessories shall conform to American Concrete Institute ACI 301 "Specifications for Structural Concrete for Buildings".
 - D. Placement shall be in accordance with approved shop drawings and ACI 318 "Standard Building Code Requirements for Reinforced Concrete".
 - E. Comply with ACI 315 "Manual of Standard Practice of Detailing Reinforced Concrete Structures".
- 1.05 DELIVERY, STORAGE, AND HANDLING
- A. Reinforcing bar steel and mesh shall be handled, shipped and stored in a manner that will prevent distortion or other damage.
 - B. Materials shall be stored in a manner to prevent excessive rusting and fouling with dirt, grease, or other bond-breaking coatings.
- 1.06 PROJECT CONDITIONS: Placement of concrete reinforcing shall be coordinated with installation of concrete formwork, vapor barriers, concrete inserts, conduit and all other items occurring in the area.

PART 2 PRODUCTS

- 2.01 STEEL BAR REINFORCEMENT: Bar reinforcement shall conform to ASTM A 615, grade 60, of domestic manufacture. Bars shall be new; free from rust, scale, oil, or other coatings that will prevent bond.
- 2.02 WELDED STEEL WIRE FABRIC: Shall conform to ASTM A 185, new, free from rust and other coatings that will prevent bond.
- 2.03 ACCESSORIES: Metal accessories as required shall support reinforcing bars and comply with ACI 315. Chairs and bolsters for use in exposed concrete shall have plastic coated or stainless steel legs or shall be plastic.

PART 3 EXECUTION

3.01 INSTALLATION

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

END OF SECTION

SECTION 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 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 05500

METAL FABRICATION

PART 1 GENERAL

- 1.01 SECTION INCLUDES: All miscellaneous metal work. The Work includes, but is not limited to, 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 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.
- 2.04 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 06100

ROUGH 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; plywood and rough hardware.
- 1.02 RELATED SECTIONS
- A. Section 03100 - Concrete Forms and Accessories.
 - B. Section 08710 - Door Hardware.
- 1.03 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.
- 1.04 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.
- 1.05 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.
- 1.06 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.

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 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.

2.05 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.

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 07610

SHEET METAL ROOFING

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Preformed, pre-finished, standing seam metal panels, vented metal soffit panels, vented ridge caps, metal gutters, metal downspouts, batt insulation, sub-framing support members, related accessories, valleys, hips, ridges, eaves, corners, rakes, miscellaneous flashing and attaching devices as shown or required for a complete metal roofing system.
- 1.02 RELATED SECTIONS: Section 09050 – Color Design.
- 1.03 REFERENCES
- A. ASTM A-525 Steel Sheet, Zinc-Coated (Galvanized)
 - B. ASTM E-1646
 - C. ASTM E-1680
 - D. Spec Data Sheet - Galvalume Sheet Metal by Bethlehem Corp.
 - E. SMACNA - Architectural Sheet Metal Manual
- 1.04 SYSTEM DESCRIPTION
- A. Design Criteria: The following standards and criteria shall be used where covered by this specification:
 1. Manual of Steel Construction, American Institute of Steel Construction, 8th Edition.
 2. Cold Formed Steel Design Manual, American Iron and Steel Institute, 1996 Edition.
 3. Low Rise Metal Building Systems Manual, American Iron and Steel Institute, 1996 Edition.
 4. 2003 International Building Code.
 5. Test for Wind Uplift Resistance of Roof Assemblies (1999) Underwriters Laboratories, Inc. UL-90 and for ASTM E-1592-95.
 - B. Design Loads: Design loads shall be developed using the procedures contained in "Design Practice and Building Practices" commentary in the MBMA publication, Low Rise Metal Building Systems Manual. The following data shall be used in developing design loads in addition to dead loads:
 1. Vertical Live Loads: Roof system shall be designed for a 20 PSF live load.
 2. Wind Loads: Basic wind speed of 90 miles per hour.
 3. Other superimposed dynamic and/or static loads such as exhaust fans and air conditioning equipment, shall be considered as part of the design requirements and combined with the normal design (live and wind) loads.
 4. Combination of normal loads and auxiliary loads or design purposes shall be as prescribed and recommended in the 2003 International Building Code.
 5. Framing and structural members shall be cold formed and designed in accordance with Cold Formed Steel Design Manual, AISI – 1996.
 6. Roof and wall panels shall be designed in accordance with Cold Formed Steel Design Manual, AISI – 1996.
 7. Rainfall Intensity: All exterior gutters and downspouts shall be designed for rainfall intensity, based upon a 5 year recurrence interval for 5 minute duration.

1.05 SUBMITTALS

- A. Submit detailed drawings showing layout of roof and soffit panels, sub-framing system, anchoring details, joint details, ventilation, trim, flashing, and accessories. Show details of weatherproofing terminations, and penetrations of metal work. Include structural analysis of the sub-framing system. Shop drawings and structural analysis shall be **Sealed And Signed** by a Professional Engineer, registered in the State of Mississippi.
- B. Submit a two-foot by two-foot representative sample of each type of panel and accessory indicating panels, standing seams, closure, edge trim and flashing complete with factory finish and color if product is not one of those specified.
- C. Submit results indicating compliance with minimum requirements of the Water Infiltration - ASTM E 1646 performance tests.
- D. Submit descriptive data on all material provided including batt insulation and sealants.
- E. Submit manufacturer's recommended installation method showing all requirements for panel installation, sealant application and sub-structural connections.

1.06 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in Architectural Sheet Metal Products with 10 years minimum experience.
- B. Installer: Company specializing in Architectural Sheet Metal Products, with 5 years minimum experience, who has completed work similar to that indicated for this project and with a record of successful in-service performance. Installer shall be certified by the manufacturer as trained and qualified to erect the manufacturer's product.

1.07 DELIVERY, STORAGE AND HANDLING: Upon receipt of panels and other materials, installer shall examine the shipment for damage and completeness. Panels should be stored on edge in a clean, dry place. One end should be elevated to allow moisture to run off. Panels with strippable film must not be stored in the open exposed to the sun. Stack all materials to prevent damage and to allow for adequate ventilation.

1.08 EXISTING CONDITIONS

- A. The Installer shall provide written certification, from an independent Professional Engineer, licensed in the State of Mississippi that the existing structure is capable of supporting all additional loads imposed by the retrofit framing system. The independent Engineer shall confirm the design loads as provided by the manufacturer of the retrofit standing seam metal roof system as being in compliance with all codes.
- B. The manufacturer shall provide stamped and sealed drawings, by an Engineer, licensed in the State of Mississippi indicating the design for the retrofit metal roof assembly as compliant with wind and snow loads. Manufacturer shall provide horizontal and vertical reactions for the new roof system.

1.09 WARRANTY

- A. Paint Finish: Paint finish shall have a 20-year guarantee against cracking, peeling and fade (Not to exceed 5 N.B.S. units per ASTM D2244.68T).
- B. Weather Tightness: The entire installation (sub-framing, clips, roof 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 metal roofing manufacturer and his authorized installer, agreeing to replace / repair defective materials and workmanship during the warranty period with **No Cost** to the Owner.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Drawings and Specifications are based on LOC-SEAM Standing Seam Panels as manufactured by Architectural Metal Systems, 1150 State Docks Road, Eufaula, AL 36027. Phone (888) 621-5020.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Butler Manufacturing Company, Kansas City, MO. Tel. (816) 968-3000.
 - 2. Ceco Building System, Columbus, MS. Tel. (601) 328 6722.
 - 3. Gulf States Manufacturing, Inc., Starkville, MS. Tel. (601) 323-8021.
 - 4. VP Buildings, Memphis, TN. Tel. (901) 748-8000.
- C. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures.

2.02 PREFORMED METAL ROOFING SYSTEM

- A. The roof system shall be a concealed fastener interlocking standing seam system with faced batt insulation between supports and panels.
- B. The concealed attachment system shall eliminate all through penetration of the exposed roofing surface into structural supports and allow the roof covering to move independently of any differential thermal movement by the framing system.
- C. The panel to structural clip shall be designed to provide plus or minus one inch of thermal movement. It shall incorporate a self-centered feather to ensure one-inch movement in both directions.
- D. The standing seam shall have integral male and female interlocking ribs with a factory applied, non-hardening sealant, and the seams shall be continuously locked or crimped together by mechanical means during installation.
- E. Roof panels shall be fastened to the support framing members with a concealed clip or backing device of steel having a protective metallic coating. Through penetration of the roofing surface by exposed fasteners shall occur only for non-structural connection at panel termination and roof perimeter flashing location.
- F. Panel termination and perimeter flashing (attached to roof panels) shall be sealed with sealants recommended by the manufacturer.
- G. Required closures shall be metal. Non-metal closures shall not be acceptable.

2.03 ROOF PANEL MATERIALS

- A. Standing seam roof panels shall have a configuration of 2-inch high vertical rib on 16 - inch centers for roofing. The panel shall have flush horizontal and vertical surfaces to facilitate sealing at terminations. Panel configurations that create voids requiring supple metal closure devices shall not be acceptable. Panels shall be joined at the sidelap with an interlocking seam mechanically locked by a seaming machine after installation. The female panel seam shall have a factory-applied sealant, in compliance with UL-90. Portable roll forming machines can be used only with prior written authorization of Project Engineer.
- B. The panel shall be 24 gage commercially pure aluminum coated steel meeting military specifications MIL-C-4174A Type II, Galvalume. Minimum yield stress shall be 50,000 PSI.

- C. Panels shall have a factory color finish on the exposed side. The exposed finish shall consist of a 70 percent KYNAR 500 resin base coating applied to a cleaned, pretreated and primed surface. Color to be selected by the Project Engineer / MDOT Architect from manufacturer's full range of standard colors. The dry film thickness of the exterior coating shall not be less than 0.9 mil, exclusive of primer. The interior color finish shall consist of a backer coat with a dry film thickness of 0.5 mil. Provide a low gloss finish to minimize the appearance of oil canning.
- D. The roofing manufacturer shall supply the Mechanical Fastening of the New Roof Assembly to the existing structure. The roofing contractor shall perform a pull out test for fasteners to the existing roof assembly. This test shall meet wind uplift requirements for each zone as designed and engineered by the roofing manufacturer.
- E. Exposed roof fasteners shall be cadmium or zinc plated carbon steel with a molded head and a 9/16-inch OD aluminum and bonded EPDM washer. Screw head to match color of roofing sheets. Plastic caps shall not be used. Self-tapping / self-drilling screws shall be #12 by 1-1/4.
- F. Panel clip fasteners shall be cadmium plated carbon steel #12 by 1-1/4 self-drilling screws with hex washer head.
- G. Panel clips for the standing seam panels shall be die formed 24-gage aluminum coated steel. The clip base shall be 18-gage galvanized steel.
- H. Batt insulation shall have a density of 0.6 PCF and shall be 1-7/8 inches thick nominal. Fiberglass insulation facing shall be laminated on one side with white vinyl vapor barrier having a perm rating of 1.3 as determined by ASTM E-96. A minimum R-Value of 5 as determined by ASTM C-518. Provide 3/8 inch to one-inch thick thermal blocks / thermal spacers at all deck supports or as required by manufacturer. The composite facing, adhesive and glass fiber blanket shall have a flame spread rating of 25 or less, smoke developed of 50 or less, determined by ASTM E-84, UL- 723.
- I. Sidelap sealant shall be factory applied butyl base mastic. Its composition shall be 85 to 90 percent solids by weight. Service temperature range shall be minus 60 degrees F to plus 225 degrees F.
- J. Eave and ridge closure sealant shall be a 3/4-inch by 3/16-inch tape mastic. The mastic shall be a non-staining, non-corrosive, non-shrinking, non-oxidizing, non-toxic and non-volatile. Composition shall be 99 percent minimum solids with a butyl base meeting performance standards in Federal Specification TT-C-1796A, Type II, Class B. Service temperature shall be minus 60 degrees F to plus 212 degrees F.
- K. Panel endlaps shall be sealed with a precut tape pad. The material shall be non-staining, non-corrosive, non-toxic and non-volatile. Composition shall be 100 percent solid ethylene propylene copolymer tape meeting performance standards in Federal Specification TT-C-1796A, Type II, Class B. Service temperature shall be minus 60 degrees F to plus 212 degrees F.
- L. Flashing laps shall be sealed with urethane caulk. All caulk shall meet the performance standards in Federal Specification TT-S-0023OC, Type II, Class A.
- M. Wall trim, metal panel flashing, edge trims, rake trim and all exposed components shall have a colored finish to match fascia panels. Materials shall be 24-gage minimum galvanized steel, coating designation G-90, conforming to the requirements of ASTM A446 Grade D. Minimum yield stress shall be 50,000 PSI.

- N. Trim items and flat sheets for on site fabrication not required to have a color finish shall be 24-gage minimum aluminum coated steel, Type II, conforming to the requirements of ASTM A463. Minimum yield stress shall be 50,000 PSI.

2.04 SOFFIT PANEL MATERIALS

- A. Perforated Soffit panels shall be 0.032-inch thick aluminum perforated panel with 12-inch coverage utilizing male/female-interlocking connection. Fasteners shall be concealed.
- B. Finish shall be Kynar 500 (70% PVDF). Color and trims shall be as selected by the Project Architect from manufacturer' full range of standard colors.

2.05 ROOF ACCESSORIES

- A. Openings 8 inches in diameter or smaller may be flashed and sealed to the roof panel by jacks.
- B. Provide flexible preformed "Deck Tight" units at pipes 10 inches in diameter and smaller; at larger than 10 inches diameter, provide curbs as described below.
- C. Metal roof curbs shall be fabricated of 18-gage galvalume material. Shell and base plate assembly shall be fully mitered and welded. The curb shall be provided with a horizontal flanged top projecting a minimum of 8 inches above the weather surface plane. Curb design shall incorporate a built-in water deflector on the up slope side to prevent ponding and direct water around the curb. The base shall fit the roof slope and shall be compatible with the roofing panels. Curb design shall utilize separate cap cells to allow positioning flexibility with roof ribs.
- D. Sealing compounds shall be as specified and supplied by the roofing manufacturer. Closures and fasteners shall conform to the roofing manufacturer's standards compatible with the roof covering furnished.
- E. The space between the new roof and existing roof shall be ventilated with eave, ridge and sidewall vents as detailed on the Drawings.

2.06 ROOF COVERING SUPPORT MEMBERS

- A. The roof covering support members shall be 16-gage (minimum) shop primed steel conforming to the requirements of ASTM A525 with a minimum yield stress of 50,000 PSI. Bracing shall be accomplished with 24-gage galvanized steel strapping coating designation G-90, conforming to the requirements of ASTM A446 Grade D. Minimum yield stress shall be 50,000 PSI.
- B. The configuration and spacing of supports shall be the roofing manufacturer's standard and shall be supported by a structural analysis. Design calculations shall be in accordance with the 1996 AISI Specifications of the design of cold-formed steel structural members.
- C. Deflection of roof covering support members shall not exceed L/180 of its span when supporting the design vertical live and applicable collateral loads and supported on spacings required on this project.
- D. The support members shall be designed to transfer roof dead loads as well as wind uplift loads directly to existing roof framing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Installer shall 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.
- B. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
- C. In areas where the existing roof may have allowed saturation of insulation under the roofing membrane, the roofing membrane shall be slit to allow these areas to dry out.

3.02 INSTALLATION

- A. Comply with Drawings, manufacturer's installation instructions, and conform to standards set forth in the Architectural Sheet Metal Manual published by SMACNA, in order to achieve a completely watertight installation.
 - B. Install panels in such a manner that horizontal lines are true and level and vertical lines are plumb.
 - C. Install starter and edge trim before installing roof panels.
 - D. Remove protective strippable film prior to installation of roof panels.
 - E. Attach panels using manufacturer's standard clips and fasteners, spaced in accordance with approved shop drawings.
 - F. Install sealants for preformed roofing panels as specified on shop drawings.
 - G. Do not allow panels or trim to come into contact with dissimilar materials.
 - H. Do not allow traffic on completed roof. If required, provide cushioned walk boards.
 - I. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.
 - J. Remove and replace all panels or components that are damaged beyond successful repair.
 - K. Panels shall be preformed in continuous lengths. Ribs shall be permanently locked using an electric seamer.
 - L. Gutter supports spaced at maximum 48 inches on center, constructed of same material as gutters.
 - M. Downspout straps shall be spaced 72 inches on center maximum (minimum of 3 per downspout) and be the same material as the downspout.
 - N. Water shall be prevented from entering the building during this Work. This shall involve keeping penetrations sealed, planning the Work to reroof sections and sealing new to old or other precautionary and effective safeguards.
 - O. Make suitable provisions to allow for free expansion and contraction of all Work without causing leaks or rupture. All Work shall be securely fastened and where necessary for strength and/or stiffness, provide suitable reinforcement.
- 3.03 CLEANING: Clean any grease, finger marks, or stains from the panels per manufacturer's recommendations. Remove all scrap and construction debris from the site.

END OF SECTION

SECTION 07840 FIRESTOPPING

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Firestopping as indicated on the drawings, specified herein, and/or required for completion of the work. Firestopping shall be required at all rated fire and smoke "fire barrier" walls and at floors.
- 1.02 SUBMITTALS: Submit manufacturer's product data, specifications and installation procedures for each type of firestopping and accessory required. Submit detailed location where each will be used. Submit UL data for assemblies where shown on the Drawings.
- 1.03 QUALITY ASSURANCE: Penetrations and miscellaneous openings in rated fire and smoke "fire barrier" walls shall be protected in accordance with NFPA 101, Life Safety Code, Chapter 6, Features of Fire Protection. All openings for air-handling ductwork or air movement, pipes, conduits, bus ducts, cables, wires, air ducts, pneumatic tubes and ducts and similar building service equipment that pass through or penetrate in any way a rated fire or smoke "fire barrier" wall or floor shall be protected. All firestopping materials used shall conform to ASTM E814, ASTM E119, and UL 1479 and tested in accordance with NFPA 90A and NFPA 251 as part of a rated assembly.
- A. FIRE AND SMOKE PARTITIONS AND RELATED ASSEMBLIES: Based on Underwriters Laboratories (UL) systems and tests and are designed in accordance with UL fire resistance ratings. Contractor shall comply with the applicable UL requirements for fire and smoke partitions and assemblies shown on the drawings.
- B. Materials not conforming to these firestopping specifications shall not be used. Materials that are not UL rated and approved shall not be allowed. Materials containing asbestos are not acceptable and shall not be used in this project.
- 1.04 DELIVERY, STORAGE, AND HANDLING: Deliver packaged materials in manufacturer's original unopened containers and store in weathertight enclosure. Handle and store all materials so as to prevent inclusion of foreign materials, breakage or damage by water.
- 1.05 WORKMANSHIP: Materials and workmanship not conforming to provisions of the specifications and manufacturer's printed instructions shall be rejected at any time during the course of the work. Rejected materials shall be removed from the site at the time of rejection. Rejected workmanship shall be corrected immediately after rejection.

PART 2 PRODUCTS

- 2.01 ACCEPTABLE MANUFACTURERS
- A. Equivalent products by the following manufacturers are acceptable:
1. Hilti, Inc., Tulsa, OK, Tel. (800) 879-8000.
 2. International Protective Coatings Corp, Hatfield, PA, Tel. (800) 334-8796.
 3. 3M Fire Protection Products, Saint Paul, MN, Tel. (800) 328-1687.
 4. United States Gypsum Company, Chicago, IL, Tel. (880) 874-4968.
- B. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures.

- 2.02 SEALANT: Equal to Hilti, Inc. FS-One.
- 2.03 CAULKING AND PUTTY: Equal to 3M Brand Fire Barriers CP- 25 Caulk and Putty 303.
- 2.04 PENETRATION SEALANTS: Equal to 3M Fire Barrier Penetration Sealing Systems 7902 and 7904 series as required.
- 2.05 INSULATION: Equal to United States Gypsum Company "Therafiber" Safing Insulation, 4 pcf density, unfaced.
- 2.06 INTUMESCENT FIRESTOPPING: Equal to Hilti, Inc. FS-One, CP 642 and FS 657 Fire Block as required.
- 2.07 ACCESSORIES: Provide backing / filling materials, retainers, collars, clamps, sleeves, primers and other necessary items of types and duration required by regulatory requirements and / or as recommended by product manufacturer for the specific substrates, surfaces and applications.
- 2.08 FINISHES
 - A. Concealed locations: Manufacturer's Standards.
 - B. Exposed to View Locations: "Custom" Colors as selected by Project Architect unless Manufacturer's Standards closely matches finish of penetrated surfaces.

PART 3 EXECUTION

- 3.01 INSTALLATION: Installation of firestopping materials for small openings, cracks, crevices, and penetrations shall be in accordance with manufacturer's printed instructions.
 - A. Verify application required and location for each type of firestopping to be used and conform to manufacturer's exact instructions for specific applications.
 - B. After installation of all Work, including but not limited to ductwork, fire and smoke dampers, communication cabling, electrical conduit, etc., properly seal all openings, cracks, crevices and penetrations throughout the entire project, to maintain fire ratings shown.
 - C. Install fireproof sealant at all penetrations through rated walls and floors and at top and bottom on each side of rated walls.
 - D. Install approved metal sleeves with fireproof sealant at all communication and control wiring passing through rated walls throughout the entire project.
 - E. Install firestopping at fire and smoke walls and floors where construction passes through those areas.

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, P.O. Box 994, Midland, MI 48686. Tel: (800) 322-8723
 - 2. GE Silicones, Hudson River Rd. Building 25-73, Waterford, NY 12188. Tel: (518) 233-2639.
 - 3. Sonneborn Building Products, 889 Valley Park Drive, Shakopee, MN 55379. Tel: (800) 433-9517.
 - 4. Tremco, Inc., 3735 Green Road, Beachwood, OH 44122. 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 Urexpam 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. Steel louvers for hollow metal doors (where required).
 - 6. Factory prime painting of Work in this Section.

1.02 RELATED SECTIONS

- A. Section 08710- Door Hardware.
- B. Section 08800-Glazing.
- 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, location of cut-outs for hardware, glazing and louvers (if required).

- C. Samples (not required for named products):
 - 1. Submit hollow metal frame, corner section of typical frame, of sufficient size to show corner joint, hinge reinforcement, dust cover boxes, anchors, and floor anchors.
 - 2. Submit hollow metal door section of typical door, of sufficient size to show edge, top and bottom construction, insulation, hinge reinforcement, face stiffening, corner of vision opening construction, glazing beads, corner of louver opening construction (if required).
- 1.05 PRODUCT IDENTIFICATION: Deliver doors and frames and other work of this section properly tagged and identified.
- 1.06 DELIVERY, STORAGE, AND HANDLING
 - A. Deliver, store and handle all metal doors and frames in a manner to prevent damage and deterioration.
 - B. Provide packaging, separators, banding, spreaders, and individual wrappings as required to completely protect all metal doors and frames during transportation and storage.
 - C. Store doors upright, in a protected dry area, at least 4 inches off the ground and with at least 1/4 inch air space between individual pieces, protect all pre-finished and hardware surfaces.

PART 2 PRODUCTS

- 2.01 ACCEPTABLE MANUFACTURERS
 - A. Drawings and specifications are based on products manufactured by Steelcraft Manufacturing Company, 9017 Blue Ash Road, Cincinnati, OH 45242 Tel. (513) 745-6400.
 - B. Equivalent products by the following manufacturers are acceptable:
 - 1. Amweld Building Products, Inc., Garrettsville, OH. Tel. (330) 527-4385.
 - 2. Ceco Door Products, Brentwood, TN. Tel. (615) 661-5030.
 - 3. Republic Builders Products, McKenzie, TN, Tel. (901) 352-3383.
 - C. Substitutions shall fully comply with specified requirements and Section 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

- A. Frames for exterior openings shall be made of commercial grade 14 gage minimum cold rolled steel conforming to ASTM A366-68 with a zinc coating conforming to ASTM A653, with a coating designation of A60 or G60 and a minimum coating thickness of 0.60 oz. per sq. ft. minimum. Frames for interior openings shall be commercial grade cold rolled steel conforming to ASTM A366-68 or commercial grade hot rolled and pickled steel conforming to ASTM A569-66T. Metal thickness shall be 16 gage for frames in openings 4 feet or less in width; 14 gage for frames in openings over 4 feet in width.
- B. Design and Construction: Frames shall be custom made welded units with integral trim, of the sizes and shapes shown on approved shop drawings. Knocked-down frames will not be accepted. Finished work shall be strong, rigid, and neat in appearance, square, true and free of defects, warp or buckle. Molded members shall be clean cut, straight and of uniform profile throughout their lengths. Jamb depths, trim, profile and backbends shall be as shown on Drawings. Corner joints shall have contact edges closed tight, with trim faces mitered and continuously welded, and stops mitered. The use of gussets will not be permitted.
1. Stops shall be 5/8 inch deep. Cut-off (sanitary or hospital type) stops, where scheduled, shall be capped at 45 degrees at heights shown on drawings, and all jamb joints below cut-off stops shall be ground and filed smooth, making them imperceptible. Do not cut off stops on frames for soundproof, lightproof or lead-lined doors.
 2. When shipping limitations so dictate, frames for large openings shall be designed and fabricated for field splicing by others.
 3. Frames for multiple or special openings shall have mullion and / or rail members which are closed tubular shapes having no visible seams or joints. All joints between faces of abutting members shall be securely welded and finished smooth.
 4. Hardware reinforcements: Frames shall be mortised, reinforced, drilled and tapped at the factory for fully templated mortised hardware only, in accordance with approved hardware schedule and templates provided by the hardware supplier. Where surface-mounted hardware is to be applied, frames shall have reinforcing plates. Frames shall be reinforced for closers. Minimum thickness of hardware reinforcing plates shall be as follows:
 - a. Hinge and pivot reinforcements - 7 gage, 1 1/4 inches by 10 inches minimum.
 - b. Strike reinforcements - 12 gage.
 - c. Flush bolt reinforcements - 12 gage.
 - d. Closer reinforcements - 12 gage.
 - e. Reinforcements for surface-mounted hardware - 12 gage.
 5. Floor anchors: Floor anchors shall be securely welded inside jambs for floor anchorage. Where required, provide adjustable floor anchors, providing not less than 2 inches height adjustment. Floor anchors shall be 14-gage minimum.
- C. Finish: After fabrication, tool marks and surface imperfections shall be removed, and exposed faces of welded joints shall be dressed smooth. Frames shall be chemically treated to insure maximum paint adhesion and coated on accessible surfaces with rust-inhibitive primer complying with FS-TT-P-57 (Type II) or FS-TT-P-659 with 2.0 mils minimum thickness. Fully cure before shipment.

- 2.04 HOLLOW METAL DOORS: 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.
- C. Stiffen face sheets with continuous vertical formed steel sections spanning the full thickness of the interior space between door faces. These stiffeners shall be 22 gage minimum, spaced 6 inches apart and securely attached to face sheets by spot welds 5 inches on center. Spaces between stiffeners shall be sound-deadened insulated full height of door with an inorganic non-combustible batt-type material.
- D. Join door faces at their vertical edges by a continuous weld extending full height of door. Welds shall be ground, filled and dressed smooth to make them invisible and provide a smooth flush surface.
- E. Top and bottom edges of doors shall be closed with a continuous recessed 16 gage minimum steel channel, extending the full width of the door and spot welded to both faces. Exterior doors shall have additional flush closing channel at top edges and, where required for attachment of weather-stripping, a flush closure at bottom edges. Provide openings in bottom closure of exterior doors to permit escape of entrapped moisture.
- F. Edge profiles shall be provided on both vertical edges of doors as follows:
1. Single-acting swing doors - beveled 1/8 inch in 2 inches.
 2. Double-acting swing doors - rounded on 2-1/8 inch radius.
- F. Hardware reinforcements: Doors shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware only, in accord with the approved hardware schedule and templates provided by the hardware supplier. Where surface-mounted hardware (or hardware, the interrelation of which is to be adjusted upon installation - such as top and bottom pivots, floor closures, etc.) is to be applied, doors shall have reinforcing plates. Minimum gages for hardware reinforcing plates shall be as follows:
1. Hinge and pivot reinforcement - 7 gage.
 2. Reinforcement for lock face, flush bolts, concealed holders, concealed or surface-mounted closers - 12 gage.
 3. Reinforcements for all other surface mounted hardware - 16 gage.
- G. Glass moldings and stops:
1. Where specified or scheduled, doors shall be provided with hollow metal moldings to secure glazing by others per glass opening sizes shown on Drawings. Fixed moldings shall be securely welded to door on security side.
 2. Loose stops shall be 20-gage steel, with mitered corner joints, secured to the framed opening by cadmium or zinc-coated countersunk screws spaced 8 inches on center. Snap-On attachments will not be permitted. Stops shall be flush with face of door.

- H. Louvers shall be 16-gage sheet steel, stationary type, closely spaced inverted "V" blade design, flush with face sheets of door, integral with and welded to door. 50 percent free area, unless indicated otherwise on Drawings. Doors with fire-resistive rating, make louvers automatically self-closing with concealed fusible link, lead weight, lever mechanism and other work parts in metal housing.
 - I. 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.
 - J. Flatness: Doors shall maintain a flatness tolerance of 1/16 inch maximum in any direction, including a diagonal direction.
- 2.05 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.
- 2.06 LABELED DOORS & FRAMES
- A. Labeled doors and frames shall be provided for those openings requiring fire protection ratings, and as scheduled on Drawings. Such doors and frames shall be Underwriters' Laboratories, Inc. labeled or other nationally recognized agency having a factory inspection service.
 - B. When door or frame specified to be fire-rated cannot qualify for appropriate labeling because of its design, size, hardware or any other reason, the Project Engineer / Architect shall be advised before fabricating work on that item is started.
- 2.07 HARDWARE LOCATIONS
- A. Hinges:
 - 1. Top – 5 inches from head of frame to top of hinge.
 - 2. Bottom – 10 inches plus 1 inch from finished floor to bottom of hinge.
 - 3. Intermediate, centered between top and bottom hinges.
 - B. Unit and integral type locks and latches – 3'- 2" to centerline of knob.
 - C. Deadlocks – 5'- 0" to centerline of cross bar.
 - D. Panic hardware – 3'-1" to centerline of cross bar.
 - E. Door pulls – 3'-6" to center of grip.
 - G. Push-pull bars – 3'-1" to centerline of bar.
 - H. Arm pulls – 3'-11" to centerline.
 - I. Push plates – 4'- 0" to centerline of plate.
 - J. Roller latches – 3'-9" to centerline.
 - K. All of the above dimensions from paragraph 2.07(B) through 2.07(J) are from finished floor.

2.08 CLEARANCES

- A. Edge clearances:
 - 1. Between doors and frame, at head and jambs - 1/8 inch.
 - 2. At door sills: where no threshold is used - 1/4 inch maximum above finished floor; where threshold is used - 3/4 inch maximum above finished floor.
 - 3. Between meeting edges of pairs of doors - 1/8 inch.
- B. Finished floor is defined as top surface of floor, except when resilient tile or carpet is used, when it is top of concrete slab. Where carpet is more than 1/2 inch thick, allow 1/4 inch clearance.

2.09 PREPARATION FOR FINISH HARDWARE

- A. Hardware supplier shall furnish hollow metal manufacturer approved hardware schedule, hardware templates, and samples of physical hardware where necessary to ensure correct fitting and installation. Include preparation for mortise and concealed hardware.
- B. Provide reinforcements for both concealed and surface applied hardware. Drill and tap mortise reinforcements at factory, using templates. Install reinforcements with concealed connections designed to develop full strength of reinforcements.

2.09 REJECTION

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

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine areas and conditions where hollow metal Work is to be installed and notify Project Engineer of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install hollow metal units and accessories in accordance with approved Shop Drawings, manufacturer's data, and Specifications.
- B. Provide masonry anchorage devices where required for securing hollow metal frames to in-place concrete or masonry construction. Set anchorage devices opposite each anchor location, in accordance with details on final shop drawings and anchorage device manufacturer's instructions. Leave drilled holes rough, not reamed, and free from dust and debris.

- C. Placing frames: Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
1. At wood stud partitions, attach wall anchors to studs with tapping screws. Place frames at fire-rated openings in accordance with NFPA Standard No. 80.
 2. Make field splices in frames as detailed on final Shop Drawings, welded and finished to match factory work.
 3. Remove spreader bars only after frames or bucks have been properly set and secured.
 4. Door installation: Fit hollow metal doors accurately in their respective frames, with the following clearances:
 - a. Jambs and head: 3/32 inch.
 - b. Meeting edges, pairs of doors: 1/8 inch.
 - c. Bottom: 1/4 inch, where no threshold or carpet.
 - d. Bottom: at threshold or carpet: 1/8 inch.
 - e. Place fire-rated doors with clearances as specified in NFPA Standard No. 80.

END OF SECTION

SECTION 08588

ALUMINUM STORM WINDOWS

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Extent of aluminum storm windows is shown on Drawings and in Schedules. Types of aluminum storm windows required include fixed exterior units.
- 1.02 SUBMITTALS
 - A. Product Data: Submit manufacturer's sample warranty, specifications, standard details, and installation recommendations for components of aluminum storm window units required for this project.
 - B. Shop Drawings: Submit Shop Drawings for fabrication and installation of aluminum storm 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 and window finish being supplied.
- 1.05 DELIVERY, STORAGE, AND HANDLING
 - A. Store and handle storm windows in strict compliance with the manufacturer's instructions.
 - B. Protect storm 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 storm 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, deterioration of finish or construction in excess of normal weathering, and defects in weather-stripping, and other components of the Work.

PART 2 PRODUCTS

- 2.01 ACCEPTABLE MANUFACTURERS
 - A. Drawings and Specifications are based on Aluminum Picture Storm Windows as manufactured by Air-Tite Storm Windows and Doors, 4625 Chennault Beach Road, Mukilteo, WA 98275. Tel. (800) 722-4424.
 - B. Equivalent products by the following manufacturers are acceptable:
 - 1. Allied Window, Inc., Cincinnati, OH, Tel. (800) 445-5411.
 - 2. Winstrom Windows, Toluca, IL. Tel. (815) 452-2371.
 - 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 wall thickness of 0.060 inch.
- B. Fasteners: Aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components.
- C. Weather-stripping: Provide nylon pile with closed foam tape on mounting flanges of main frame.
- D. Glass and Glazing Materials: Low-E (enhanced energy savings) with unitized cushion glazing with marine vinyl boot.

2.04 FINISHES: Standard baked-on white enamel paint.

PART 3 EXECUTION

3.01 INSTALLATION: Comply with manufacturer's instructions and recommendations for installation of aluminum storm 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.

3.02 ADJUSTING AND CLEANING: Provide tight fit at contact points and weather-stripping, for weather-tight closure.

- A. Clean completed system promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances from aluminum surfaces.
- B. Provide protective measures and other precautions required to ensure that aluminum storm 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 SECTION INCLUDES: Hardware as shown on the Drawings and in Schedules. Door hardware is hereby defined to include all items known commercially as builders hardware, as required for swing doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame.

- A. The required types of hardware include (but are not limited to) the following:
1. Butts and hinges
 2. Lock cylinders and keys
 3. Closers
 4. Door trim units
 5. Stripping and seals
 6. Thresholds
- B. Items of hardware not definitely specified, but required for the completion and proper operation of the doors, shall be suitable in type, comparable to the type specified for similar openings.
- C. All modifications of hardware required by reason of construction characteristics shall be such as to provide the proper operation or functional features. Contractor shall be fully responsible for checking all details, such as wall trim clearance, bevels, backsets, proper type strike plates, length of spindles, hands of locks, etc., in order that all items of hardware shall fit properly. Hardware for application to metal shall be made to standard templates. Template information shall be furnished to door and frame fabricators and all other trades requiring same, in order that they may cut, reinforce or otherwise prepare in the shop, materials for reception of hardware.
- D. Hardware shall be free from defects affecting appearance and serviceability. Working parts shall be well fitted and smooth working without unnecessary play. All items of hardware shall be delivered to the building site in sufficient time in advance of its requirement for use for inspection prior to installation.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, roughing-in diagrams, and Installation instructions for each type of hardware. Include operating instructions, maintenance information and spare part sources.
- B. Contractor's Hardware Schedule: After all samples have been approved but prior to delivery of hardware, Contractor shall prepare and submit to the MDOT Architect a complete schedule of all finish hardware required. Schedule shall follow requirements of Specifications and shall indicate type, manufacturer's name and number, location and finish of each item required. Approval of schedule will not relieve Contractor of responsibility for furnishing all necessary hardware.
- C. Submit such samples as required by the MDOT Architect for approval. Do not deliver hardware until approval is obtained.

1.03 QUALITY ASSURANCE

- A. Perform work in accordance with the following requirements:
 - 1. ANSI A117.1 – Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
 - 2. NFPA 101.
- B. Hardware Supplier: Company specializing in supplying commercial door hardware with five years documented experience and approved by manufacturer.
- C. Hardware supplier shall have in his employment, an Architectural Hardware Consultant (AHC) in good standing as certified by the Society of Hardware Consultants Council. The Architectural Hardware Consultant shall assist the Contractor in installation procedures.
- D. Templates: The hardware supplier shall provide templates and / or physical hardware to trades as required and in sufficient time to prevent delay in the execution of the Work.

1.04 PACKING AND MARKING: Package each item of hardware and lockset separately in individual containers, complete with screws, keys, instructions and installation template for spotting mortising tools.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Equivalent products by the following manufacturers are acceptable:
 - 1. Corbin Russwin Arch't. Hardware. Berlin, CT. Tel: (800) 543-3658.
 - 2. Hager Companies. Saint Louis, MO. Tel: (800) 325-9995.
 - 3. LCN. Princeton, IL. Tel: (800) 526-2400.
 - 4. McKinney Hinge. Scranton, PA. Tel: (800) 346-7707.
 - 5. Pemko. Ventura, CA. Tel: (800) 283-9988.
 - 6. Rockwood Manufacturing Co. Rockwood, PA. Tel: (800) 458-2424.
 - 7. Schlage Lock Co. Colorado Springs, CO. Tel: (800) 847-1864.
- B. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures.

2.02 KEYING / CYLINDERS

- A. All cylinders and locksets shall be set to the existing masterkey system. Furnish all cylinders & locksets with removable type cores. The removable core system shall be one that uses either temporary construction cores or construction keyed cores operated by a construction key until such time the construction key is rendered inactive by the change key or retractor key.
- B. All cylinders shall be keyed in sets as directed by the Project Engineer. Furnish 3 change keys per lock and 6 masterkeys per set.

2.03 MATERIALS: See Hardware Schedule at end of this Section. Products listed set standard.

PART 3 EXECUTION

3.01 INSTALLATION: Mount hardware units at heights recommended in "Recommended Locations for Builders' Hardware" NBHA, except as otherwise specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by the Project Architect.

- A. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, install each item completely and then remove and store in a secure place during the finish application. After completion of the finishes, re-install each item. Do not install surface-mounted items until finishes have been completed on the substrate.
- B. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- C. Cut and fit threshold and floor covers to profile of door frames, with mitered corners and hairline joints. Join units with concealed welds or concealed mechanical joints.
- D. Screw thresholds to substrate with No. 10 or larger screws, of the proper type for permanent anchorage and of bronze or stainless steel that will not corrode in contact with the threshold metal.
 - 1. At exterior doors, and elsewhere as indicated, set thresholds in a bed of either butyl rubber sealant or polyisobutylene mastic sealant to completely fill concealed voids and exclude moisture from every source.
 - 2. Do not plug drainage holes or block weeps. Remove excess sealant.

3.02 ADJUSTING AND CLEANING: Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Lubricate moving parts with type lubrication recommended by manufacturer (graphite-type if no other recommended). Replace units that cannot be adjusted and lubricated to operate freely and smoothly as intended for the application made.

3.03 SCHEDULE:

HW1 (For Exterior Hollow Metal Doors)

Each Opening Shall Have:

3 – Each Hinges	Hager	BB1279 4 1/2 X 4 1/2 X NRP X 652
1 – Lockset	Schlage	D50RD Rhodes X 626
1 – Closer	LCN	P1460/1460 AL X TBGN
1 – Kickplate	Rockwood	8 X 2 LDW 0.050 X 630 (Mounted push side)
1 – Threshold	Pemko	2005AV
1 – W/Strip	Pemko	303AV
1 – Door Bottom	Pemko	2211AV (for Hollow Metal Doors)
1 – Stop		(As Required)
3 – Silencers		

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 and MDOT Architect shall be contacted for a color selection. Subject to approval of the Project Engineer and 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 Project 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
• 04200 - Existing Brick Walls (Paint)	ICI #476 Golden Wheat	(golden brown)
• 05500 - Miscellaneous Steel	ICI #1094 Olde Hunter Green	(dark green)
• 07610 - Metal Roofing	AMS-Evergreen	(dark green)
• 07610 - Metal Wall Panels	AMS-Evergreen	(dark green)
• 07610 - Metal Soffit Panels	AMS-Light Stone	(light tan)
• 07610 - Met Trim, Gutters & DS	AMS-Evergreen	(dark green)
• 07920 - Joint Sealants	Pecora-Match adjacent lighter color	
• 08100 - Metal Dr & Frames (Ext)	ICI #1094 Olde Hunter Green	(dark green)
• 08100 - Metal Dr & Frames (Int)	ICI # 410 Nutty Brown	(light brown)
• Existing Wood Doors (Int)	ICI # 410 Nutty Brown	(light brown)
• 08588 – Aluminum Storm Windows	Air-Tite- Standard White Enamel	(white)

- 09250 - Gypsum (Walls) ICI #560 Russian White (light tan)
- 09250 - Front Entry (Walls) ICI #476 Golden Wheat (golden brown)
- 09250 - Gypsum (Ceilings) ICI # 2015 White Whisper (white)
- 09653 - Rubber Base Johnsonite #73 Palm Leaf (green)
- 09680 - Carpet Designweave Ravella II-00339 Grand View (green/variegated)

- 10200 – Wall Louvers C/S Group #80 Interstate Green (green)
- 10200 – Dormer Louvers Match AMS-Evergreen (dark green)
- 10260 - Corner Guards C/S Group #253 Parchment (light tan)

PART 3 EXECUTION

- 3.01 EXECUTION: Refer to execution requirements specified in other Sections of this Specification for the specific products listed. Upon written notification and subsequent submittals by the Contractor, any remaining colors, finishes, textures or patterns not included in this Color Design will be selected by the Project Engineer with recommendations from MDOT Architect.

END OF SECTION

SECTION 09250

GYP SUM 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 framing and furring.
 - 2. Drywall finishing (joint tape-and-compound treatment).

1.02 SUBMITTALS: Submit manufacturers 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.

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: 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.

2.04 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.

2.05 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 09510 ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED SECTIONS

- A. Section 07210 – Building Insulation.
- B. Section 09250 – Gypsum Board.
- C. Section 15010 – Mechanical General.
- D. Section 16010 – Basic Electrical Requirements.

1.03 SUBMITTALS

- A. Manufacturer's product specifications, samples, and installation instructions for each acoustical ceiling material required, and for each suspension system, including certified laboratory test reports and other data as required to show compliance with these specifications. Include manufacturer's recommendations for cleaning and refinishing acoustical units, including precautions against materials and methods that may be detrimental to finishes and acoustical performances.

1.04 QUALITY ASSURANCE: Installer shall be a company with not less than 3 years of documented successful experience in installation of acoustical ceilings similar to requirements for this Project and acceptable to manufacturer of acoustical units, as shown by current written statement from manufacturer (required for approval).

1.05 PROJECT CONDITIONS

- A. Do not install interior acoustical ceilings until the following conditions are met:
 - 1. Space is enclosed and weatherproof.
 - 2. Wet work in space completed and nominally dry.
 - 3. Work above ceilings is completed.
 - 4. Ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.
- B. Maintain a light level of a minimum of 50 fc during entire installation.

1.06 PROJECT COORDINATION: It shall be this contractor's responsibility to coordinate with mechanical and electrical trades with respect to their requirements for additional suspension system components. Any additional components required shall be furnished and installed by this contractor.

- 1.07 MAINTENANCE STOCK: At time of completing installation, deliver stock of maintenance material to Owner. Furnish full size units matching units installed, packaged with protective covering for storage, and identified with appropriate labels. Furnish amount equal to 2 percent of acoustical units and exposed suspension installed.

PART 2 PRODUCTS

2.01 ACOUSTICAL PANELS

- A. Provide manufacturer's standard lay-in panels of type recommended by manufacturer for application indicated. Provide sizes shown by reflected ceiling plans or, if not otherwise indicated, 2' by 2' grid-size panels, with white washable finish.
- B. Mineral Fiber Acoustical Tile: Provide units with Intersept Antimicrobial solution (**mold and mildew guard**) not less than 5/8-inch thick and of density not less than 10 pounds per cubic foot, medium-coarse non-directional texture, NRC 0.50 to 0.60, CAC 25 to 33, light reflectance over 75 percent. Products offered by manufacturers to comply with requirements include the following:
1. No. 770 Cortega Square Edge; Armstrong World Industries, Inc.
 2. Van-157 Vantage 10 Trim Edge ; BPB Celotex
 3. No. 560 Fissured Square Edge; U.S. Gypsum Co.

2.02 CEILING SUSPENSION MATERIALS

- A. Comply with ASTM C 635, as applicable to type of suspension system required for type of ceiling units indicated. Coordinate with other work supported by or penetrating through ceilings, including light fixtures, HVAC equipment, and partition system (if any). Structural Class of the system shall be intermediate-duty.
- B. Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table I, Direct Hung.
1. Hanger Wires: Galvanized carbon steel, ASTM A 641, soft temper pre-stretched, yield-stress load of at least 3 times design load, but not less than 12 gage (0.106 inch).
 2. Type of System: Either direct or indirect-hung suspension system, at Contractor's option.
 3. System Manufacturer: Same as acoustical unit manufacturer or one of the following:
 - a. Chicago Metallic Corp. Donn Corp.
 - b. W. J. Haertel Div.; Leslie-Locke.
 - c. National Rolling Mills Co. Roblin Building Products Roper.
 - d. Eastern Building Systems.
- C. Edge Moldings: Manufacturer's standard channel molding for edges and penetrations of ceiling, with single flange of molding exposed, white baked enamel finish unless otherwise indicated.

- D. Exposed Suspension System: Manufacturer's standard exposed runners, cross-runners and accessories, or types and profiles indicated, with exposed cross runners coped to lay flush with main runners. Provide uniform factory-applied finish on exposed surfaces of ceiling suspension system, including moldings, trim, and accessories. Use manufacturer's standard baked enamel finish, white unless otherwise selected by MDOT Architect.

2.03 MISCELLANEOUS MATERIALS

- A. Edge Trim Molding: Metal or extruded PVC plastic, of types and profiles indicated, white finish unless otherwise indicated.
- B. Hold-Down Clips: Where required for wind uplift resistance or fire-resistance rating, provide standard spring steel clips, except provide accessible type at locations indicated on drawings.

PART 3 EXECUTION

- 3.01 COORDINATION: Mechanical and electrical work above suspended ceiling shall be strictly coordinated with the work in this Section.
- 3.02 EXAMINATION: Installer must examine conditions under which acoustical ceiling work is to be performed and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
- 3.03 PREPARATION: Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.
- 3.04 INSTALLATION
 - A. Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire resistance rating requirements as indicated, and industry standards applicable to the Work.
 - B. Install suspension systems to comply with ASTM C 636, with hangers supported only from building structural members. Locate hangers near each end and spaced 4 feet along each carrying channel or direct-hung runner, unless otherwise indicated, leveling to tolerance of 1/8 inch in 12 feet. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices which are secure and appropriate for substrate, and which will not deteriorate or fail with age or elevated temperatures.
 - C. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units. Screw-attach moldings to substrate at intervals not over 16 inches on center and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.

- D. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations. Install hold-down clips in areas indicated, and in areas where required by governing regulations or for fire- resistance ratings; space as recommended by panel manufacturer, unless otherwise indicated or required.

3.05 ADJUSTING AND CLEANING

- A. Adjust sags or twists which develop in the ceiling system and replace parts that are damaged or faulty.
- B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09653

RESILIENT WALL BASE AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient Wall Base and Accessories.
- B. Clean and wax existing resilient floor tile.

1.02 SUBMITTALS

- A. Submit manufacturer's product data and written instructions for recommended installation and maintenance practices for each type of product indicated.
- B. Submit complete line of color samples for selection.

1.03 QUALITY ASSURANCE

- A. Wherever possible, provide resilient base, adhesives, cleaners, polishes and accessories produced by a single manufacturer.
- B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.04 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS – RESILIENT WALL BASE

- A. Drawings and Specifications are based on Resilient Wall Base manufactured by Johnsonite, 16910 Munn Road, Chagrin Falls, OH 44024. Tel. No. (800) 899-8916.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Armstrong Commercial Flooring, Lancaster, PA. Tel. No. (800) 292-6308.
 - 2. Azrock Commercial Flooring, Florence, AL. Tel. No. (800) 558-2240.
 - 3. Flexco, Inc. Tuscumbia, AL. Tel. (800) 633-3151.
 - 4. Mannington Commercial, Salem, NJ. Tel. No. (800) 241-2262.
- C. Alternate manufacturers: Products produced by other manufacturers that fully meet or exceed the specified requirements may be considered under provisions of Section 01630-Product Substitution Procedures.

2.02 RESILIENT BASE

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

2.03 INSTALLATION MATERIALS

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

PART 3 EXECUTION

3.01 EXAMINATION

- A. Installer shall examine the areas and conditions under which resilient flooring, wall base and accessories are to be installed or cleaned and waxed 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 base and accessories to job site conditions for at least 48 hours prior to installation.
- B. Clean substrates to be covered by resilient products immediately before installation.

3.03 INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Install resilient materials after finishing operations, including painting, have been completed and permanent-heating system is operating. Building air temperature and relative humidity must be within limits recommended by manufacturer.
- D. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- E. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- F. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- G. Do not stretch resilient base during installation.

3.04 CLEANING AND PROTECTION

- A. Protection: Protect existing flooring from damage by covering with floor protection paper, plywood or as required to prevent damage during construction. Damaged tile shall be replaced (matching existing color, texture and pattern) at Contractor's expense.
- B. Remove excess adhesive or other surface blemishes, using neutral type cleaners as recommended by manufacturer. Cover resilient products until Substantial Completion.
- C. Finishing Existing Floor Tile: 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 09680

CARPET

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Carpeting and accessories as shown on the Drawings and Schedules.
- 1.02 RELATED SECTIONS: Section 09050 – Color Design.
- 1.03 SUBMITTALS: Submit manufacturer’s sample warranty and technical data to show compliance with requirements. Include laboratory test reports and manufacturer’s certifications and installation / maintenance instructions and recommendations. Submit additional copy of all submittals to installer.
 - A. Test Certifications: Submit independent test reports that products specified comply with the ratings specified in Part 1.04 Quality Assurance and the following:
 - 1. Critical Radiant Flux of Floor Covering Systems test rating in accordance with N.F.P.A. Standard No. 253 - 1984 and ASTM E 648.
 - 2. Flammability of Floor Covering Materials in accordance with C.P.S.C. FF 1 70 or ASTM D 2859.
 - 3. Smoke Density Test of Materials in accordance with N.F.P.A. Standard No. 258 or ASTM E 662.
 - B. Submit two 18 inch x 18 inch samples of each carpet required, and 6 inch lengths of exposed edge stripping.
- 1.04 QUALITY ASSURANCE
 - A. Installer Qualifications: Engage an experienced installer, with 5 years minimum experience, who has completed carpeting work similar to that indicated for this project, and with a record of successful in-service performance. Installer shall be approved by the manufacturer of the carpet specified. Installation shall be under direct supervision of an experienced supervisor thoroughly familiar in this type of work.
 - B. General Standard: Comply with recommendations of “Carpet Specifier’s Handbook” by The Carpet and Rug Institute, which can be reasonably applied to types of carpeting required.
 - C. Product Performance Testing; Flame/Smoke Resistance:
 - 1. National Flammability Std. CPSSD FF1 70 or ASTM D 1859 (Methenamine Pill Test). Result: Pass (Self-Extinguishing).
 - 2. Radiant Panel Test ASTM E 648: For burning under varying radiant energy levels. Result: Class 1, greater than .45 watts/sq./cm.
 - 3. Smoke density test NFPA 258 and ASTM E 662 for measuring optical density of smoke generated in a radiant heat chamber, with and without flame. Result: Pass (Less than 450 smoke develop limit)
- 1.05 PRODUCT DELIVERY AND STORAGE: Deliver carpeting materials in protective wrapping, and store inside, protected from weather, moisture and soiling.

1.06 WARRANTY:

- A. Provide special warranty, signed by Contractor, Installer and Manufacturer (Carpet Mill), agreeing to repair or replace defective materials and workmanship of carpeting work during 1-year warranty period following date of Maintenance Release. Attach copies of product warranties.
- B. Provide 10-year wear warranty.

PART 2 PRODUCTS

- 2.01 CARPET: Each required type of carpet is specified by either carpet data sheet at end of this section or carpet schedule on Drawings.
- 2.02 CARPET FLAMMABILITY: Provide carpet that passes the flammability test of ASTM D 2859 (DOC FF-1-70), Pill Test.
- 2.03 CARPET CUSHIONS: Provide Manufacturer's standard carpet cushion of type, weight and thickness indicated. Refer to drawings for space-to-space variations (if any) in carpet cushion requirements. Provide cushion which passes pill test for flammability, ASTM D 2859 (DOC FF-1-70).
- 2.04 CARPET ACCESSORIES: Provide carpet accessories as hereinafter specified and as required to provide a complete carpeting installation. The cost of carpet accessories shall be included in the contractor's proposal and not included in the allowance.
 - A. Carpet Edge Guard, Nonmetallic: Extruded or molded vinyl or rubber carpet edge guard equal to Model No. 15 as manufactured by Mercer Plastics Company. 1 Jabez Street, Newark, New Jersey. Colors selected by Project Architect from among standard colors available.
 - B. Installation Adhesive: Water resistant type as recommended by carpet manufacturer, and which complies with flammability requirements for installed carpet.
 - C. Seaming Cement: Hot-melt seaming adhesive or similar product recommended by carpet manufacturer, for taping seams and buttering cut edges at backing to form secure seams and prevent pile loss at seams.
 - D. Miscellaneous Materials: As recommended by manufacturers of carpet and other carpeting products; and selected by installer to meet project circumstances and requirements.

PART 3 EXECUTION

3.01 PRE-INSTALLATION REQUIREMENTS

- A. Installer shall examine substrates for moisture content and other conditions under which carpeting is to be installed, and notify Contractor in writing of conditions detrimental to proper completion of the Work. Do not install carpet until detrimental conditions have been corrected.
- B. Clear away debris and scrape up cementitious deposits from surfaces to receive carpeting; vacuum clean immediately before installation.

- C. Check concrete surfaces to ensure no “dusting” through installed carpet; apply sealer where required to prevent dusting.
 - D. Sequence carpeting with other Work so as to minimize the possibility of damage and soiling of carpet during the remainder of the construction period.
- 3.02 INSTALLATION: Comply with manufacturers’ instructions and recommendations for seam locations and direction of carpet; maintain uniformity of direction and lay of pile. At doors, center seams under doors; do not seam in traffic direction at doorways. Extend carpet under open-bottomed obstructions and under removable flanges and furnishings and into alcoves and closets of each space.
- A. Provide cutouts where required, and bind cut edges properly where not concealed by protective edge guards or overlapping flanges. Install carpet edge guard where edge of carpet is exposed; anchor guards to substrate.
 - B. Install carpet by trimming edges, buttering cuts with seaming cement, taping or sewing or taping-and-sewing seams to provide sufficient strength for stretching and continued stresses during life of carpet. Apply seaming cement over stitching on backing, if not covered by tape.
- 3.03 CLEANING AND PROTECTION:
- A. Remove debris, sorting pieces to be saved from scraps to be disposed of. Vacuum carpet using commercial machine with face-beater element. Remove spots and replace carpet where spots cannot be removed.
 - B. Advise Contractor of protection methods and materials needed to ensure that carpeting shall be without deterioration or damage at time of acceptance.
- 3.04 CARPET DATA SHEET: The individual carpet data sheets follow:

Manufacturer:	Designweave
Style Name& Color:	Ravella II Z6369-00339 Grand View
Pile Construction:	Loop Graphics
Face Yarn:	Solution Dyed Nylon / Yarn Dyed Nylon
Tufted Yarn Weight:	26 Ounces
Tufted Pile Height:	7/32 inch high / 2/32 inch low
Gauge:	1/10
Stitched Per Inch:	11.2
Primary Backing:	Polypropylene
Secondary Backing	ActionBac®
Width:	12 ft.
Density:	6,686
Protective Treatment:	Designweave SP
Pattern Repeat:	3/8 inch W by 1/2 inch L
Flammability:	Passes Methenamine Pill Test (DOC ff#1-70)
Flooring Radiant panel:	Meets NFPA Class 1 under ASTM E-648
Wear Warranty	Ten years

END OF SECTION

SECTION 09900

PAINTS AND COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Painting and finishing of exterior and interior exposed items and surfaces throughout the project, except as otherwise indicated. Surface preparation, priming and finish coats specified in this Section are in addition to shop priming and surface treatment specified under other Sections of the Work.
- B. The Work includes field painting of exposed bare and covered pipes and ducts (including color coding), and of hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under the mechanical and electrical Work, except as otherwise indicated.
- C. "Paint" means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
- D. Paint all exposed surfaces whether or not colors are designated in "schedules", except where the natural finish of the material is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas. If color or finish is not designated, the 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 09050 – 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 09050.
- 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 ICI Dulux Paints, 925 Euclid Ave., Cleveland, OH 44115. Tel. (800) 984-5444.
- B. Equivalent products by the following manufacturers are acceptable:
 - 1. Devoe Cleveland, OH. Tel. (888) 265-6753.
 - 2. Benjamin Moore & Company, Montvale, NJ. Tel. (800) 344-0400.
 - 3. Farrell-Calhoun Paint, Memphis, TN. Tel. (901) 526-2211.
 - 4. PPG Architectural Finishes, Inc., Pittsburgh, PA. Tel. (800) 441-9695.
 - 5. Sherwin-Williams Company, NW, Cleveland, OH. Tel. (800) 321-8194.
- C. Substitutions shall fully comply with specified requirements and Section 01630-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 & Zinc Coated Metal
 - 1st Coat – Waterborne Acrylic Primer – ICI Devflex # 4020
 - 2nd Coat – Waterborne Acrylic Semi Gloss Enamel – ICI Devflex # 4206
 - 3rd Coat – Waterborne Acrylic Semi Gloss Enamel – ICI Devflex # 4206
(First coat not required on items that are shop primed.)
 - Not less than 2.5 mils dry film thickness.
2. Painted Brick Wall (Existing)
 - 1st Coat – Surface Filler – ICI Bloxfil # 4000
 - 2nd Coat – Waterborne Primer – ICI Ultra-Hide Gripper # 3210
 - 3rd Coat – Alkyd Semi Gloss Enamel – ICI Ultra-Hide # 1516
 - Apply filler coat at a rate to ensure complete coverage with all pores filled. Not less than 4.0 mils dry film thickness, excluding first coat.

B. Interior Paint Systems are as follows:

1. Gypsum Drywall & Similar Hard Surfaces
 - 1st Coat – Latex Primer – ICI Ultra-Hide # 1030
 - 2nd Coat – Alkyd Semi Gloss Enamel – ICI Ultra-Hide # 1516
 - 3rd Coat – Alkyd Semi Gloss Enamel – ICI Ultra-Hide # 1516
 - Not less than 2.5 mils dry film thickness.
2. Gypsum Drywall & Similar Hard Surfaces (in wet areas)
 - 1st Coat – Waterborne Primer – ICI Ultra-Hide Gripper # 3210
 - 2nd Coat – Polyamide Epoxy Gloss – ICI Tru-Glaze # 4508
 - 3rd Coat – Polyamide Epoxy Gloss – ICI Tru-Glaze # 4508
 - Not less than 4.0 mils dry film thickness.
3. Ferrous & Zinc Coated Metal
 - 1st Coat – Waterborne Acrylic Primer – ICI Devflex # 4020
 - 2nd Coat – Waterborne Acrylic Semi Gloss Enamel – ICI Devflex # 4206
 - 3rd Coat – Waterborne Acrylic Semi Gloss Enamel – ICI Devflex # 4206
 - Not less than 2.5 mils dry film thickness.
4. Painted Woodwork
 - 1st Coat – Alkyd Enamel Undercoat – ICI Ultra-Hide # 1120
 - 2nd Coat – Alkyd Semi Gloss Enamel – ICI Ultra-Hide # 1516
 - 3rd Coat – Alkyd Semi Gloss Enamel – ICI Ultra-Hide # 1516
 - Not less than 2.5 mils dry film thickness.

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. 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: Section 09050 – Color Design.
- 1.03 SUBMITTALS
- A. Product Data: Submit manufacturer's specifications; certified test data, where applicable; and installation instructions for required products, including finishes.
 - B. Shop Drawings: Submit Shop Drawings for the fabrication and erection of louver units and accessories. Include plans, elevations and details of sections and connections to adjoining Work. Indicate materials, finishes, fasteners, joinery and other information to determine compliance with specified requirements.
 - C. Samples: Submit 6-inch square samples of each required finish. Prepare samples on metal of same gage and alloy to be used in Work. Where normal color and texture variations are to be expected, include two or more units in each sample showing limits of such variations.
- 1.04 QUALITY ASSURANCE
- A. Performance Requirements: Where louvers are indicated to comply with specific performance requirements, provide units whose performance ratings have been determined in compliance with Air Movement and Control Association (AMCA) Standard 500.
 - 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. Equivalent products by the following manufacturers are acceptable:
 1. All-Lite Louvers, Mineral Wells, WV. Tel. (304) 489-8113.
 2. Construction Specialties, Inc., Cranford, NJ. Tel. (908) 272-5200.
 3. Ruskin Manufacturing, Kansas City, MO. Tel. (816) 761-7476.
- B. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures

2.02 WALL LOUVERS

- A. Drainable Blade Fixed Louver: 6 inch deep extruded aluminum louver equal to C/S Model A6097. Free area to be 52.1 percent minimum for 48 inches square. Pressure drop to be no more than 0.17-inch of water gage at 1013 FPM in intake direction.
- B. Standard Brick Vent: 4 inch deep vent equal to C/S Model with aluminum through wall duct extension. 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(s) as indicated.

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 Project Engineer / 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 10260

WALL AND CORNER GUARDS

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Vinyl / Acrylic surfaced mounted Corner Guards.
- 1.02 RELATED SECTIONS: Section 09050 – Color Design.
- 1.03 SUBMITTALS
 - A. Product Data: Submit manufacturer's technical data and installation instructions for corner guards.
 - B. Samples: Submit samples of material finishes, profiles and colors for corner guards.

PART 2 PRODUCTS

- 2.01 ACCEPTABLE MANUFACTURERS
 - A. Equivalent products by the following manufacturers are acceptable:
 - 1. Arden Architectural Specialties, Inc., Saint Paul, MN. Tel. (651) 631-1607.
 - 2. Construction Specialties, Inc., Muncy, PA. Tel. (570) 546-5941.
 - 3. Koroseal Wall Protection Systems, Inc., Fairlawn, OH. Tel. (330) 668-7600.
 - B. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures
- 2.02 CORNER GUARDS: Corner guards shall be installed full height, unless height indicated otherwise on the Drawings, at all outside corners in corridors and elsewhere as shown on the Drawings. Corner guards shall be equal to C/S Model SSM-20 series surface mounted corner guards with optional full height aluminum retainers, vinyl covers and matching top and bottom end caps. Color to be selected by Project Engineer / MDOT Architect from full range of standard colors. Refer to Section 09050 for color(s).

PART 3 EXECUTION

- 3.01 INSTALLATION: Install units plumb and level, in locations as shown or described. Securely attach to supporting structure, in accordance with manufacturer's installation instructions.
- 3.02 CLEANING AND PROTECTION: At completion of installation, clean surfaces in accordance with manufacturer's instructions. Protect units from damage until acceptance by Owner.

END OF SECTION

SECTION 11458 DISAPPEARING STAIRS

PART 1 GENERAL

- 1.01 SECTION INCLUDES: Disappearing (telescoping) steel stairs where indicated on Drawings.
- 1.02 SUBMITTALS
 - A. Product Data: Submit manufacturer's technical data and installation instructions for disappearing stair.
 - B. Shop Drawings: Submit shop drawings showing details of frame type, anchorage and accessory items.
- 1.03 QUALITY ASSURANCE: Provide disappearing stair constructed of the highest quality standards for materials and workmanship.
- 1.04 WARRANTY: Provide manufacturers unlimited warranty against defects.

PART 2 PRODUCTS

- 2.01 ACCEPTABLE MANUFACTURERS
 - A. Drawings and Specifications are based on Rainbow Attic Stair, Prestige Model M3060H, one-piece telescoping steel stairway as manufactured by SP Partners, LLC, 1492 High Ridge Road, Suite 1, Stamford, CT 06903. Tel. (877) 369-6996.
 - B. Equivalent products by the following manufacturers are acceptable:
 - 1. American Stairway, Inc., Memphis, TN. Tel. (901) 795-9200.
 - 2. Bessler Stairway Company, Memphis, TN, Tel. (901) 360-1900.
 - 3. Werner Ladder Co., Franklin Park, PA, Tel. (847) 455-9450.
 - C. Substitutions shall fully comply with specified requirements and Section 01630-Product Options and Substitution Procedures
- 2.02 MANUFACTURED UNITS: Furnish disappearing stair assembly manufactured as an integral unit, complete with all parts and ready for installation.
- 2.03 COMPONENTS
 - A. Stair Type: Telescoping.
 - B. Construction: Powder coated steel.
 - C. Hanging System: Steel hangers with lag screws.
 - D. Insulated Door: 2 inches- Melamine finished (R-15).
 - E. Side Handrails: Telescoping.
 - F. Weight Capacity: 350 lbs.

- G. Tread Width: 16 inches.
- H. Rough Opening Size: 30 inches by 60 inches.

PART 3 EXECUTION

- 3.01 EXAMINATION: Installer shall examine areas and conditions under which disappearing stair is to be installed and notify the Contractor in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to installer.
- 3.02 INSTALLATION
 - A. Install units plumb and level, in locations as shown or described. Securely attach to supporting structure, in accordance with manufacturer's installation instructions.
 - B. Set frames accurately in position with face panels plumb and level in relation to adjacent finish surfaces.
 - C. Coordinate installation with work of other trades.
- 3.03 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 15010

GENERAL PROVISIONS

PART 1 GENERAL

1.01 INSTRUCTIONS

- A. This Contractor shall provide all items, articles, materials, operations or methods listed, mentioned or scheduled on the drawings, and/or herein, including all labor, materials, equipment and incidental necessary, required, or implied, for installation of complete air conditioning ventilating, heating, plumbing and fire protection systems as specified herein and as shown on the drawings.
- B. The General Conditions, Information to Bidders, Special Conditions, and other pertinent documents issued by the Architect are a part of the Contract Documents and shall be complied with in every respect.
- C. This Contractor shall examine the general construction drawings, the structural drawings and the electrical drawings, and lay out his work accordingly to avoid conflict.
- D. This Contractor shall visit the site in order to familiarize himself with existing working conditions. Failure to do so shall not relieve contractor of responsibility of making changes required by conditions encountered on site.

1.02 LOCAL SITE CONDITIONS

- A. Before bidding, make complete investigation at Site in order to be informed as to location of utilities and as to conditions under which work is to be performed. Utility locations shown were obtained from surveys and/or local utility companies and are not to be assumed as being accurate.
- B. Make determination of soil conditions before bidding. These specifications and accompanying drawings in no way imply as to condition of soil to be encountered.

1.03 CLEAN UP

- A. Do not allow waste material or rubbish to accumulate in or about job site.
- B. At completion of work, remove all rubbish, tools, scaffolding and surplus materials from and about building, leaving work clean and ready for use without further cleaning required. Clean all equipment, piping, valves, fixtures, and fittings of grease, metal cuttings, insulation cement, dust, dirt, paper labels, etc.
- C. Any discoloration or other damage to parts of building, its finish or furnishings due to failure to properly clean or keep clean mechanical systems shall be repaired without cost to Owner.

1.04 DRAWINGS

- A. The drawings indicate the extent and general arrangement of the various systems. If any departure from these drawings is necessary, descriptions of these departures and a statement of the reasons therefore shall be submitted to the Architect and approval.

- B. These drawings and specifications shall be considered a part of this contract. Should an error or omission occur in either or both the drawings and specifications, or conflict one with the other, this Contractor shall not avail himself of such unintentional error, omission or conflict, but shall have same explained to him and adjusted before signing the contract or proceeding with the work.

PART 2 PRODUCTS

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

3.02 EQUIPMENT CONNECTIONS

- A. Each equipment item with drain connections, shall be provided with a properly-sized drain, with trap and clean-out, run to the nearest floor drain or as directed.
- B. Rough-in and make final connection to all equipment requiring same, furnished under other divisions of these specifications or by the Owner.
 - 1. Provide necessary labor and materials, including stop valves, traps, pressure-reducing valves, etc. where necessary. Trap and vent drainage connections as required.

2. If equipment or fixtures to be furnished by Owner and/or Owner's vendor are not delivered prior to final acceptance, services shall be capped or plugged at walls or floor as directed, ready for future connection.

C. No equipment or fixture shall be "roughed-in" until proper rough-in drawings are in the hands of the trade doing the work.

3.03 PROTECTION OF EQUIPMENT

A. Responsibility for care and protection of equipment and material under this Contract rests with this Contractor until equipment or materials have been installed, tested and accepted.

B. Store equipment, including pipe and valves, off the ground and under cover. For storage outdoors, minimum 4 mil thick plastic shall be fitted to withstand splattering, ground water, precipitation and wind.

C. All pipe ends, valves, and parts of equipment left unconnected permanently or temporarily, shall be capped, plugged or properly protected to prevent entry of foreign matter.

D. Protect air handling unit coils by use of protective sheet metal panels or plywood.

E. Plug ends of pipe when work is stopped and close ends of ducts with plastic taped in place until work resumes.

F. Damaged equipment shall be repaired or replaced at the option of the Architect/Engineer.

3.04 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 standpipes, equipment hangers and supports not provided with factory prime coat, shall be cleaned and painted with one coat of zinc chromate primer. In addition, such items in finished spaces shall also be painted with two coats of finish paint in a color to match adjacent surfaces or as otherwise selected by the Architect.

C. Black ferrous metal items exposed outside the building, such as equipment support beams, uninsulated pipe and pipe supports not provided with factory prime coat, shall be cleaned and painted with one coat of rust inhibiting primer and two coats of an asphaltic base aluminum paint. Insulated pipes outside the building shall be cleaned and painted with one coat of rust inhibiting primer before installing insulation.

D. In lieu of painting hanger rods, cadmium plated or galvanized rods may be furnished.

E. No nameplates or equipment shall be painted, and suitable protection shall be afforded to the plates to prevent their being rendered illegible during the painting operation.

F. Galvanizing broken during construction shall be recoated with cold galvanizing compound.

G. All ductwork, pipng, insulation, conduit or other appurtenances visible through grilles and diffusers shall be painted flat black.

3.05 PROTECTION OF EXISTING UTILITIES

- A. The Contractor shall use extreme caution during excavation operations not to damage or otherwise interrupt the operations of existing utilities. The Contractor shall be responsible for the continuous operation of these lines and shall provide bypasses or install such shoring, bracing, or underpinning as may be required for proper protection.
- B. Obtain approval from the Architect at least 7 days prior to connecting to any utility line and coordinate with the appropriate utility company.

3.06 CUTTING AND PATCHING

- A. The Contractor shall assume all cost of, and be responsible for, arranging for all cutting and patching required to complete the installation of his portion of the work. All cutting shall be carefully and neatly done so as not to damage or cut away more than is necessary of any existing portions of the structure.
- B. All patching will be done by workmen skilled in the trade required.
- C. The Contractor shall make suitable provisions for adequately water-proofing at all floor penetrations of water proof membrane floors. This shall include but not be limited to floor drains, open sight drains, hub drains, cleanouts, and sleeves for the various piping. This also applies to membrane roofing systems.

3.07 ACCESS PANELS

- A. Provide access panels as required or as indicated to service valves in piping, controls, items in duct, etc.
- B. Access doors shall be provided under this section of the specifications and furnished to the General Contractor to be installed.
- C. Access doors shall be equal to the following MILCOR types as manufactured by Inryco, Inc.:
 - 1. Style AT Door for Acoustical Tile Ceilings
 - 2. Style AP Door for Acoustical Plaster Ceilings
 - 3. Style K Door for Plastered Wall and Ceiling Surfaces
 - 4. Style DW Door for Drywall
 - 5. Style ATR for Suspended Drywall Ceilings
 - 6. Style M Door for Masonry, Ceramic Tile, Etc.
 - 7. Fire-Rated 1-1/2 hr. (B-label) Door where required.
- D. Size and type shall be as required for proper service and/or as may be directed by the Architect.
- E. Access doors installed in firewalls or partitions shall be U.L. labeled to maintain the fire rating at the wall or partition.

3.08 ESCUTCHEONS

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

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

3.09 EQUIPMENT, MATERIALS AND BID BASIS

- A. It is the intention of these specifications to indicate a standard of quality for all material incorporated in this work. Manufacturer's names are used to designate the item of equipment or material as a means of establishing grade, size and quality. Where several manufacturers are named, only these manufacturers' products will be considered and the Contractor's bid shall be based on their products. Other named manufacturers, although acceptable as manufacturers, must prove their product will perform satisfactorily and will meet space requirements, etc., before submitting shop drawings, when their equipment achieves the required results in a manner different than that of the first named manufacturer. Where only one manufacturer is named, unless the specifications state otherwise, manufacturers of similar quality products will be considered. Such unnamed manufacturer's products will, however, be considered as substitutions and shall not be used as a basis for bidding. In the event the Contractor wishes to submit substitutions to the Architect for review prior to bid, he shall furnish descriptive catalog material, text data, samples, etc., as well as any other pertinent data necessary to demonstrate that the proposed substitutions are acceptable equals to the specified product. No substitutions shall be made without the written consent of the Architect.
- B. The use of one named manufacturer in the schedules on the drawings is for guide purposes. The provisions of the above paragraph will govern in the selection of products to be used.

- 3.10 FOUNDATIONS: All concrete foundations required by equipment furnished under the Mechanical Division shall be reinforced and constructed in conformance with the recommendations of the manufacturer of the respective equipment actually applied, and with the approval of the Architect. All corners of the foundations shall be neatly chamfered. Foundation bolts shall be placed in the forms when the concrete is poured. Allow one inch (1") below the equipment bases for alignment, leveling and grouting with non-shrinking grout. Grouting shall be done after the equipment is leveled in place. After the grout has hardened, the foundation bolts shall be pulled up tight and the equipment shimmed, if necessary. After removal of the forms the surface of the foundation shall be rubbed. Unless otherwise noted, foundations shall be six inches (6") high. All concrete work performed shall conform entirely to the requirements of the General Specifications which describe this class of work.

3.11 RECORDS AND INSTRUCTIONS FOR OWNER

- A. The Contractor shall accumulate during the job's progress the following data in quintuplicate prepared in neat brochures or packet folders and turned over to the Architect/Engineer for check and subsequent delivery to the Owner:
 1. All warranties and guarantees and manufacturer's directions on equipment and material covered by the Contractor.
 2. Approved fixture brochures, wiring diagrams, and control diagrams.
 3. Original and copies of approved shop drawings.
 4. Any data and/or drawings required during construction.
 5. Repair parts lists of all major items and equipment including name, address, and telephone number of local supplier or agent.

6. Valve tag charts and diagrams specified elsewhere herein.

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 request for payment prior to his final request for payment, but in no case, less than two weeks before final inspection.

3.12 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Description

1. Complete operating and maintenance instructions shall be provided to the Owner. Two (2) separate copies (three for the Owner, one 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 shall be included for each piece of equipment. Operating instructions shall include recommended periodic maintenance and seasonal changeover procedures, and suggested procedures in operation of all systems to promote energy conservation. These instructions must be written expressly for this project and shall refer to equipment, valves, etc. by mark number from project schedules. Operating instructions and procedures shall be submitted in draft form for approval prior to final issue of complete brochures. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions. 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. Prior to final acceptance or beneficial occupancy, provide the services of a competent representative to instruct and train the Owner in the operation of all systems for a period of not less than three (3) days. This instruction shall include a complete walk-through of all equipment and systems. The Architect reserves the right to attend any such meeting and shall be duly notified. Where specified, certain major items of equipment shall be installed under the supervision of and tested by a specialist furnished by the manufacturer of the equipment. Such specialist shall train the operator in the use of his equipment.
4. A competent technician employed by the Temperature Control Subcontractor shall be required to instruct the Owner in proper operating procedures and shall explain the significance of the temperature control literature filed in the maintenance manual over a period of two (2) days while the system is in continuous operation as specified above.
5. Printed instructions, installed in a suitable frame with a glass front, covering the operation and maintenance of each major item of equipment, shall be posted at locations designated by the Architect. Provide two bound manuals containing complete repair parts lists, and operating service and maintenance instructions for all equipment provided.

3.13 RECORD SET DRAWINGS

- A. The Contractor shall maintain on a daily basis at the project site a complete set of "Record Drawings" reflecting an accurate dimensional record of all buried or concealed work. In addition, the "Record Drawings" shall be marked to show the precise location of concealed work and equipment, including concealed or embedded piping and valves and all changes and deviations in the Mechanical work from that shown on the Contract Documents. This requirement shall not be construed as authorization for the Contractor to make changes in the layout or work without definite instructions from the Architect. The "Record Drawings" shall consist of a set of mylar sepia prints of the Contract Drawings for this Division with the Engineer's seal and Engineer's firm name removed or blacked out. Prior to commencing work the Contractor shall purchase from the Architect a set of mylar sepia prints to be used for the "Record Drawings".
- B. Record dimensions shall clearly and accurately delineate the work as installed; locations shall be suitably identified by at least two (2) dimensions to permanent structures.
- C. The Contractor shall mark all "Record Drawings" on the front lower right hand corner with a rubber stamp impression that states the following:

"RECORD DRAWINGS (3/8" high letters) to be used for recording Field Deviations and Dimensional Data Only" (5/16" high letters)

3.14 GUARANTY-WARRANTY

- A. This guarantee shall include capacity and integrated performance of component parts of various systems in strict accord with the true intent and purpose of these Specifications. Conduct such tests as herein specified or as may be required by the Architect to demonstrate capacity and performance ability of various systems to maintain specified conditions.
- B. All materials and equipment shall carry a full year's warranty from time Owner accepts building or the date of substantial completion, whichever is earlier, regardless of start-up date of equipment, unless a longer warranty period is specified under other sections.

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

3.16 FLAME SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

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

3.17 EQUIPMENT FURNISHED BY OWNER

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

3.18 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 (15). Any requirements for such are beyond the scope of this contract and shall be done only by those persons contracted to do so.

3.19 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. All components shall be in conformance with the requirements of the National Electrical Code and Division 16. Motor starters and disconnects as required for rooftop units, and fans provided under this division shall be furnished under Division 15.
- 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 120V. power circuits indicated on 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 mechanical and electrical drawings and specifications and coordinated before equipment is ordered or submitted.

3.20 MOTORS

- A. Unless specifically noted otherwise in other sections of this specification, all motors and motor controllers shall meet the requirements specified in this section. All motors shall be built in accordance with the current applicable IEEE, and NEMA standards and shall have voltage, phase, frequency and service as scheduled.
- B. Each motor shall be suitable for the brake horsepower of the driven unit, rated with 1.15 minimum service factor, and shall be NEMA design B. The motor temperature rise shall not exceed 40 degrees C. for drip proof motors, 50 degrees C. for splash proof motors, and 55 degrees C. for totally enclosed or explosion proof motors. The motor shall be capable of operating continuously at such temperature rises, and shall be capable of withstanding momentary overloads of 25 percent without injurious overheating.
- C. Each item of motor driven equipment shall be furnished complete with the motors and drives as required to perform the specific function for which it is intended, scheduled, and specified.

- D. Motors shall be ball bearing type selected for quiet operation and shall be manufactured for general purpose duty unless otherwise indicated. Each bearing shall be accessible for lubrication, where necessary, and designed for the load imposed by the V-belt drive or the driven apparatus. Direct drive motors shall be designed for the specific application with all necessary thrust bearings, shaft capacities, etc.
- E. Motors larger than 1/2 horsepower shall be of U.S. manufacture and have bearings with pressure grease lubrication fittings.
- F. Motors connected to drive equipment by belt shall be furnished with adjustable slide rail bases except for fractional horsepower motors which shall have slotted bases. Motor leads shall be permanently identified and supplied with connectors.
- G. Each motor to be installed outdoors shall be of the totally-enclosed fan-cooled type, or housed in a weatherproof housing.
- H. Unless otherwise indicated, motors smaller than 1/2 horsepower shall be capacitor start or split phase type designed for 120 volt, single phase, 60 cycle alternating current. Shaded pole motors are not to be acceptable except 35 watts and smaller. Motors 1/2 horsepower and larger shall be squirrel cage induction type, 3 phase, 60 cycle alternating current.
- I. If the Contractor proposes to furnish motors varying in horsepower and/or characteristics from those specified, he shall first inform the Architect/Engineer of the change and shall then coordinate the change and shall pay all additional charges in connection with the change.

END OF SECTION

SECTION 15011

SCHEDULE OF SUBMITTAL DATA

PART 1 GENERAL

- 1.01 RELATED DOCUMENTS: The requirements of the General Conditions, Supplementary Conditions, and Section 15010, "General Provisions" apply to all work herein.
- 1.02 QUALITY ASSURANCE:
- A. Shop drawings or fully descriptive catalog data shall be submitted by the Contractor for all items of material and equipment furnished and installed under this contract. The Contractor shall submit to the Architect a sufficient number of copies of all such Shop Drawings or catalog data to provide him with as many reviewed copies as he may need, plus two (2) copies for retention; one by the Architect and one by the Engineer.
 - B. Before submitting Shop Drawings to the Architect for review, the Contractor shall examine them and satisfy himself that they are correctly representative of the material or equipment to which they pertain. The Contractor shall so note these Drawings before submitting them. The Contractor's review of the Shop Drawings is not intended to take the place, 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 Specification unless he has, in writing, specifically called attention to such deviations at the time of submission and has obtained the permission of the Architect 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 this is not mentioned, it will be assumed that no extra cost is involved for making the change.
 - D. Verification and assignment of dimensions, quantities, and construction means, methods, sequences or procedures, the correctness of which is set forth in the Contract Documents or submittal, shall be the sole responsibility of the Contractor.
 - E. Reproduction of design documents in any portion for use in a submittal is not acceptable.

PART 2 PRODUCTS

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

PART 3 EXECUTION

3.01 SUBMITTAL DATA:

A. General

- 1. The submittal data to be furnished for this project shall comply with the Specifications and Contract Documents in their entirety. Any submittals herein scheduled are as a minimum only and shall not be construed to limit the submittal data required within the individual Sections of these Specifications.

2. Shop Drawings will be returned unchecked unless the following information is included: Reference to all pertinent data in the Specifications or on the Drawings, such as sound power levels of motor driven equipment where called for in the specifications, electrical characteristics and horse power, capacities, construction material of equipment, UL labels where required, accessories specified, manufacturer, make and model number, weights where specified, starters where required by Division 15, size and characteristics of the equipment, name of the project and a space large enough to accept an approval stamp. The date 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.
 3. HVAC, plumbing, and fire protection submittal data shall be bound into separate HVAC, plumbing, and fire protection volumes, with each volume containing one copy of all specified equipment shop drawings. The binders shall be provided 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 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 date and will address and resolve all comments thereon. All submittals shall include identification tabs and sufficient space for all submittal data. FAILURE to provide **BOUND AND IDENTIFIED SUBMITTALS** will result in the **AUTOMATIC REJECTION** of the submittal data with **NO EXCEPTION**.
- B. The bound submittals are to be submitted for review within 30 days after the Contract is awarded. No submittal will be checked until ALL required submittals have been received by the Engineer. Only Automatic Temperature Controls, ductwork and piping fabrication drawings may be submitted after the completed bound submittal is reviewed and accepted by the Engineer.
- C. The Contractor shall submit with the bound and identified submittal data a letter signed by the Contractor's Project Manager (or higher level officer of the firm) stating that all electrical characteristics of the mechanical equipment to be supplied 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 performed without any additions to the Contract Sum. Shop Drawings shall be submitted for each of the following:

Submit attachment and fastening methods for piping and equipment to the Structural Engineer for approval.

Automatic Temperature Controls
Air Handling Units
Cleanouts
Condensing Units
Cooling Coils
Disconnect Switches
Ductwork Accessories and Details (min. 1/4"=1'0" scale)
Fans
Fire Hydrants
Grilles, Registers and Diffusers
Insulation
Manholes

Plumbing Drains
Plumbing Fixtures, Carriers and Fittings
Refrigerant Piping Diagrams and Layouts approved by the compressor Manufacturer
Rooftop units
Test, Adjusting and Balancing Reports and Forms
Valves
Water Heaters

- D. The Contractor shall submit three copies of a letter, signed by an officer of the company, that the items listed below meet or exceed criterion 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.

Flexible Duct
Flexible Connectors
Ductwork Access Doors and Panels
Vacuum Breakers
Filters
Dampers
Water Supplies and Stops
Pipe Hangers and Supports
Hydrants
Shock Absorbers

3.02 OPERATING AND MAINTENANCE INSTRUCTIONS:

A. Description

1. Complete operating and maintenance instructions shall be provided to the Owner. Two (2) separate copies (three for the owner, one 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 instruction shall be included for each piece of equipment. Manufacturers' Standard literature is acceptable for each piece of equipment. However, the contractor shall prepare a SYSTEM O&M manual including overall system descriptions, operating and energy conservation techniques.
2. A system wiring and control diagram shall be included in the operating and maintenance instruction.
3. Prior to final acceptance or beneficial occupancy, provide the services of a competent representative to instruct the Owner in the operation of all systems. This instruction shall include a complete walk-through of all equipment and systems. The Architect reserves the right to attend any such meeting and shall be duly notified.

3.03 OTHER SUBMITTALS:

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

1. As built drawings for ductwork, HVAC piping, plumbing and fire protection systems.
2. All guarantees.
3. Submit two (2) copies of welders certificate.
4. Certify disinfection of domestic water service.
5. Manufacturer's representative shall certify that HVAC equipment and valves are installed in accordance with the manufacturer's recommendations.

END OF SECTION

SECTION 15012

COORDINATION DRAWINGS

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS: The requirements of the General Conditions, Supplementary Conditions, and Section 15010, "General Provisions" apply to all work herein.
- 1.02 QUALITY ASSURANCE:
- A. Shop drawings shall be submitted by the Contractor for all items of systems and equipment furnished and installed under this contract. The Contractor shall submit to the Architect a sufficient number of copies of all such Coordination Drawings to provide him with as many reviewed copies as he may need, plus two (2) copies for retention; one by the Architect and one by the Engineer.
 - B. Before submitting Coordination Drawings to the Architect for review, the Contractor shall examine them and satisfy himself that they are correctly representative of the systems or equipment. The Contractor shall so note these Drawings before submitting them. The Contractor's review of the Coordination Drawings is not intended to take the place, in any way, of the official review of the Architect. Any Coordination Drawings which have not been reviewed by the Architect/Engineer shall not be used in fabricating or installing any work.
 - C. The review of Coordination Drawings by the Architect shall not relieve the Contractor from responsibility for deviations from the Plans and Specification unless he has, in writing, specifically called attention to such deviations at the time of submission and has obtained the permission of the Architect thereon; nor shall it relieve him from responsibility for error of any kind in Coordination Drawings. When the contractor does call such deviations to the attention of the Architect, he shall state in his letter whether or not such deviations involve any extra cost. If this is not mentioned, it will be assumed that no extra cost is involved for making the change.
 - D. Verification and assignment of dimensions, quantities, and construction means, methods, sequences or procedures, the correctness of which is set forth in the Contract Documents, shall be the sole responsibility of the Contractor.
 - E. Reproduction of design documents in any portion for use in a submittal is not acceptable.

PART 2 - PRODUCTS

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

PART 3 - EXECUTION

3.01 COORDINATION DRAWINGS:

- A. General
 - 1. Work will not commence in any area until coordination drawings for that area has been reviewed and processed by the Architect/Engineer.

2. Prepare coordination drawings to a minimum scale of $1/4" = 1'0"$, detailing major elements, components, equipment and materials in relationship to other systems, installations, and building components. Specifically include plumbing systems, HVAC piping systems, ductwork, sprinkler and fire protection systems, lighting, buss duct, cable tray, conduit, electrical panels and control panels. Indicate the proposed locations of piping, ductwork and equipment. This includes the following:
 - a. Clearances for installing and maintaining insulation.
 - b. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
 - c. Equipment connections and support details.
 - d. Exterior wall and foundations penetrations.
 - e. Fire-rated wall and floor penetrations.
 - f. Sizes and location of required concrete pads and bases.
3. Project background drawings files will be made available to the contractor in Autocad 2004 format for use in preparing coordination drawings. A mere re-plot of the engineers files will be rejected without review.
4. The engineer's review of coordination drawings is limited to the assumption that the contractor is fully aware of the building conditions and limitations of the project. Review and acceptance of the coordination drawings does not relieve the contractor of coordinating his work with the work of other trades.

3.02 DUCT COORDINATION DRAWINGS:

- A. Work will not commence in any area until shop drawings for that particular area has been submitted for review and processed by the Architect/Engineer.
 1. Prepare coordinated sheet metal coordination drawings to a minimum scale of $1/4" = 1'-0"$ or larger, detailing major elements, components and systems. Indicate that proposed locations of ductwork and equipment. Show the relationship of duct systems and related equipment to the structure and building components. This work includes the following:
 - a. Indicate the horizontal location of ductwork from the nearest column line. Indicate the bottom of duct elevation relative to the finished floor. Provide sections and details of equipment installations and shafts as necessary to properly indicate the coordination of the complete duct system.
 - b. Clearances for installing insulation.
 - c. Clearances for servicing and maintaining equipment.
 - d. Equipment connections.
 - e. Wall penetrations and damper installations.
 - f. Duct access doors.
 - g. Sizes and location of required concrete pads and bases.
 - h. Equipment rooms.
 2. Refer to Division 15000, Section 15010 Mechanical General Requirements for additional requirements.

END OF SECTION

SECTION 15015 DESIGN CONDITIONS

PART 1 GENERAL

1.01 DESCRIPTION: The requirements of the General Conditions, Supplementary conditions, and Section 15010, "General Provisions" apply to all Work herein.

PART 2 DESIGN CONDITIONS

2.01 DESIGN CONDITIONS

A. Outside conditions are as follows:

	Dry Bulb Deg. F.	Wet Bulb Deg. F.
Summer Outside Air Temperature	98	80
Winter Outside Air Temperature	0	

B. The indoor design condition for cooling is 75 deg. F. dry bulb/50% relative humidity.

C. The indoor design condition for heating is 75 deg. F. dry bulb.

D. Schedule of Working Pressures:

	<u>Working System</u>	<u>Normal Operating Pressure</u>	<u>Temperature Range</u>
1.	Sanitary drain and vent	Atmospheric	Ambient
2.	Domestic Cold Water	150	Ambient
3.	Domestic Hot Water	150	120 deg. F.
4.	Fire Protection	175	Ambient

E. Range of indoor design goals for HVAC sound control:

1. All occupied space shall have an NC criteria curve range not to exceed NC 35.

F. Building envelope design criteria - these values are repeated here to alert the General Contractor to the properties of materials used in the calculation of heating and cooling loads for this project. It shall be the responsibility of the General contractor to notify the Architect and Engineer if materials with properties other than those stated below are used in the construction of this project:

1. Typical vision glass shading coefficient - 0.82
2. Typical vision glass "U" values - 0.6
3. Insulated exterior walls transmission coefficient-0.04 BTU/hr.) (F deg.)(sq.ft.)
4. Roof heat transmission coefficient - 0.024 Btu/(hr.)(F. deg.)(sq.ft.)

END OF SECTION

SECTION 15016

CODES AND REGULATIONS

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 kitchen hood 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, ORDINANCES AND PERMITS:

- A. All heating, ventilating and air conditioning materials and workmanship shall comply with the following codes and standards as applicable:
 - 1. The International Building Code (2003)
 - 2. The International Mechanical Code (2003)
 - 3. The National Electric Code (2002)
 - 4. City of Batesville, MS
- B. All plumbing materials and workmanship shall comply with the following codes and standards as applicable:
 - 1. The International Plumbing Code (2003)
 - 2. The National Electric Code (2002)
 - 3. City of Batesville, MS
- C. 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 Society of Mechanical Engineers Code (ASME)
 - 5. Factory Mutual Underwriters (FM)
 - 6. National Fire Protection Association Standard (2002)
 - 7. Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA)
 - 8. Underwriters Laboratories, Inc. (UL)

PART 2 - PRODUCTS

- 2.01 COORDINATION: Any modification to the mechanical systems and their components, the electrical systems, the building structure and architecture, or any other portion of the building that results from the use of any other than the basis of design equipment shall be coordinated with all plans and codes. Such coordination shall occur before shop drawing submittals and shall be clearly indicated on the shop drawings. Any related modifications shall be performed without any additional cost to the Contract.

PART 3 - EXECUTION

3.01 GENERAL:

- A. This Contractor shall conform to standards prescribed by City, County, State and Federal regulations or ordinances having jurisdiction. Execution of the Contract Documents indicates Contractor's knowledge of above regulations or ordinances and any changes that may be necessary to conform to such regulations or ordinances shall be made by this Contractor without extra cost to the Owner.
- B. Permits required for the installation of the work, as well as all authorized code inspections, construction fees, meters and assessments shall be arranged for and paid for by the Contractor.
- C. The contractor shall comply with all applicable provisions of the William-Steiger Occupational Safety and Health Act O.S.H.A.).

END OF SECTION

SECTION 15020 IDENTIFICATION OF PIPING SYSTEMS

PART 1 GENERAL

1.01 APPLICABILITY

- A. All work specified in this Section shall comply with the provision of Section 15010, "General Provisions".
- B. All piping in mechanical spaces, in unfinished space, such as store rooms and above lift out ceiling, shall be identified with pressure-sensitive or snap on type pipe markers with color bands of the proper size. Markers shall have proper legend and meet OSHA Specifications. Where pipes are too small for such application, a 1-1/2" brass tag shall be used. Do not identify piping in the finished areas, such as offices.
- C. Markers shall be placed so as to be easily read. Arrows shall be applied to indicate direction of flow.

PART 2 PRODUCTS

2.01 PIPE MARKINGS

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

2.02 BAND AND LETTER SIZE: Band and letter sizes shall conform to ASHRAE standards of the following table:

O.D. of Pipe or Covering	Width of Color Band	Size of Letter/Numbers
1¼" and smaller	8"	1/2"
1½" to 2"	8"	3/4"
2½" to 6"	12"	1¼"
6" to 10"	24"	2½"
over 10"	32"	3½"

2.03 IDENTIFICATION: Band legend and color and letter color shall conform to the following table:

<u>Piping Band</u>	<u>Legend Letters</u>	<u>Band Color</u>
Cold Water (Domestic)	CW (Dom)	White Green
Hot Water (Domestic)	HW (Dom)	Black Yellow
Hot Water Circulation (Dom.)	HWC Dom)	Black Yellow
Drain	D	Black Green

PART 3 EXECUTION

3.01 EXECUTION

- A. Locate pipe identification in the following areas:
 - 1. Each riser.
 - 2. Each valve.
 - 3. One each side where piping passes through walls and floors.
 - 4. At or near each change in direction or height.
 - 5. Every 40 feet along continuous runs.
 - 6. Within 4 feet of exit or entrance to vessel or tank.
- B. Indicate pipe content flow direction with arrows of matching style and placed so the arrow points away from the legend.
- C. In addition to the above, fire protection piping and accessories will be identified as outlined in NFPA 13.
- D. If manufactured preprinted markers are used they shall be attached to the piping with self-locking nylon fasteners.

END OF SECTION

SECTION 15025

MOTORS, STARTERS, CONTROLS AND WIRING

PART 1 GENERAL

1.01 SCOPE

- A. All electrical work specified in this Section shall comply with the provisions of Division 16. All mechanical work specified shall be in accordance with Section 15000.
- B. All motors shall be provided as noted here in.
- C. All motor starters shall be provided by Division 15 for each motor including package units. Motor starters shall be installed either in a Motor Control Center or separately mounted adjacent to the motor served as shown, indicated and/or required.
- D. Motor power wiring is defined as those conductors between the energy source and the motor. This power wiring shall be terminated at motor terminals and will be provided under Division 16 work.
- E. All control wiring required for automatic starting and stopping of motors shall be provided under this Division unless specifically shown on the electrical drawings.
- F. Power wiring will be connected through all line voltage control devices such as firestats and thermostats by Division 16 work.
- G. Smoke detectors for HVAC equipment shall be furnished by Division 16 and installed by Division 15.

PART 2 PRODUCTS

2.01 MOTOR STARTERS

- A. The Electrical Contractor shall furnish and install all manual starters as required. Where magnetic starters, reversing starters, multiple speed starters, etc., are required, they shall be furnished by the Mechanical Contractor. All poly-phase motors and all motors which are automatically controlled shall be furnished with magnetic starters, full voltage, non-reversing type, complete with necessary auxiliary contacts for controls unless otherwise noted. Heaters shall be of the melting alloy type, sized to the exact nameplate running current of the motor. Overloads shall have visual trip indicators and shall be trip-free with reset button held in. All magnetic motor starters or controllers shall be equipped with one overload element in each phase. Manually operated motors with magnetic controllers shall be provided with oil-tight pushbutton stations and automatically controlled motors shall be provided with oil-tight, "hand-off" automatic switches. All magnetic starters shall be provided with red bull's eye pilot light in cover. Energy for controlled circuits shall be taken through auxiliary contacts, and shall not be taken from the load contacts from the starters. All power wiring and control wiring shall be run in rigid conduit in damp locations or electrical metallic tubing in dry locations and shall conform to NEC Standards.
- B. All motor starters, push buttons and pilot lights shall be of the same manufacturer as the switchboard.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide control wiring and install all motor starters, unless integrally factory mounted on a piece of equipment.
- B. Provide control wiring to all motors except packaged units that are prewired between the starter and motor.
- C. Where line voltage control devices are mounted at, on or inside a unit, such as aquastats, firestat for single phase devices, etc., the power wiring to the unit shall be connected through such a control device by the work of Division 16.
- D. On final inspection, it shall be demonstrated to the Architect or his representative that each overload relay control circuit is properly wired and functioning correctly by manually tripping each overload relay individually, one at a time. This inspection procedure shall not involve removal of any wiring or disconnecting any current carrying parts.
- E. Standard minimum one-year warranty on all electrical equipment provided herein shall apply.

END OF SECTION

SECTION 15030

TRENCH EXCAVATION AND BACKFILL

PART 1 - GENERAL

- 1.01 APPLICABILITY: The work specified herein shall include all labor, materials, equipment, tools, supplies and supervision required to install and place in operation the mechanical systems and appurtenances specified herein and/or indicated on the drawings or reasonably implied as necessary for completion of the various systems.

PART 2 SCOPE OF WORK

- 2.01 SCOPE: Furnish and install heating, air conditioning and ventilating equipment and systems as shown on drawings and described herein.

PART 3 EXECUTION

3.01 WORK BY OTHERS

- A. The Electrical Contractor shall bring adequate power to and make final connections to all equipment furnished under this Contract. All control wiring shall be by Controls Contractor.
- B. The General Contractor shall provide prepared openings for ducts and other mechanical work as required in walls, roof, ceilings, etc.; shall do all painting as required; and shall assist Mechanical Contractor with installation of all mechanical equipment in exterior walls and on roof.
- C. All items of labor, materials and equipment not specifically stated herein or on drawings to be by others and required to make the system complete and operative shall be by this Contractor.
- D. The Contractor shall so coordinate the work of the several various trades that it may be installed in the most direct and workmanlike manner without hindering or handicapping the other trades. Piping 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, except where noted to the contrary, shall be installed in chases, furred spaces, above ceilings, etc. In all cases, pipes and ducts shall be installed as high as possible. Runs of piping shall be grouped whenever it is feasible to do so.

- F. Piping, equipment, or ductwork shall not be installed in electrical equipment rooms or elevator machine rooms except as serving only those rooms. Outside of electrical equipment rooms, do not run piping or ductwork, or locate equipment, with respect to switchboards, 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.
 3. Clearances apply vertically from floor to structure.
 4. Provide safe access to equipment and apparatus requiring operation, service or maintenance within the life of the system. This includes, but is not limited to, motors, valves, filters, dampers, shock absorbers, etc. Equipment located above lay-in type ceilings is considered accessible.

END OF SECTION

SECTION 15080

TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS: 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.
 - B. The Test and Balance Agency contract shall not be assigned to any subcontractor; the Agency shall work directly under the General Contractor. The independent Test and Balance Agency shall be a certified member of the Associated Air Balance Council (AABC).
 - C. Testing and Balance Agency as part of its contract shall act as an authorized inspection agency, responsible to the Owner, and shall, during the test and balance, list systems that are installed incorrectly, require correction, or have not been installed in accordance with contract drawings and specifications.
 - D. One agency shall be responsible for all phases of Total System Balance.
 - E. 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.
 - F. 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.
 - G. 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 trips and subsequent adjustments. Submit statements to Architect.
- 1.03 LEAKAGE TESTS, MEDIUM AND HIGH PRESSURE DUCTS: 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.
- 1.04 LEAKAGE TESTS, LOW PRESSURE DUCTS: The Test and Balance Agency shall witness and certify to duct leakage tests for 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.

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 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: Except as otherwise indicated, use same products as used by original Contractor for patching holes in insulation, ductwork, and housings which have been cut or drilled for test purposes, including access for test instruments, attaching jigs, and similar purposes.

PART 3 - EXECUTION

3.01 REQUIRED DOCUMENTS

- A. The General Contractor shall provide the following, in a timely fashion to the Test and Balance Agency:
 - 1. Contract Drawings (complete set)
 - 2. Applicable Specifications
 - 3. Addenda
 - 4. Change orders
 - 5. Reviewed shop drawings
 - 6. Reviewed equipment manufacturer's submittal data
 - 7. Reviewed temperature control drawings

3.02 COOPERATION 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.

3.04 OPERATING TESTS A complete system operating test shall be made for a period of 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.

- 3.05 CONTROL PERFORMANCE CHECK 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.

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 of relief air in CFM.
3. Test, adjust and record all required and measured outside air quantities and return air CFM. Test and record quantity of return air in 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, etc., 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, etc., should be checked for air flow so that exterior conditions do not cause excessive abnormal pressure conditions.

END OF SECTION

SECTION 15100

PIPE HANGERS AND SUPPORTS

PART 1 GENERAL

- 1.01 GENERAL Provide adequate pipe and equipment foundations and suspension systems in accordance with recognized engineering practices, using, where possible, standard, commercially accepted hangers and accessories.
- 1.02 CODES
- A. All pipe hangers and supports shall conform to the latest requirements of the Code for Pressure Piping, Refrigeration Piping ANSI-ASME B31.5-74 and Manufacturers' Standardization Society of Valve & Fittings Industry Documents MSS-SP-58-75 and MSS-SP-69-76.
 - B. All auxiliary steel necessary for the installation of the pipe hangers and supports shall be designed in accordance with the AISC 1978 Specification.
- 1.03 DESIGN
- A. Supporting Steel not shown for the equipment will be designed, supplied and erected by the Contractor. (The supporting steel is that steel which is connected to the structural steel shown on the Drawings and carries the weight of the mechanical items.) This supporting steel design must carry the dead weight and dynamic load imposed by the equipment and provide for safety of installing personnel and safety of personnel to operate, maintain, repair and replace equipment.
 - B. The supporting steel shall be connected to the structural steel in such a manner as not to overload the structural steel. It is the responsibility of the General Contractor, Mechanical Contractor and the steel fabricator to verify that this purpose is accomplished. It is the responsibility of the general contractor to call to the attention of the Architect-Engineer any deficiency prior to bidding.
 - C. Where thermal movement in the pipe line will occur, the pipe hanger assembly must be capable of supporting the line in all operating conditions. Accurate weight balance calculations shall be made to determine the supporting force at each hanger in order to prevent excessive stress in either pipe or connected equipment.

PART 2 PRODUCTS

- 2.01 PRODUCTS Numbers refer to Fee & Mason. Equal devices by Grinell or B-line will be acceptable.
- 2.02 CONCRETE INSERTS Inserts shall be Figures 186, 2570 or FAMET 9000 where a continuous insert is required.
- 2.03 BEAM & STEEL JOIST CLAMPS Clamps shall be Figures 249, 254, 282, 252, or 253.
- 2.04 RISER CLAMPS Riser clamps shall be Figures 238 or 241, for steel pipe or Figure 368 for copper tubing. For riser loadings in excess of the maximum recommended loads shown for the above items, clamps shall be designed in accordance with Figures 395 or 396.

2.05 HANGER RODS

- A. Hanger rods shall be Figures 267A and 263. Eye rods shall be Figures 228 and 228 WL.
- B. All rods shall be galvanized coated.

2.06 PIPE HANGERS

- A. All hangers for piping 2" or larger shall be provided with means of vertical adjustment.
 - B. On uninsulated steel pipe, hangers shall be Figures 199, 236, or 239.
 - C. On uninsulated copper tubing, hangers shall be Figures 307 or 364.
 - D. On hot insulated steel pipe, hangers shall be Figure 261 or welded attachments, Figures 90, 92, 94, or 96. Where thermal movement causes the hanger rod to deviate more than 5 Degrees from the vertical, or where longitudinal expansion causes a movement of more than 1/2" in the piping supported from below, roller hangers Figures 160, 161, 162, 170 or 272 shall be used in conjunction with a protective saddle sized to suit the insulation thickness. On insulated steel pipe for chilled or hot water or similar service the hanger must be placed on the outside of the insulation.
 - E. On insulated copper tubing, hangers shall be Figures 199 or 239 and shall be placed on the outside of the insulation.
 - F. Insulated pipe and tubing supports shall be Pipe Shields, Inc. A1000, A2000, A3000, A4000, A5000, A6000, A7000 or A8000.
 - G. Base supports shall be Figures 259 or 291.
- 2.07 BRACKETS AND RACKS Welded steel brackets shall be Figures 151 and 155. Multiple pipe racks or trapeze hangers shall be fabricated from FAMET channel, clamps, and accessories.
- 2.08 ANCHORS, GUIDES AND SLIDING SUPPORTS Pipe anchors shall be Figures 141 or 159. Guides shall be Figures 120, 121, 122 or 165. Sliding supports shall be Figures 143 or 145.

PART 3 EXECUTION

3.01 ATTACHING TO STRUCTURE

- A. Where equipment or piping is supported off a concrete structure, inserts shall be used. Where support rod sizes exceed 7/8" diameter or where the pipe load exceeds the recommended load for the insert, use 2 inserts with a trapeze type connecting member below the concrete. In cases where pipes are supported from existing slab, use Phillips' "RED HEAD" or equal, sized for Safety Factor 4.
- B. Where equipment or piping is supported from building steel beam, clamps or welded beam attachments shall be used. Holes drilled in building steel for hanger support rods will not be permitted.
- C. All vertical runs of piping shall be supported at each floor.

3.02 HANGER RODS AND SPACING

- A. Where hanger rod sizes are catalog-listed for a specified hanger, this size shall govern. Where hanger rod sizes are not catalog-listed, the load on the hanger shall be the determining factor and the maximum recommended hanger rod load, as catalog-listed, shall govern.
- B. Pipe hangers shall be at each change in direction, not more than 2'-0" from end of run, and on straight runs the spacing shall not exceed whichever is closer: at each joint, or as follows:

<u>PIPE SIZE</u>	<u>STEEL PIPE</u>	<u>COPPER PIPE</u>
To 3/4"	7'-0"	5'-0"
1" to 2"	10'-0"	8'-0"
2-1/2" to 4"	12'-0"	10'-0"
5" to 8"	16'-0"	10'-0"

- C. Provide supports at concentrated loads such as equipment, in-line pumps, valves and other piping specialties, to prevent line sag and/or excess stress in the piping systems.
- D. For cast iron pipe provide hanger at each joint or fitting with a maximum spacing of 5'-0" on center.
- E. Where distance between riser clamp and hanger exceeds 10'-0" in height, intermediate clamps shall be installed to provide support or alignment at a maximum of every 10'-0".

3.03 AUXILIARY STEEL

- A. Furnish all miscellaneous structural members necessary to hang or support pipe or mechanical equipment. Material of members shall be consistent with that of the main structural system.
- B. All auxiliary steel shall receive one shop coat of primer paint prior to installation.
- C. Notify Architect of any adjustment necessary in main structural system for proper support of major equipment and provide for personnel safety for maintenance, repair and replacement of equipment.

- 3.04 CONCRETE PADS Provide concrete pads where indicated on drawings under floor-mounted equipment and apparatus.

END OF SECTION

SECTION 15115 HEAT TRACE

PART 1 – GENERAL

1.01 RELATED SECTIONS

- A. Section 15180 - Thermal Insulation for Mechanical Systems.
- B. Section 15400 - Plumbing Basic Materials and Methods

1.02 REFERENCES

- A. NEC – National Electrical Code.
- B. ASTM – E84 – Surface Burning Characteristics of Building Material.
- C. NFPA 255 – Surface Burning Characteristics of Building Material.
- D. UL 723 – Surface Burning Characteristics of Building Material.

1.03 SUBMITTALS

- A. Product Data: Provide a description, list of materials for each product and/or piece of equipment.
- B. Manufacturer shall provide written procedures which describe the minimum acceptable workmanship and industry standards for this installation.

1.04 QUALITY ASSURANCE Flame spread/smoke development rating of 25/50 or less in accordance with ASTM E84 and NFPA 255.

1.05 QUALIFICATIONS: Installing Contractor specializing in this work shall have a minimum of five (5) years experience.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to site in factory-fabricated water resistant packaging, labeled with manufacturer's identification, including product description.
- B. This Contractor shall store heating cable and components in a clean and dry space that protects from weather.

PART 2 – PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A. Manufacturers: Provide products complying with these specifications. The following is an approved list of manufacturers.
 - 1. Chromalox Division, Emerson Electric Company
 - 2. Raychem Corporation.
 - 3. Dekoron, DeKoron – Furon, Inc.
 - 4. Thermon Manufacturing Company.

- B. UL Standards: Electric heating cable shall conform to all applicable standards and shall be UL-labeled.
- C. Provide heat tracing cable as specified herein and as indicated on the Drawings. Heat-trace the entire length of the pipe including all valves, fittings, and accessories. Provide all associated accessories including thermostats, termination kits, cold lead kits, end seal kits, and fiberglass tape as recommended by the manufacturer.
- D. Self-regulating Freeze Protection Heat Tracing Cable: Provide self-regulating heat tracing cable rated at 5 watts/foot, 120 volts and the amount and length required. Heat tracing cable shall consist of twin copper conductors encased in a conductive polymer core matrix whose resistance varies with temperature.
- E. Electric heating Cable Thermostats: Provide rain tight NEMA 4X enclosure electric heating cable thermostats with a temperature setpoint of 40°F, 22 ampere contacts, remote sensing bulb/capillar tube and as recommended by the cable manufacturer for freeze protection applications. Thermostats shall be used in the ambient sensing mode with the sensor bulb exposed to ambient air. Contractor shall verify power requirements.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. General: Install electric heat tracing cable in accordance with the manufacturer's written instructions, the applicable portions of the NEC, and recognized standards. Furnish, install and connect the heat trace cable and all required accessories in accordance with the manufacturer's instructions. All metallic piping which is heat traced shall be grounded per NEC requirements.
- B. Contractor shall install electric heat trace cable for freeze protection of piping systems where indicated on the drawings. Maintain a 40°F water temperature within the traced pipe with an ambient temperature is 10°F.
 - 1. Secure cable to the traced pipe in the 5 o'clock or 7 o'clock position with fiberglass tape on 12" centers. Loop cable at valves, flanges, and unions to allow adequate slack cable such that the valve flanges and unions can be removed without removing the cable.
 - 2. Where the traced piping is PVC, install heat transfer foil as recommended by the manufacturer.
- C. Thermostats: Install ambient sensing thermostats for control of freeze protection heat cable in locations where shown on the drawings or as directed by the Engineer of record.
- D. This Contractor shall coordinate installation of power connections to thermostats and heat cable with Division 16.
- E. Provide insulation and jacketing for the traced piping as specified in Section 15180. Do not install insulation until the heat cable has been tested.
- F. Labeling: Install labels on heat traced piping that indicates that the pipe is electrically traced.

- 3.02 TESTING: Test heating tape and cable to demonstrate proper operation. Repair or replace damaged tape and cable. Retest to ensure proper operation.

END OF SECTION

SECTION 15180

THERMAL INSULATION FOR MECHANICAL SYSTEMS

PART 1 GENERAL

- 1.01 Furnish and install all insulation for HVAC piping and duct and plumbing piping.
- 1.02 Insulations specified are intended to set a standard. Insulations by other manufacturers will be considered provided that samples of each substitute item are submitted for approval.
- 1.03 Specifications apply to supply and associated return system unless specifically specified otherwise.
- 1.04 All insulation shall have surface burning characteristic ratings as tested by ASTM E-84, UL 723, or NFPA 255 not exceeding:

Flame Spread	25
Smoke Developed	50

Composite shall include insulation, jacketing and adhesive used to secure jacketing or facing. All accessory items such as PVC jacketing and fittings, adhesive, mastic, cement, tape and cloth shall have the same component ratings as specified above.

- 1.05 Insulation shall include all insulating materials, their applications, bands, tie wire, and weather protection for all pipe, fittings, valves, and equipment as indicated and as specified herein.
- 1.06 Pipe insulation on cold surfaces shall pass full thickness through hanger with galvanized iron sheet metal saddle at each hanger as per schedule below:

Through 3"	16 ga. x 12"
4" - 6"	16 ga. x 18"

PART 2 PRODUCTS

2.01 PREMOLDED FIBERGLASS PIPE INSULATION:

- A. Pipe insulation (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. Insulation shall be suitable for use on either hot or cold water pipes with temperature range of +20 degrees to 400 degrees F. Thermal conductivity shall not exceed 0.23 at 75 degrees F. mean temperature.

**INSULATION THICKNESS IN INCHES
FOR PIPE SIZES**

	Temperature Up to	Up to 1"	1 ¼" to 2"	2 ½" to 3 ½"
<u>Cooling Systems</u>				
Refrigerant hot gas and liquid	Any	¾"	1"	1 ½"
Refrigerant suction		¾"	1"	1 ½"

**INSULATION THICKNESS IN INCHES
FOR PIPE SIZES**

	Temperature Up to	Up to 1"	1 ¼" to 2"	2 ½" to 3 ½"
<u>Plumbing</u> Horizontal portion of rain leaders including each elbow and roof drain body.	Any	1"	1"	1"

2.02 FOAMED PLASTIC SHEET AND TUBING

- A. Minimum of 4.5 lbs. Per cu. Ft. Thermal conductivity shall not exceed 0.28 at 75° F mean temperature. Insulation material equal to Armaflex.
- B. Insulate:
 - 1. Water cooler waste and trap with 12" thick foamed plastic tubing
 - 2. Domestic hot water piping below ground with ½" thick foamed plastic tubing.
 - 3. Refrigerant piping.
- C. Piping outside the building may be insulated with 1" thick flexible foamed plastic insulation with weatherproof aluminum as hereinafter specified.

2.03 HVAC DUCTWORK

- A. RECTANGULAR DUCTWORK (NOT INTERNALLY LINED) Owens-Corning 1-1/2" thick fiberglass faced duct wrap with factory-applied flame-retardant foil-reinforced Draft Facing (FRK). Type FRK 25, Series ED-100.
- B. ROUND AND OVAL DUCT WORK Owens-Corning 1-1/2" thick 3/4 lb. density fiberglass duct wrap with factory-applied flame-retardant foil-reinforced Kraft Facing (FRK). Type FRK 25, Series ED-100. Round or oval ductwork in attic shall have 2" thick 3/4 lb. density fiberglass duct wrap.
- C. RECTANGULAR DUCTWORK (INTERNALLY LINED)

ACOUSTICAL DUCT LINER

- 1. **Duct liner shall be equal to Knauf Textile Duct Liner.** Acoustical duct liner shall be a flexible type with a minimum 1" thickness using long fiberglass with a smooth firmly bonded fire-resistant surface to prevent erosion of the insulation. Surface not to exceed 25 flame spread and 50 smoke development. Thermal conductivity shall not exceed 0.26 at 75° F. mean temperature.
- 2. Noise reduction coefficient (NRC) shall not be less than .60 based on acoustical materials test, Mounting No. 6. Completely coat all duct surfaces with Benjamin Foster 85-15 adhesive. Neoprene coated side on liner shall face air stream. Sections shall be jointed by coating the edges with Foster 30-36. Secure liner to duct system with self-adhering pins adhered to clean surface and secure with self locking washers, space pins not more than 4" from the edges and not more than 16" on centers. Lining shall meet National Board of Fire Underwriters' Standards for Internal Duct Application and shall have a minimum density of 1-3 lbs. per cu. ft. All duct liner shall be marked with the density located so as to be visible on the exposed surface of the liner. Air friction correction factor shall not exceed 1.40 at 2000 FPM and 1.5 at 4000 FPM.

3. Insulate all rectangular supply, return, and outside air ductwork internally as described in Paragraphs A and B.

PART 3 EXECUTION

3.01 GENERAL

- A. The application of all insulation shall be performed by experienced mechanics, regularly employed in the trade, in a neat and workmanlike manner. Unless otherwise specified to a greater quality, the application of all insulation shall be in accordance with the manufacturer's recommendations.
- B. Omit insulation from the following items:
 1. Exposed plated plumbing pipe.
 2. Vents to atmosphere, discharge from safety and relief valves, overflow pipes, and hot only drain pipes.
 3. Valves, unions, flanges, traps, strainers, and devices in HOT ONLY piping.
 4. Exhaust discharge ducts.
- C. Foil-Faced (FF) duct insulation shall be acceptable to NFPA Standards 90A and 90B.
- D. All exposed ends of pipe insulation shall be pointed up neatly with appropriate insulating cement, or use premolded PVC end caps on cold only piping and preformed aluminum end caps on dual-temp, hot or steam piping.
- E. Piping systems shall be tested and cleaned before insulation is applied.
- F. Surfaces to be insulated shall be clean, dry and free of foreign material, such as rust, scale and dirt when insulation is applied. Perform pressure tests required by other Sections before applying insulation.
- G. 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 pipe fittings, flanges, unions and valves.
- B. Install insulation materials with smooth and even surfaces, jackets drawn tight and cemented down smoothly at longitudinal seams and end laps. Do not use scrap pieces of insulation where a full-length section will fit.
- C. Install insulation, jackets and coatings continuous through wall and floor openings and sleeves.
- D. Fittings, valves and flanges shall be insulated with field fabricated multiple mitered segments of molded fiberglass insulation of the same thickness as adjoining pipe insulation. Secure fitting insulation segments with 20 gauge galvanized steel wire and apply a smoothing coat of insulating cement. White fabric and mastic shall be used on exposed fittings.
- E. Application of all materials shall be in accordance with the manufacturer's instructions.

- F. Butt all joints of pipe insulation together and secure all jacket laps with lap adhesive. Seal all joints with joint straps furnished with insulation.
- G. Care shall be taken so as not to place insulation over vent and drain inlets and outlets.
- H. Staples are not permitted on pipe insulation.**
- I. 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.

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 0.16" thick corrugated aluminum, overlap two inches, and locate seams to shed water and secure with a minimum of three 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 COPPER PIPING (REFRIGERANT)

- A. Under ground piping, not mill coated and wrapped shall be covered with Armaflex as specified herein. After installation and testing, seal all joints and fittings as specified from insulation manufacturer.

3.05 FIBERGLASS DUCT WRAP TYPE INSULATION (To be used on round or oval duct only or on rectangular duct with a maximum dimension less than 36.) Adhere insulation tightly wrapped to duct surface with approved adhesive applied in strips approximately 4" wide on approximate 8" centers. In addition, secure insulation to the bottom and/or sides of rectangular duct work with a dimension of 24" and above with mechanical fasteners at not more than 18" on center. Butt circumferential edges of insulation and seal joints with staples at 6" o.c., adhering the flange over each joint, and seal at lap of longitudinal joints. Tape all joints and punctures with 3" wide foil reinforced Kraft tape.

3.06 ARMAFLEX PIPE INSULATION Apply in accordance with latest edition of Armstrong's "INSULATION INSTRUCTIONS TO THE CONTRACTOR". On outdoor or underground application, apply four coats of Armstrong's Weatherproof Plastic, reinforced with glass mesh.

END OF SECTION

SECTION 15200

VIBRATION ISOLATORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The requirements of the General Conditions, Supplementary Conditions, and Section 15010, "General Provisions" 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 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. There shall be no direct contact of isolated piping or equipment with partitions, conduits, floor slabs or walls.
- D. Where spring isolators are exposed to the outside, 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 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 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. 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 housing 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.

2.02 ISOLATION HANGERS 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 larger enough to permit the hanger rod to swing thru a 30 deg. arc before contacting the hole and short circuiting the spring. Mason Type 30N or PC30N.

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 runoff independent of the seal. The aluminum member shall house cadmium plated springs having a 1" 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 PIPE CONNECTORS

- A. Flexible connectors shall be the twin-sphere type, made of multiple plies of nylon cord fabric and neoprene, hydraulically molded. Connectors through 1-1/2" shall have threaded ends, and connectors 2" and larger shall have flanges with recessed groove to receive the connector's raised neoprene face. Connectors 12" and larger operating above 100 psig shall have isolated limit stops to prevent over-extension and over-compression. Limit stops shall be either control cables with neoprene isolated end fittings and anti-compression stops, or spring loaded control units. Connectors shall be line size and shall be designed for the pressures and temperatures encountered in the system, minimum 150 psig and 220 deg. F. Mason Type MFTNC.
- B. Type "M" flexible metal hose. Flexible stainless steel hose shall have stainless steel braid and carbon steel fitting. Mason Type BSS.

- 2.05 FLEXIBLE DUCT CONNECTORS 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 meet or exceeds the contract documents provide flexible connectors as made by Duro-Dyne, Young Regulator or Vent Fabrics.

- 2.06 PIPE ANCHORS Acoustical pipe anchor shall consist of telescopic arrangement of two steel tubing separated by minimum half inch thickness of heavy duty neoprene. Vertical restraints shall be provided to prevent vertical travel in either direction. Allowable loads on the isolation material shall not exceed 500 psi, the design shall be balanced for equal resistance in any direction.

- 2.07 PADS 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 1/2 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>Minimum Static Deflection Inches</u>
1.	Refrigeration Machines		
a.	Condensing Units	C	1.50
b.	Pad Mounted Condensing	Unit	PAD
2.	Air Compressors		
a.	Air Compressor or	A B-H	0.35 1.50
3.	Fans and Air Handling Equipment Up to 50 HP		
a.	Suspended Units	D	1.00
b.	Utility Set Floor Mounted	B	1.50

- B. Piping shall be isolated with "D" hanger within the mechanical room or within 50 feet of the vibrating equipment which ever is greater. Maximum deflect shall no exceed 2".
- C. Provide type M-L flexible pipe connectors on the equipment side from shut off valves at the pump suction and discharge and at other locations shown on the drawings.
- D. Provide waffle type pads under chiller and condenser water riser clamps. On risers exceeding stories or 80 feet in height, piping shall be supported by Type B spring mountings.
- E. After installation, verify that isolators are properly adjusted, with springs perpendicular to base housing, adjustment bolts are tightened up on equipment mountings, hangers are not cocked, and Type 3 base plates.

END OF SECTION

SECTION 15317

REFRIGERANT PIPING SYSTEM

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The requirements of the General Conditions and Supplementary Conditions.
- B. Refer to Specification Section 15100, "Pipe Hangers and Supports" for specification and installation requirements of the pipe support system.
- C. Refer to Specification Section 15180, "Thermal Insulation for Mechanical Systems" for specification and installation of thermal insulation for the various types of pipe, fittings, and accessories specified in this section.

1.02 DESCRIPTION OF WORK

- A. Extent of the piping systems work is indicated on the Drawings and schedules, and by the requirements of this section.
- B. The construction requirements herein shall include appurtenant structures and buildings to which the piping system is to be connected.

1.03 QUALITY ASSURANCE

- A. Codes and regulations referred to are minimum standards. Where the requirements of these specifications or drawings exceed those of the codes and regulations, the drawings and specifications shall govern.
- B. Firms regularly engaged in manufacture of piping products of types, materials and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years are approved.
- C. Certify brazing procedures, brazes and operators in accordance with Section IX ASME Boiler and Pressure Vessel Code (ANSI B31.5). Two copies of the qualification test report and certification shall be submitted to the Architect.

1.04 DEFINITIONS Pipe sizes listed are for outside diameter of the pipe (O.D.).

PART 2 PRODUCTS

2.01 REFRIGERANT PIPE

- A. All Pipe Sizes
 - 1. Type: Copper tubing of the pipe sizes listed.
 - 2. Class: Type L hard drawn tubing, ASTM B-88
 - 3. Fitting: Sweat type wrought copper.
 - 4. Joints: Socket brazed with 95-5 tin-antimony

PART 3 EXECUTION

3.01 GENERAL PIPE SYSTEM

- A. Nonferrous Metallic Pipe Where nonferrous metallic pipe, e.g., copper tubing, crosses ferrous piping material, a separation must be maintained between pipes.
- B. Cut pipe accurately to measurements, and ream free of burrs and cutting splatter. Carefully align and grade pipe, and work accurately into place. Fittings shall be used for any change in direction. Provide for expansion at every building expansion joint. Protect open pipe ends to prevent trash being placed in the lines during installation. Clean all dirt and cutting debris from pipes before making the next joint.
- C. Install piping so as to preserve access to all valves, air vents, and other equipment and to provide the maximum headroom possible.
- D. Joints shall be made with nitrogen gas in the pipes to prevent oxidation. All piping shall be installed parallel to or at right angles with building walls, columns, and partitions.
- E. Clean inside of refrigerant lines with methyl alcohol before assembly and take care thereafter to prevent foreign matter from entering and being sealed in. Cut pipe ends square and deburr. Clean pipe and fitting with #00 steel wool before joining. Make joints without burning.

3.02 TESTS

- A. Test refrigerant piping, equipment, valves and fittings at a pressure of 245 psi on the low side and 300 psi on the high side by introducing refrigerant and dry carbon dioxide (CO₂) or nitrogen throughout the refrigerant circuit. Bubble test joints with soap lather, clean joints of soap and leak-test with a halide torch. The system shall be pumped out and the entire circuit placed under 27 inches of vacuum and allowed to stand sealed off for a period of 8 hours, without any loss of vacuum.
- B. Submit an affidavit signed by the Architect's representative and the Contractor's representative stating they have witnessed and approved the dehydration test.

- 3.03 SUBMITTALS Submittals shall include but shall not be limited to a diagram approved by the compressor manufacturer, to include the size and length of the refrigerant piping, all offsets and elbows required for the installation location of all valves, filter driers, moisture and liquid indicators and flexible connectors where required.

END OF SECTION

SECTION 15400

PLUMBING BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.01 DESCRIPTION

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

B. Refer to the following sections for related work:

- 15011 Schedule of Submittal Data
- 15020 Identification of Piping Systems
- 15100 Pipe Hangers and Supports
- 15442 Water Heaters - Electric

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

1.03 GENERAL PROVISIONS AND BASIC MATERIALS The requirements of the Mechanical General Section apply to this work.

1.04 CODE

A. The work shall comply with the International Plumbing Code (2003 edition); acceptability under the codes shall not authorize any substitution, smaller size, lighter weight or less durable materials for the items specified.

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

PART 2 PRODUCTS

2.01 PIPING MATERIALS FOR DRAINAGE SYSTEMS

A. Sanitary Drainage and vent piping all sizes: Polyvinyl chloride pipe (PVC) ASTM D-2665, PVC Type DWV fittings with solvent weld joints.

B. Condensate Drain Piping: Type DWV copper pipe with tin-antimony soldered joints and drainage fittings.

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

2.03 DOMESTIC WATER PIPING

- A. Aboveground piping 3" and smaller inside building: Type "L" copper tubing with tin-antimony soldered joints and wrought copper socket fittings. Underground piping 3" and smaller: Type "K" hard drawn copper tubing, with 95-5 silver soldered joints and wrought copper socket fittings.

2.04 BASIC PIPING SPECIALTIES

A. Unions

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

B. Dielectric Adapters

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

C. Pipe Sleeves

1. The Contractor shall install, as required, in concrete, carpentry or masonry construction, all necessary hangers, sleeves, expansion bolts, inserts and other fixtures and appurtenances necessary for the support of all pipe, equipment and devices furnished under each section of the Specification.
2. Cutting of openings and installation of sleeves or frames through walls and surfaces shall be done in a neat workmanlike manner. Openings shall be cut only as large as required for the installation; sleeves, except as otherwise indicated, and/or frames shall be installed flush with finished surfaces and grouted in place. Surfaces around opening shall be left smooth and finished to match surrounding surface.
3. Where pipes pass through floor slabs, sleeve shall be standard weight black steel pipe with top of sleeve 3" above finished floor. Where pipes pass through walls, sleeves shall be standard weight black steel pipe or 20-gage galvanized sheet metal with ends flush with wall surfaces.
4. Each pipe passing through walls, floors, ceilings or partitions shall be provided with sleeves having internal diameter one inch larger than the outside dimensions of insulated pipes.
5. All pipe sleeves through floors, roofs and masonry walls shall be built in place as the affected walls, floors, and roofs are built.

6. All penetrations through rated floors shall be packed with mineral wool and capped off with a silicon caulk. As an alternate, an approved, fire rated sealant as manufactured by 3M or Hilti may be used.
7. Sleeves through exterior wall shall be steel or cast iron pipe, flush with the exterior surfaces, and with the space between the pipe and the sleeves caulked watertight in an approved manner.
8. Inserts shall be cast iron or galvanized steel individual type, with accommodations for removable nuts and threaded rods up to $\frac{3}{4}$ inch diameter, and permitting lateral adjustment.

D. Floor, Wall and Ceiling Plates

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

2.05 VALVES

- A. All shutoff valves shall be gate, butterfly, or ball valves unless otherwise noted. All drain valves shall be globe or angle valves unless otherwise noted.
- B. Gate valves 2" and smaller shall be of Class 125, body and bonnet shall be of ASTM B-62 cast bronze composition, solid disc, copper-silicon alloy stem, brass packing gland, solder ends, Teflon-impregnated packaging, and malleable handwheel; NIBCO S-11 or approved equal.
- C. Class 150 valves meeting the above specifications shall be used where pressure requires; NIBCO S-134 or approved equal.
- D. Ball valves 2" and smaller shall be 600 psi CWP, have cast brass bodies, replaceable reinforced Teflon seats, conventional port, blowout proof stems with extension for insulation, chrome-plated brass ball, solder ends with extended solder cups; NIBCO S-580-BR-R-70 or approved equal.
- F. Gate valves 2-1/2" and larger shall be Class 125 iron body, bronze mounted, with body and bonnet conforming to ASTM A-126 Class B cast iron, flanged ends, with Teflon-impregnated packing and two-piece packing gland assembly; NIBCO F-617-0 or approved equal.
- G. Globe valves 2" and smaller shall be of Class 125, body and bonnet of ASTM B-62 cast bronze composition, solder ends, copper silicon alloy stem, brass packing gland, Teflon-impregnated packing and malleable handwheel; NIBCO S-235-Y or approved equal.
- H. Globe valves 2-1/2" and larger shall be of Class 125 iron body, bronze mounted with body and bonnet conforming to ASTM A-126 Class B cast iron, flanged end, with Teflon-impregnated packing and two-piece packing gland assembly; NIBCO F-178-B or approved equal.

- I. Check valves 2" and smaller shall be of Class 125, solder ends, with bodies and caps conforming to ASTM B-62 cast bronze composition, swing type disc; NIBCO S-413-BYW or approved equal.
- J. Check valves 2-1/2" and larger shall be iron body, bronze mounted, with body and cap conforming to ASTM A-126 Class B cast iron, flanged ends, swing type disc; NIBCO F-918-B or approved equal.

2.06 PLUMBING SYSTEM INSULATIONS

- A. All pipe insulation material shall have a permanent composite insulation, jacket and adhesive fire and smoke hazard rating as tested by procedure ASTM-B84, NFPA 255, and UL 723 not exceeding Flame Spread 25, Smoke Developed 50.
- B. The use of staples for securing insulation will not be permitted.
- C. Insulation shall be applied on clean dry surfaces. All insulation shall be continuous through wall and ceiling openings and sleeves.
- D. Ends of fiberglass pipe insulation on cold pipelines shall be sealed off with white vapor barrier coating at valves, flanges and fittings.
- E. Unions shall not be insulated.
- F. Pipe covering protection shields and saddles shall be provided around exterior of pipe insulation at pipe hangers which fit around pipe insulation. Foamglass pipe insulation shall be used under saddles on pipe 2" and larger.

2.07 FIBERGLASS PIPE INSULATION Insulation shall be one piece fibrous glass sectional pipe insulation with white all service jacket. Longitudinal jacket laps and butt strips shall be self-sealing. Insulation shall have an average thermal conductivity not to exceed 0.23 BTU-in. per square foot per degrees F. per hour at a mean temperature of 75 degree F. Insulation shall be Manville Fiberglass Micro-Lok AP-T Plus or approved equal.

2.08 APPLICATION

- A. 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.
- B. Fittings, valves and flanges shall be insulated with molded fiberglass insulation of the same thickness as adjoining pipe insulation. Insulation at fittings shall be covered with white PVC jacket as manufactured by Zeston or equal.

**INSULATION THICKNESS IN INCHES
FOR PIPE SIZES**

	Temperature Up to	Up to 1"	1 ¼" to 2"	2 ½" to 4"	4" & Over
Cold Water	50°-65°F	½"	1"	1"	1"
Hot Water	200°F	½"	1"	1"	1 ½"

2.09 PIPE HANGERS AND SUPPORTS: Provide pipe hangers and supports in accordance with Section 15100 "Pipe Hangers and Supports".

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install soil and vent piping pitched to drain at minimum slope of 1/4" per foot (2%) for piping 3" and smaller, and 1/8" per foot (1%) for piping 4" and larger.
- B. Install piping and make all joints in accordance with the pipe manufacturer's recommendations. Make provisions for thermal expansion and contraction.
- C. Install cleanouts on drainage piping where indicated on the drawings and as required by the code, and at every change in direction of more than 45 degrees in horizontal piping. Locate wall cleanouts as low as possible but high enough for the cover plate to clear the base. Locate test tees where necessary to separate sections of piping for testing.
- D. Install piping and pipe supports as specified. Keep pipe ends closed except for vent and drain openings; protect vent and drains from the entrance of materials that could cause stoppage.
- E. Vents extending through roof shall terminate at 1'-0" above roof and shall be minimum size of 3" diameter.

3.02 TESTS OF PIPING

- A. Install temporary connections and plugs or valves at all points necessary for venting air from the piping, filling, holding test pressure, draining and flushing the piping.
- B. Test all new soil, waste and vent piping under 10 feet head of water (except for the uppermost 10 feet) as required by the Plumbing Code, with zero leakage allowed. The test pressure shall be maintained for at least 30 minutes before inspection starts and maintained for the time necessary to inspect all joints but not less than 15 minutes.
- C. Test all new pressure piping roughing hydrostatically to show zero leakage in eight (8) hours at the following pressures measured at the low points: Domestic water (C.W. and H.W.), 125 psi.

3.03 FLUSHING AND STERILIZING

- A. Flush all new water piping after pressure tests and repairs are completed by draining from the low points; refill with clean water.

3.04 START-UP, ADJUSTMENT, INSTRUCTION Start-up, lubricate, adjust and test equipment installed under this Section and furnish instructions to the Owner as specified in the Mechanical General Section.

END OF SECTION

SECTION 15442

WATER HEATERS - ELECTRIC

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 electric water heaters:
 - 15011 Schedule of Submittal Data
 - 15020 Identification of Piping System
 - 15100 Pipe Hangers and Supports
 - 15400 Plumbing Basic Materials and Methods

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

1.03 QUALITY ASSURANCE

- A. Manufacturing firms shall be regularly engaged in the manufacture of electric water heaters of type and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.
- B. Provide water heaters which comply with ASHRAE 90.1b-1992 for energy efficiency.
- C. U.L. and NEMA Compliances - Provide electrical components required as part of electric water heaters, which have been listed and labeled by Underwriters Laboratories and comply with NEMA Standards.
- D. NEC Compliance - Comply with the National Electric Code as applicable to installation and electrical connections of ancillary electrical components of electric water heaters.

1.04 SUBMITTALS

- A. Product Data - Submit manufacturer's plumbing equipment specifications, installation and start-up instructions.
- B. Maintenance Data - Submit maintenance data and parts lists for each item of accessory equipment. Include "trouble-shooting" maintenance guides. Include this data in maintenance manual.

PART 2 PRODUCTS

2.01 GENERAL: Refer to schedule for heater sizes, capacities, electrical characteristics and element operation.

2.02 ELECTRICAL STORAGE TYPE WATER HEATERS:

- A. Tank Materials - Tank shall be welded steel construction, 150 psi working pressure.

- B. Lining - All interior tank surfaces shall be glass lined.
- C. Elements - Electric heating elements shall be low watt density with zinc plated copper sheath.
- D. Enclosure - Heater shall be factory insulated and provided with steel enclosure with baked enamel finish.
- E. Controls - Adjustable thermostat, high temperature cut off and low water cut off.
- F. Accessories - Provide the following water heater accessories
 - Magnesium anode
 - ASME combination temperature and pressure relief valve.
 - Brass tank blowdown drain valve.
 - Thermometer
 - Automatic air vent
 - Watts No. 530 adjustable bleeder pressure relief valve.
- G. Warranty - Furnish three (3) year limited warranty for tank leakage.
- H. Manufacturer - Provide water heaters meeting specification requirements of one of the following manufacturers:
 - A.O. Smith
 - Lochinvar
 - Rheem
 - Ruud
 - State Industries

PART 3 EXECUTION

3.01 INSTALLATION OF WATER HEATERS

- A. Install water heaters where indicated on drawings, in accordance with manufacturer's installation instructions, and in compliance with applicable codes.
- B. Connections - Make connections between water heaters and domestic water piping shutoff valves with unions or flanges as indicated. Provide dielectric isolation at all tank connections.
- C. Identification - Provide sign securely attached to water heater identifying equipment number, service and capacity. Provide identification on all piping connections to water heaters.
- D. Testing - Upon completion of installation, pressure test water heaters hydrostatically to assure structural integrity and freedom from leaks.
- E. Disinfection and Flushing - Disinfect in accordance with potable water piping requirements and flush water heaters upon completion of installation in accordance with manufacturer's instructions, and comply with applicable health codes.

END OF SECTION

SECTION 15660 CONDENSING UNITS (CU-1, CU-2)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Condensing unit package.
- B. Charge of refrigerant and oil.
- C. Controls and control connections.
- D. Refrigerant piping connections.
- E. Motor starters.
- F. Electrical power connections.

1.02 RELATED SECTIONS

- A. Section 03300 - Cast-in-Place Concrete: Equipment bases.
- B. Section 15317 - Refrigeration Piping Systems.
- C. Section 15860 – Central Air Handling Units.
- D. Section 15900 – Automatic Temperature Controls.
- E. Section 15200 - Vibration Isolators

1.03 REFERENCES

- A. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.
- B. ANSI/ASHRAE/IES 90 A - Energy Conservation in New Building Design Standard.
- C. ARI 210/240 - Unitary Air-Conditioning Equipment and Air-Source Heat Pump Equipment, (units less than 135,000 Btuh).
- D. ARI 360 - Commercial and Industrial Unitary Air Conditioning Equipment testing and rating standard (condensing units greater than 135,000 Btuh).
- E. ARI 340 - Commercial and Industrial Unitary Heat Pump Equipment, (heat pumps greater than 135,000 Btuh).
- F. ANSI Z21.47/UL1995 - Unitary Air Conditioning Standard for safety requirements.
- G. California Energy Commission Administrative Code - Title 20/24 - Establishes the minimum efficiency requirements for HVAC equipment installed in new buildings in the State of California.
- H. ARI 270 - Sound Rating of Outdoor Unitary Equipment, (units less than 135,00 Btuh).

- I. ARI 370 - Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment (equipment above 135,000 Btuh).
- 1.04 SUBMITTALS
- A. Submit unit performance data including: capacity, nominal and operating performance.
 - B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
 - C. Submit shop drawings indicating overall dimensions as well as installation, operation and service clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.
 - D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.
- 1.05 DELIVERY, STORAGE, AND HANDLING
- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
 - B. Protect units on site from physical damage. Protect coils.
- 1.06 WARRANTY
- A. Provide parts warranty for one year from start-up or 18 months from shipment, whichever occurs first.
 - B. Provide one year parts warranty.
 - C. Provide five year extended warranty for compressors.
- 1.07 MAINTENANCE SERVICE
- A. Provide maintenance service with a two month interval as maximum time period between calls. Provide 24 hour emergency service on breakdowns and malfunctions.
 - B. Include maintenance items as outlined in manufacturer's operating and maintenance data.
 - C. Submit copy of service call work order or report and include description of work performed.
- 1.08 REGULATORY REQUIREMENTS
- A. Unit shall conform to ANSI Z21.47/UL 1995 for construction of packaged air conditioner.
 - 1. In the event the unit is not UL approved, the manufacturer must, at his expense, provide for a field inspection by a UL representative to verify conformance to UL standards. If necessary, contractor shall perform modifications to the unit to comply with UL, as directed by the UL representative, at no additional expense to the Owner.

1.09 ACOUSTICS

- A. Manufacturer of condensing units shall provide outdoor sound power level data across all major octave band center frequencies for cataloged operating range of unit at gross cooling capacity range. Data shall be obtained in conformance with ANSI S1.32-1980, American National Standard Methods for the Determination of Sound Power Levels of Discrete Frequency and Narrow Band Noise Sources in Reverberation Rooms and per AMCA Standard 300-85 test code "Sound Rating Air Moving Devices".

PART 2 PRODUCTS

2.01 SUMMARY

- A. The contractor shall furnish and install air-cooled condensing units as shown as scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform at the specified conditions as scheduled.

B. APPROVED MANUFACTURER

- 1. Trane

2.02 GENERAL UNIT DESCRIPTION

- A. Provide self-contained, packaged, factory-assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressors, condensing coil and fans, integral sub-cooling circuits, filter driers, and controls. Provide expansion valves and check valves for split system heat pump units.
- B. Performance Ratings: Energy Efficiency Rating minimum 11.5 EER as prescribed by ANSI/ASHRAE 90A.

2.03 CASING:

- A. Cabinet: Galvanized steel, phosphatized, and finished with an air-dry paint coating durable enough to withstand 1000 consecutive-hour salt spray application in accordance with standard ASTM B 117. Structural members shall be 14 gauge with access doors and removable panels of minimum 18 gauge steel.
- B. Control Panel: The unit control panel section shall be compartmented to separate high and low voltage components. The control panels shall also be fully gasketed, hinged and provided with quick release latches for easy access.

2.04 CONDENSER SECTION

- A. Coils aluminum fins mechanically bonded to copper tubing. Provide subcooling circuit(s). Factory leak test under water to 450 psig and vacuum dehydrate.
- B. Units shall be furnished with fully louvered condenser coil guards. Coil guards shall completely cover condenser coil and compressor/piping areas.

2.05 REFRIGERANT CIRCUIT

- A. Provide a minimum of two circuits all units.
- B. Provide pressure gauges for suction and discharge for each circuit. Mount gauges adjacent to compressors.

2.06 FANS AND MOTORS

- A. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge. Fans shall be statically and dynamically balanced.
- B. Weatherproof motors suitable for outdoor use, with permanently lubricated totally enclosed or open construction motors shall be provided and shall have built in current and thermal overload protection. Motors shall be either sleeve or ball bearing type.

2.07 COMPRESSORS

- A. Compressors shall be industrial grade, energy-efficient direct-drive 3600 RPM maximum speed scroll type. The motor shall be of a suction gas cooled hermetic design. Compressor shall have centrifugal oil pump with dirt separator, oil sight glass, and oil charging valve. A solid state temperature sensor shall be embedded in the motor windings to protect against excessive winding temperatures.
 - 1. If semi-hermetic scroll industrial grade compressors are utilized provide single piece crankshafts, connecting rods, aluminum pistons, rings to prevent gas leakage, high strength non-flexing ring type suction and discharge valves, spring loaded heads, replaceable cylinder liners, and sealing surface immersed in oil. Provide removable discharge heads and hand hole covers, and discharge service valves.
 - 2. Provide compressor with automatic capacity reduction equipment consisting of suction valve unloaders. Use electric solenoid actuated lifting mechanism operated by oil pressure. Provide for unloaded compressor start.
- B. Motor shall be designed for across-the-line starting and suitable for a voltage utilization range of +/- 10 percent from nameplate voltage.

2.08 CONTROLS

- A. Variable Air Volume Control: Provide Honeywell W7100A discharge air controller with factory supplied, field installed discharge air sensor. Provide preventative coil frost protection for compressor unloading based on refrigerant circuit suction temperature to prevent coil frosting with minimum energy usage. The controller shall provide a voltage output signal for interface with field supplied components for simultaneous economizer operation.
- B. Unit Control: Provide 115 volt control circuit with fusing and control power transformer. Unit wired with contactors for compressor and condenser motors, compressor overload protection, high/low cutouts, differential oil pressure control, reset relay, and anti-cycle compressor timer.

2.09 LOW AMBIENT CONTROLS

- A. Provide low ambient electronic damper assemblies to allow the unit to start and operate down to 0 degrees F (10 degrees F with hot gas bypass) outdoor ambient conditions. Low ambient damper operation shall be modulated based upon refrigerant head pressure.

2.10 MISCELLANEOUS FEATURES

- A. Fully louvered condenser and compressor section coil guards.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide for connection to electrical service.
- C. Install units on vibration isolation.
- D. Install units on concrete base as indicated.
- E. Provide connection to refrigeration piping system and evaporators.

3.02 MANUFACTURER'S FIELD SERVICES

- A. Supply initial charge of refrigerant and oil for each refrigerant circuit.

END OF SECTION

SECTION 15810

VARIABLE AIR VOLUME UNITS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. The requirements of the General Conditions, Supplementary Conditions, and Section 15010 "General Provisions" apply to all work specified in this Section.
- B. Refer to Specification Section 15011, titled "Schedule of Submittals Data" for the submittal and approval requirements regarding the piping system.
- C. Furnish and install all required equipment, appurtenances, and accessories for a complete heating and/or cooling system.
- D. See other sections of these specifications that may specify accessories or features.
- E. Refer to the schedules on the drawings where equipment capacities are not included in this section.
- F. Review other sections of the Specifications and the Drawings for services required to each piece of mechanical equipment. Any required accessories, appurtenances, or service omitted from the plans or specifications that are not called to the attention of the Architect at least 72 hours before bidding and corrected by addendum shall be provided as though shown.

1.02 ACCEPTABLE MANUFACTURERS:

- A. The following manufacturer is acceptable on this project: Trane.

1.03 RELATED SECTIONS

- A. Section 15840 - Ductwork and Accessories.
- B. Section 15900 – Automatic Temperature Controls.
- C. Section 15870 – Grilles, Registers and Diffusers.

1.04 REFERENCES

- A. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- B. UL 181 - Factory-Made Air Ducts and Connectors.
- C. NFPA 70 - Electric Duct Heaters.
- D. UL 1995, Heating and Cooling Equipment.
- E. CUL C22.2 No. 236, Heating and Cooling Equipment.
- F. ARI 880 - Air-Conditioning and Refrigeration Institute Standard Rating Conditions for Air Terminals
- G. ASTM A 527 (Steel Sheet, Zinc Coated Galvanized).

- H. A-A-1419 or F-F-310 Federal specification (filter element, Air conditioning, Viscous-impingement or Dry type, replaceable), Tested per UL 900.

1.05 SUBMITTALS

- A. Submit shop drawings and product data sheets indicating configuration, general assembly, and materials used in fabrication.
- B. Submit product performance data indicating design air flow, minimum static pressure drop, fan operating condition.
- C. Submit installation, operation and maintenance documentation.

1.06 QUALIFICATIONS

- A. Manufacturer: The company manufacturing the products specified in this section shall have a minimum of ten years experience producing products of this type.

1.07 SYSTEM RESPONSIBILITY

- A. The contractor shall be responsible for any and all costs associated with any and all changes resulting from the use of a supplier other than the listed acceptable manufacturers.

1.08 WARRANTY

- A. Provide manufacturer's parts warranty for one year from unit start-up or eighteen months from unit shipment, whichever is shorter.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. General
 - 1. Manufacturer shall participate in the ARI Certification program. Unit performance data shall be rated in accordance with ARI Standard 880. The manufacturer shall display the ARI Symbol on all units.
 - 2. Single duct terminal units shall be UL listed as an entire assembly.
- B. Acceptable Manufacturer
 - 1. Trane

2.02 MANUFACTURED UNITS

- A. Single duct terminal units: Ceiling mounted primary air control terminal units for connection to a single medium - 1.5-3.0 in. wg. pressure duct of a central air distribution system. Terminals units may be provided with controls and integral heating coils.
- B. Identify each terminal unit with clearly marked identification label and airflow indicator. Label shall include unit nominal air flow, maximum factory-set air flow, minimum factory-set air flow, and coil type.

2.03 FABRICATION

- A. Casings: Units shall be completely factory-assembled, manufactured of corrosion protected steel, and fabricated with a minimum of 18-gauge metal on the high pressure (inlet) side of the terminal unit damper and 22-gauge metal on the low pressure (outlet) side and unit casing.
- B. INSULATION - Matte Faced - The interior surface of unit casing acoustically and thermally lined with a minimum of 1/2 inch, 1.75 lb./cu. ft. density glass fiber with a high density facing. The insulation R-Value shall be a minimum of 1.9. Insulation shall meet NFPA-90A and UL 181 requirements.
- C. INSULATION EDGE TREATMENT - All cut edges of insulation shall completely enclosed by metal to arrest cut fibers and prevent erosion into the airstream.
- D. Assembly: Primary air control damper, airflow sensor, fans, controls and optional heating coil in single cabinet.
- E. Rectangular Supply Air Outlet Connections: Rectangular outlet connections for single duct units shall be slip and drive type. Rectangular outlet connections for dual duct and fan powered units shall be flanged type.

2.04 PRIMARY AIR CONTROL DAMPER ASSEMBLY

- A. Locate primary air control damper assembly inside unit casing. Construct the damper assembly from extruded aluminum and/or a minimum 20 gauge galvanized steel components. Maximum damper leak rate shall not exceed 1% of damper nominal CFM at 4 inch wg. differential.
- B. Provide damper assembly with integral flow sensor. Flow sensor shall be provided regardless of control type. Flow sensor shall be a multi-point, averaging, ring or cross type. Bar or single point sensing type is not acceptable.

2.05 HEATING COILS

- A. Electric Resistance Heating Coil: Coil shall be factory installed and wired and shall be constructed of open-wire type resistance heat elements. Coils shall be provided with primary and secondary over-temperature protection. Coils shall be constructed for single point power connection. Controls shall consist of an integral control box which includes a 24 VAC transformer and magnetic contactors. Electric heat coil shall be installed at the terminal unit supply air outlet connection.
 - 1. All single duct terminal unit electric heat coils shall be furnished with an airflow switch to disable the coil upon a low flow condition.
 - 2. Disconnect switch - Provide a door interlocking switch to disconnect power to the unit when the coil control panel is opened.
- B. Capacity: Provide coils in capacities as scheduled on the drawings.

2.06 WIRING

- A. Factory install and wire power line fusing, a disconnect switch and a 24 VAC transformer for control voltage on direct digital or electronic control units. Provide terminal strip in control box for field wiring of thermostat and power source.

- B. Install electrical components in control box with removable cover. Incorporate single point electrical connection to power source.
- C. Disconnect switch - Provide single duct terminals with a factory installed and wired switch to disconnect power to the unit controls.
- D. Control Transformer - Provide single and dual duct terminal units with a factory installed and wired 24 VAC transformer to provide control voltage power to the unit.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The Contractor, prior to installing any equipment, shall examine the conditions under which the equipment is to be installed, and shall notify the Architect of conditions detrimental to the proper installation of the equipment.
- B. Install all equipment in accordance with the latest manufacturer's written instructions, and in accordance with governing codes and recognized industry standards and practices to ensure that the equipment serves the intended function.
- C. Coordinate all work with other trades as necessary for proper interfacing.
- D. All equipment shall be protected from any form of damage. Any damaged equipment shall be replaced without additional cost.

3.02 START-UP: The initial start-up shall be made by an authorized representative of the equipment manufacturer.

3.03 ADJUSTMENT: The equipment shall be tested and adjusted to ensure the scheduled capacities as indicated. All controls shall be tested and adjusted.

END OF SECTION

SECTION 15840

DUCTWORK AND ACCESSORIES

PART 1 GENERAL

1.01 DESCRIPTION

- A. All work specified in this Section is subject to the provisions of Division 15000.
- B. Ductwork shall be provided to meet the minimum capacities indicated, shall meet all constraints of construction, and shall comply with all Specification Sections.
- C. See Section 15180 for ductwork insulation.
- D. No ductwork shall be fabricated until fabrication shop drawings have been prepared, submitted and reviewed.

PART 2 PRODUCTS

2.01 DUCTWORK - GENERAL

- A. SMACNA Standards indicated shall mean standard published by the Sheet Metal and Air Conditioning Contractor's National Association, Inc. Ductwork shall be constructed in complete conformance with the latest edition of the SMACNA Manual. Duct classification shall be as follows:
 - 1. From air handling unit to all terminal units: Medium Pressure - 6" static pressure, Class A seals.
 - 2. From terminal units to diffusers, toilet exhaust ductwork: Low Pressure - 1" static pressure, Class B seals.
- B. Ductwork shall be constructed of G90 galvanized sheet steel, unless otherwise specified herein. All medium pressure supply air ductwork from each rooftop unit for the first twenty feet shall be perforated acoustical (K-27 or equal). All return and outside air ductwork shall be lined with duct liner. Additionally, each branch duct which connects to the main supply air duct within the first twenty (20) feet from the unit shall be perforated acoustical for the first five (5) feet. Medium pressure ductwork may be 1" thick, double-wall, acoustical duct (K-27 or equal), at the Contractor's option. Ductwork shall be round, oval or rectangular as indicated. 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. Liner for first 5'feet from VAV Boxes shall be 1" thick, 3 lb. per cubic foot density fiberglass duct liner. All other internally insulated ductwork shall be 1" thick, 1-1/2 lb. cubic foot density fiber glass duct liner. Secure liner with spray-on adhesive and stick pins and clips. Liner shall have black neoprene face in contact with the air stream. Liner shall meet all requirements for Flame Spread and Smoke Developed ratings; i.e., NFPA 25/50. Thermal conductivity for duct liner insulation shall be $K = 0.24 \text{ Btu-in. per sq. ft. per } ^\circ\text{F per hour at } 75^\circ\text{F mean temperature}$.
- D. Ductwork fabrication shop drawings shall be submitted as part of the shop drawing submittal. See Section 15012 "Coordination Drawings".

- E. Turning vanes shall be installed in all 90 degree square and rectangular elbows and at other locations shown. The turning vanes shall be double thickness type, with vanes secured to the runners and runners secured to the duct. Elbows in round ductwork and other radiused elbows shall have an inside radius equal to the diameter of the duct.
- F. All branch takeoffs in medium pressure ductwork shall be made with conical, bellmouth, or lateral fittings.
- G. Low pressure round ducts up to and including 12" in diameter shall be longitudinal lock seam construction. Low pressure round ducts larger than 12" and all medium pressure round ducts shall be spiral lock seam construction.
 - 1. Girth joints in ducts up to and including 12" shall be beaded crimp type and each joint shall be fastened with sheet metal screws, equally spaced, not more than 8" on centers and with a minimum of 3 screws in each joint. The beaded-crimp joint shall provide at least a 1" lap to accommodate the sheet metal screws.
 - 2. Girth joints in ducts larger than 12" shall be the beaded sleeve type. The beaded sleeve joints shall be fabricated of the same gauge galvanized sheet steel and the duct shall be fastened with a minimum of 3 sheet metal screws in each joint.
- H. Duct hangers and supports shall be in accordance with Section IV (pages 4-1 through 4-13) **HANGERS AND SUPPORTS** of the referenced SMACNA Standard, except:
 - 1. Hangers shall be spaced not over 8'-0" on centers.
 - 2. For rectangular ducts with longest dimensions up through 60", hangers shall be the galvanized steel strap type; with the longest dimension 61" and larger, hangers shall be trapeze type constructed of galvanized steel angles with round hanger rods. Sizes for strap hangers and trapeze angles and rods shall be based on duct size as scheduled in the SMACNA Standard, Table 4-1 (page 4-8) for strap hangers and Table 4-3 (page 4-10) for trapeze hangers.
 - 3. For round ducts, hangers shall be galvanized steel strap hangers. Sizes and number of strap hangers shall be based on duct size as scheduled in the SMACNA Standard, Table 4-2 (page 4-9). For duct sizes requiring 2 hangers, the hanger supports shall be minimum 3/8" round steel hanger rods.

2.02 MANUAL DAMPERS AND DAMPER HARDWARE

- A. Splitter dampers shall be constructed of not less than 20 gauge galvanized steel sheet. The length of the damper blade shall be the same as the width of the widest duct section at the split, but in no case shall blade length be less than 12".
- B. Volume Control Dampers
 - 1. Dampers shall be single blade butterfly type in ducts up to and including 12" x 12" size; for ducts larger than 12" x 12", in either or both dimensions, the dampers shall be the multi-blade type. All dampers in O.A. ductwork shall shut tightly and have vinyl edge seals.
 - 2. Single blade butterfly dampers shall be constructed of not less than 16 gauge 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 12" in either direction shall be multi-blade dampers and shall be the opposed blade type, constructed of not less than 16 gauge galvanized steel blade mounted in galvanized steel channel frame. Blade spacing shall not exceed 6" and the top and bottom edges of the blade shall be crimped to stiffen the blades. Damper blades shall be interconnected by rods and linkages to provide simultaneous operation of all blades. Damper shall be provided with an extended rod to permit installation of a damper regulator.

C. Hardware for Manual Dampers

1. Splitter damper hardware - When neither dimension of a damper exceeds 18", the damper shall be provided with a ball joint bracket attached to the outside of the duct. The bracket shall have a set screw for securing damper rod in position. The damper operating rod shall be not less than 1/4" diameter steel rod and shall be secured to the damper blade with a clip. When either dimension of a damper exceeds 18", the damper shall be provided with 2 ball joint brackets and rods. The rods shall be located at quarter points on the damper.
2. Duct mounted regulators with operating handle and locking quadrant shall be provided on manual volume control dampers.
3. Damper hardware shall be Ventfabrics, Young Regulator or Duro-Dyne provided the equipment meets or exceeds the requirements of the Contract Documents.

D. Dampers shall be Ruskin, Price, or Greenheck.

2.03 FLEXIBLE DUCTWORK

- A. Flexible ductwork shall be Class 1, UL 181 air duct with an aluminized mylar or polyester inner liner laminated to a corrosion resistant steel wire helix. Aluminum helix is not acceptable.
- B. A 1" thick, one (1) pound density fiberglass insulation and vinyl outer jacket shall cover the wire helix.
- C. The maximum allowable length of low pressure flexible ductwork shall be 4'-0" and shall be limited to short run-outs and end runs connected to round neck ceiling supply diffusers. Provide a spin-in fitting with integral volume damper at all flexible run-out connections in low pressure ductwork.
- D. The maximum allowable length of medium pressure flexible ductwork shall be 1'-0" and shall be limited to short run-outs connecting FPB and VAV units to medium pressure sheet metal ductwork.
- E. Flexible ductwork shall be designed for pressures up to 4" W.G. for low pressure ductwork and 10" W.G. for medium pressure ductwork.
- F. Low pressure flexible ductwork shall be Clecon Model Flex 28 VF Series or Genflex Type SLS-181 or Wiremold type WGC and medium pressure flexible ductwork shall be Clecon Model FLEX 28 VF Series, Genflex 1HPL-181 or Wiremold type WGC.

2.04 FLEXIBLE DUCT CONNECTIONS: Flexible duct connections shall be non-combustible, installed at all belt-driven equipment and where shown. Material shall be glass fabric double coated with neoprene (30 Oz. per square yard minimum) and shall be Vent Fabrics, Duro-Dyne or Young Regulator, provided the equipment meets or exceeds the requirements of the Contract Documents. Provide duct supports on each side of flexible connections.

2.05 FIRE DAMPERS

A. Fire dampers (FD) 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 or oval duct). Damper shall be Ruskin Model 1BD2 or approved equal.

1. Hat channel frame shall be 16 gauge (1.5 mm) minimum galvanized steel with tabbed corners for reinforcement. Bearings shall be stainless steel sleeve. Blades shall be airfoil shaped double skin construction with 14 gage (1.9 mm) equivalent thickness. Blade edge seals shall be silicone rubber and galvanized steel mechanically locked in blade edge (adhesive or clip fastened seals not acceptable) and shall withstand 450 F (232 C). Jamb seals shall be flexible metal compression type.
2. Each damper shall be 1-1/2 hour rated under UL555, and shall further be classified by Underwriters Laboratories as a Leakage Rated Damper for use in smoke control systems. Leakage rating under UL555S shall be Class 1 (4 cfm/sq. ft. at 1" w.g. and 8 cfm/sq. ft. at 4" w.g.).
3. Dampers shall operate (open and close) under HVAC system operating conditions with pressures of at least 8" w.g. in the closed position and 4000 fpm air velocity in the open position.
4. In addition to the leakage ratings, the dampers and their actuators shall be qualified as a single entity under UL555S to 350 F (177 C) elevated temperature. Actuators shall be installed at time of damper fabrication. Dampers shall be equipped with factory supplied caulked sleeve. All wiring or piping material required to interconnect the actuator with detection and/or alarm or other systems shall be furnished by others. Damper shall be Model FSD60 or approved equal.
5. Electric actuator shall be 120 volts ac, 70 watts running and 25 watts while in the holding mode. The actuator shall be designed to spring the damper closed upon loss of power in less than 20 seconds. Stall type actuators are unacceptable. Damper actuators shall be factory installed on the damper and tested to verify cycle timing.

B. Acceptable manufacturers of fire dampers are: Prefco, Ruskin, or Air Balance provided, the equipment meets or exceeds the requirements of the Contract Documents.

2.06 ACCESS DOORS

A. Provide a duct access door at each fire and/or smoke damper where required for access. Access doors 18" x 18" and larger shall have a continuous hinge on one 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 shall be double metal faced, internally insulated same as duct, and provided for gasket seal. Access doors downstream of fire dampers in medium pressure ductwork shall be the implosion type.

- B. Coordinate the location of access doors above inaccessible ceilings with the Architect.
- 2.07 AIR EXTRACTORS: Provide in duct mounted supply outlets and takeoff or extension collars to supply outlets. Air extractors shall be factory-fabricated and factory or field assembled units consisting of curved turning vanes or louver blades for uniform air distribution and change of direction with minimum turbulence and pressure loss. Where adjustable devices such as air deflectors or extractors are inaccessible they shall be provided with means for adjustment and position lock external to the duct in which they are located. Similar to Young Regulator Model No. 1.
- 2.08 DUCT INSTRUMENT TEST HOLES: Provide for each system four (4) test holes two: (2) in supply duct and two(2) in return air plenum at opposite ends near air handling units with screwed caps. Also, at duct mounted coils and electric duct heaters provide one (1) on either side of the coil or duct heater.
- 2.09 REGISTER AND GRILLE CONNECTION
 - A. Where take-offs are on side of duct, clinch lock short tee sections onto trunk. Install collars with slip joints and 3/4" flange at outlet end. At plastered surfaces set collars exactly flush with plaster surface (mechanic must be on job to make adjustments during plaster application). Set flange face so as to receive register gasket, and be concealed by register flange. Collars may be deleted where mounting frames are furnished with registers.
 - B. Install boots above lay-in ceilings simultaneously with ceiling work; mechanic must be on job during this phase of construction work.
 - C. At return relief and exhaust grilles 48" or more in either dimension, collars shall be 1 x 2 x 1/8 inch steel angle frames with corners mitered, welded and ground smooth. Frames in ceilings shall be independently suspended from the ceiling structure, or the duct shall have special reinforcing to prevent sagging of the boot.
 - D. Interior of ductwork visible through grilles and diffusers shall be painted flat black.

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. Duct liner shall be cut to provide overlapped and compressed longitudinal corner joints. Liner shall be installed with coated surface facing the air stream. Duct liner shall be adhered to the ductwork with a 100% coverage of the sheet metal surfaces using a fire retardant adhesive applied by spraying. Coat all exposed leading edges and all transverse joints with fire retardant adhesive. All leading and trailing edges shall be secured with sheet metal airfoils.
- D. Sound Proof Construction for Duct Penetrations is required for openings between ductwork and interior spaces. The method for sound proofing shall be as follows:
 - 1. Fill openings with fibrous glass blanket or board for full depth of penetration.

2. Caulk each side of opening with non-hardening, non-aging caulking compound equal to Johns-Manville "Duxeal".
3. Penetrations through fire-rated partitions and shafts shall be sealed with Dow-Corning RTV fire-retardant foam.
4. Duct system sound levels shall be maintained at such a level as to not exceed a maximum of NC 35 for all spaces. Duct fabrication and installation shall be altered, if noise levels are exceeded, at no cost to the Contract.
5. All exterior kitchen exhaust ductwork shall be painted with rust inhibiting primer.
6. Unavoidable obstruction: Where structural elements or pipes must pass through a duct, provide two-piece streamliners, and enlarge duct to compensate for net loss of area. Round pipes and rods smaller than three (3) inches need not have special treatment. Note: This provision will not be used to justify obstructions which can be avoided.

E. Splitter Dampers

1. Provide where shown on drawings. Fabricate blades of same thickness galvanized steel as the duct where used (min. 20 ga.), securely attached to a rod at the air leading edge to present a round nose to air flow. Length shall be sufficient to close either branch duct.
2. Anchor splitters at the air entering edge by 3/16 inch adjustable galvanized steel rods that pass through set screw clamps on the outside of duct. Use one (1) rod and clamp on splitters with leading edge up to 15 inches, (2) rods up to 30 inches, and on 15 inch centers above 30 inches.
3. When splitter dampers occur above other than lay-in ceilings, provide Young Model No. 890-A damper assembly complete with supports, bearings and Young No. 1 regulators with an additional end bearing and chromium plated ceiling escutcheon.

END OF SECTION

SECTION 15841

FILTERS

PART 1 GENERAL

- 1.01 GENERAL: All work specified in this Section is subject to the provisions of Section 15010.
- 1.02 COORDINATION: The filters of one manufacturer (Farr) have been used as the basis of design. Any modifications to ductwork, building structure, etc., that result from the use of any other units shall be coordinated with all trades; this coordination shall occur before delivery of equipment from the manufacturer. Any modifications shall be performed without incurring any additional cost to the Owner.
- 1.03 ACCEPTABLE MANUFACTURERS:
 - A. Manufacturers listed below are acceptable: Farr.
 - B. All devices selected must meet or exceed all the requirements of the Contract Documents.

PART 2 PRODUCTS

- 2.01 FILTER: Filter media shall have an average efficiency of 35-35% on ASHRAE Test Standard 52-76. It shall have an average arrestance of not less than 97% on that standard. Filters shall be listed by Underwriter's Laboratories as Class 2.

PART 3 EXECUTION

- 3.01 SPARES: Provide one (1) complete set of replacement filters as recommended by the manufacturer.

END OF SECTION

SECTION 15850

FANS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Requirements of the General Conditions, Supplementary Conditions, and Section 15010 "General Provisions" 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.
- C. Furnish and install all required equipment, appurtenances, and accessories for a complete heating and cooling system.
- D. See other sections of these specifications that may specify accessories or features.
- E. Refer to the schedules on the drawings where equipment capacities are not included in this section.
- F. Review other sections of the specifications and the plans for services required to each piece of mechanical equipment. Any required accessories, appurtenances, or service omitted from the plans or specifications that is not called to the attention of the Architect at least 72 hours before bidding and corrected by addendum shall be provided as though shown.
- G. 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.
- H. Fan motor enclosure shall be the drip-proof type unless specifically indicated otherwise.
- I. Roof-mounted fans shall be waterproof design so that water cannot enter the building through the fan housing, whether or not the fan is operating.
- J. Belt driven power assemblies shall be mounted on vibration isolators.
- K. Centrifugal fan wheel shall be statically and dynamically balanced.

1.02 COORDINATION

- A. Motors required in connection with equipment shall be of sufficient size and speed for duty to be performed, not exceeding their full-rated load when driven equipment is operated at specified capacity under most severe conditions likely to be encountered.
- B. Belt drives shall be adjustable "V" belt type. Selection shall be based on 150% of the motor horsepower. Selection shall be factory-set so that specified capacity is at midpoint setting, allowing 20% overall speed adjustment. Motors shall be selected on 110% of the brake horsepower required with a service factor of 1. Motors and/or drives shall be changed if required to delivery specified CFM should static pressure differ from that specified.
- C. All exposed rotating machinery shall be equipped with guards.

- D. Submit all equipment for approval.

1.03 SUBMITTALS

- A. In accordance with Section 15011, submittals shall be furnished for the following:
 - 1. All fan sections, including motors and drives. All centrifugal fans, including motors and drives.
 - 2. In-line centrifugal fans
- B. Complete maintenance and operating manuals.
- C. Sound power levels for all fans (Db and/or sone levels).
- D. Provide fan curves for each fan showing CFM versus static pressure, horsepower and efficiency at the specified design point.

1.04 APPLICABLE STANDARDS

- A. All fans and power exhausters shall be listed in the current edition of AMCA and shall bear the AMCA seal.
- B. Fan performance criteria:
 - 1. Fans shall be scheduled on plans indicating manufacturer's name and model number, CFM, static pressure, sones, drive, horsepower and voltage. Fan motors $\frac{1}{2}$ horsepower and larger shall be sized based on full design CFM at 115% design static pressure.

PART 2 PRODUCTS

- 2.01 COORDINATION: Units of one manufacturer have been used as the basis of design. Any modifications to electrical connections, building structure, etc., that result from the use of another manufacturer shall be coordinated with all other trades. This coordination shall occur before delivery of equipment from the manufacturer. Any modifications shall be performed without incurring any additional cost to the contract.

2.02 FANS

- A. Furnish and install all supply and exhaust fans as scheduled on drawings. Fans shall be of the type size and capacity as scheduled and shall be furnished as hereinafter specified and scheduled.
- B. All fans shall have been statically and dynamically balanced prior to leaving the factory. Fans found vibrating noticeable in the field, due to damage in shipment, improper handling, etc., shall be removed and replaced at no additional cost to the Owner.

2.03 DESCRIPTION

A. CABINET FANS

1. Ceiling and inline cabinet fans as indicated on drawings shall have acoustically insulated housings and shall not exceed sound level ratings shown. Fans shall bear the AMCA Certified Ratings Seal and UL Label. Integral backdraft damper shall be chatter-proof. Fans shall have true centrifugal wheels. Face grille shall be of aerodynamic white egg crate design and provide 85% free area. Manufacturers shall submit vibration amplitudes and magnetic motor hum in decibels. Fans shall be provided with cord, plug, and receptacle inside the housing. Entire fan, motor and wheel assembly shall be removable without disturbing the housing. Fan motors shall be suitably grounded and mounted on vibration isolators. Fans shall be manufactured by Greenheck or Cook.

B. IN-LINE CENTRIFUGAL FANS

1. 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). 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.
2. 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.
3. The fan wheel shall be the air foil centrifugal type for fan wheels 27" and larger in diameter and backward inclined type for fan wheels under 27" in diameter. 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.
4. The motor shall be mounted on an adjustable base and shall be as specified herein before. Provide drive guards.
5. Fans shall be manufactured by Greenheck or Cook.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The Contractor, prior to installing any equipment, shall examine the conditions under which the equipment is to be installed, and shall notify the Architect of conditions detrimental to the proper installation of the equipment.
- B. All equipment shall be installed in accordance with the latest manufacturer's written instructions, and in accordance with governing codes and recognized industry standards and practices.
- C. Coordinate all work with other trades as necessary for proper interfacing.

- D. All proper equipment shall be protected from any form of damage. Any damaged equipment shall be replaced without additional cost.
- 3.02 START-UP: An authorized representative of the equipment manufacturer shall make the initial start-up. The balancing contractor shall be responsible for final verification and reporting of all airflows.
- 3.03 ADJUSTMENT: The equipment shall be tested and adjusted to ensure the scheduled capacities as indicated. All controls shall be tested and adjusted.

END OF SECTION

SECTION 15860

CENTRAL AIR HANDLING UNITS

PART 1 GENERAL

1.01 GENERAL

- A. Manufacturer must clearly define any exceptions made to the Plans and Specifications Mechanical contractor is responsible for expenses that occur due to exceptions made.
- B. Unit must be specifically designed for indoor outdoor installation.
- C. Fabricate draw-through type air handling units suitable for medium pressure operation.
- D. Fabricate units with fan and coil sections plus accessories, including cooling coil, mixing box/ filter section drain pan.
- E. Unit casing shall be leak-proof and constructed to withstand suction pressure of 2.0 inch water gauge with a maximum deflection of 1 in 200.

1.02 RELATED DOCUMENTS

- A. Requirements of the General Conditions, Supplementary Conditions, and Section 15010 "General Provisions" 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.
- C. Furnish and install all required equipment, appurtenances, and accessories for a complete heating and cooling system.
- D. See other sections of these specifications that may specify accessories or features.
- E. Refer to the schedules on the drawings where equipment capacities are not included in this section.
- F. Review other sections of the specifications and the plans for services required to each piece of mechanical equipment. Any required accessories, appurtenances, or service omitted from the Drawings or Specifications that are not called to the attention of the Architect at least 72 hours before bidding and corrected by addendum shall be provided as though shown.
- G. Section 15100 – Pipe Hangers and Supports.
- I. Section 15180 – Thermal Insulation For Mechanical Systems

1.03 ACCEPTABLE MANUFACTURERS: Air handling units shall be as manufactured by Trane.

1.04 COORDINATION

- A. Motors required in connection with equipment shall be of sufficient size and speed for duty to be performed, not exceeding their full-rated load when driven equipment is operated at specified capacity under most severe conditions likely to be encountered.

- B. Belt drives shall be adjustable "V" Belt Type. Selection shall be based on 150% of the motor horsepower. Selection shall be factory-set so that specified capacity is at midpoint setting, allowing 20% overall speed adjustment. Motors shall be selected on 110% of the brake horsepower required with a service factor of 1. Motors and/or drives shall be changed if required to deliver specified CFM should static pressure differ from that specified.
- C. All exposed rotating machinery shall be equipped with guards.
- D. Submit all equipment for approval.

1.05 REFERENCES

- A. ARI 430 - Standard for Central Station Air Handling Units.
- B. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- C. ANSI/AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- D. SMACNA - HVAC Duct Construction Standards.
- E. ARI 410 - Standard for Forced Circulation Air-Cooling and Air-Heating Coils.
- F. ANSI/UL 900 - Test Performance of Air Filter Units.
- G. AMCA 300 - Reverberant Method for Sound Testing of Fans.
- H. ARI 260 - Standard for Sound Rating of Ducted Air Moving and Conditioning Equipment
- I. AMCA 301 - Method for Publishing Sound Ratings for Air Moving Devices.
- J. ASHRAE 68 - Laboratory Method of Testing In-Duct Sound Power Measurement Procedure for Fans.

1.06 QUALITY ASSURANCE

- A. Air Handling Units: Product of manufacturer regularly engaged in production of components who issues complete catalog data on total product offering.
- B. ISO 9001 Certification. The air handling manufacturer shall be registered to ISO 9001, establishing quality assurance requirements from design and development to production to installation and servicing.
- C. Constant Volume Air Handling Units: Certify air volume, static pressure, fan speed, brake horsepower and selection procedures in accordance with ARI 430. If air handling units are not certified in accordance with ARI 430, contractor shall be responsible for expenses associated with testing of units after installation to verify performance of fan(s). Any costs incurred to adjust fans to meet scheduled capacities shall be the sole responsibility of the contractor.

- D. Variable Air Volume Air Handling Units with Variable Inlet Vanes: Certify air volume, static pressure, fan speed, brake horsepower and selection procedures in accordance with ARI 430. Certify units with inlet vanes in wide-open position. If air handling units are not certified in accordance with ARI 430, contractor shall be responsible for expenses associated with testing of units after installation to verify performance of fan(s). Any costs incurred to adjust fans to meet scheduled capacities shall be the sole responsibility of the contractor.
 - E. Air Coils: Certify capacities, pressure drops and selection procedures in accordance with ARI 410-87.
- 1.07 SUBMITTALS
- A. Submit unit performance including: capacity, nominal and operating performance.
 - B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
 - C. Submit shop drawings indicating overall dimensions as well as installation, operation and service clearances. Indicate lift points and recommendations. Indicate unit shipping, installation and operating weights including dimensions.
 - D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.
- 1.08 DELIVERY, STORAGE, AND HANDLING
- A. Deliver products to site under provisions of Section 15010. Units shall ship fully assembled up to practical shipping and rigging limitations. Units not shipped fully assembled shall have tags and airflow arrows on each section to indicate location and orientation in direction of airflow. Each section shall have lifting lugs or shipping skid to allow for field rigging and final placement of section.
 - B. Deliver units to site with fan motors, sheaves, and belts completely assembled and mounted in units. Mount motors as specified in Article 2.04 Paragraph F and Article 2.05 Paragraph A.
 - C. Store and protect products under provisions of Section 15010 "General Provisions".
 - D. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.
- 1.09 ENVIRONMENTAL REQUIREMENTS: Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.
- 1.10 EXTRA STOCK: Provide one set of disposable filters.
- 1.11 WARRANTY: A parts warranty for one year from date of start-up or 18 months from date of shipment, whichever comes first, shall be provided at no additional cost.

PART 2 PRODUCTS

2.01 COORDINATION

- A. Units of one manufacturer have been used as the basis of design. Any modifications to electrical connections, building structure, etc., that result from the use of another manufacturer shall be coordinated with all other trades. 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. Manufacturer must clearly define any exceptions made to Plans and Specifications. Any deviations in layout or arrangement shall be submitted to engineer prior to bid date for approval. Mechanical Contractor is responsible for expenses that occur due to exceptions made.
- C. Unit layout shall be single path (single plenum), providing one path for outside air with all components arranged in series as specified below and indicated on drawings.
- D. Unit arrangement shall be horizontal draw-thru type air handling units with fan segments.
- E. Factory fabricate air handling units of sizes, capacities, and configurations as scheduled on drawings.
- F. Provide unit mounting legs to support all sections of unit and raise unit for proper trapping. Contractor will be responsible for providing a housekeeping pad when unit mounting device is not of sufficient height to properly trap unit. Unit mounting devices not constructed of galvanized steel shall be chemically cleaned, coated with rust-inhibiting primer and finished with rust-inhibiting enamel.

2.02 CASING

- A. Unit shall be constructed of a complete structural frame with removable panels. Removal of side panels shall not affect the structural integrity of the unit. Contractor shall be responsible to provide connection flanges and all other framework that is needed on unit to ensure that removal of unit's panels shall not affect structural integrity. On units larger than 12 tons, manufacturer shall be able to ship each segment (filter, coil, fan) separate so that unit can be broken down for ease of installation in tight spaces.
- B. Panels shall be fully removable to allow complete access for inspection and cleaning of all interior surfaces. If panels are not removable, then manufacturer shall provide access sections with doors between all internal components to ensure access and cleanability of the air handler.
- C. Construct casing sections located upstream of supply fan for operation at 4 inches water gauge negative static pressure and casing sections located downstream of supply fan for operation at 6 inches water gauge positive static pressure.
- D. All exterior panels and structural frames shall be constructed of G90-U galvanized steel. Casings not constructed of G90-U galvanized steel, casings with welds on exterior surfaces, or casings with welds on interior surfaces that have burned through to exterior surfaces shall be chemically cleaned, coated with rust-inhibiting primer and finished with rust-inhibiting enamel in order to prevent premature corrosion and microbial growth.

- E. All joints between exterior panels and structural frames shall have seals and gaskets with closed-cell foam gasketing for air seal and acoustical break.
- F. Casing shall have full size removable access doors as scheduled on drawings. Access doors shall have double-wall construction. Provide automotive style neoprene gasketing around full perimeter of access doors to prevent air leakage. Provide "ventlock" style non-corrosive alloy latches operable from the inside or outside of unit. If access doors open against unit operating pressure, provide safety latches that allow access doors to partially open after first handle movement and fully open after second handle movement.
- G. Insulate casing sections with 2" thick 1-1/2 pound per cubic foot density fiberglass insulation or equivalent. Provide double-wall casing construction and encase insulation between solid exterior and solid interior casing panels such that no insulation is exposed to airstream. Foil facing on insulation is not acceptable as alternate to double wall construction. Insulation shall comply with NFPA 90A.

2.03 FANS

- A. Provide supply fan section(s) with FC double-width, double-inlet centrifugal fan designed and suitable for class of service indicated in the unit schedule. Fan shaft to be properly sized and protectively coated with lubricating oil. Fan shafts shall be solid and properly designed so that fan shaft does not pass through first critical speed as unit comes up to rated RPM. Fans shall be statically and dynamically tested as an assembly at the required RPM to meet design specifications. Key fan wheels to fan shaft to prevent slipping.
 - 1. Provide self-aligning, grease lubricated pillow-block ball bearings selected for L-50 200,000 hour average life per ANSI/AFBMA 9. Extend both grease lubrication fittings to drive side of unit with plastic tubes and zerk fittings rigidly attached to drive side bearing support.
- B. Mount fans on isolation bases. Internally mount motors on same isolation bases and internally isolate fans and motors with 2 inch spring isolators. Install flexible canvas ducts between fan and casings to ensure complete isolation. Flexible canvas ducts shall comply with NFPA 90A. If no isolators or flexible canvas duct is provided, then the entire unit shall be externally isolated from the supply duct work and piping by contractor in order to avoid transmission of noise and vibration through the ductwork.
- C. Fan sections shall have full height, double-wall, hinged, removable access doors on drive side for inspection and maintenance of internal components. Construct doors in accordance with Article 2.03 Paragraph E.
- D. Belts shall be enclosed as required by OSHA standard 29 CFR 1910 to protect worker from accidental contact with the belts and sheaves.
- E. Fan and motor assembly shall be weighed at AHU manufacturer's factory for isolator selection. Fan section assemblies shall be statically and dynamically balanced. Fan section assemblies include fan wheels, shafts, bearings, drives, belts, isolation bases and isolators. Isolators must be allowed to free float when performing fan balance. Vibration shall be measured at each fan shaft bearing in horizontal, vertical and axial directions. Design RPM's to be balanced as scheduled on drawings.

2.04 MOTORS AND DRIVES

- A. Factory install all motors on slide base to permit adjustment of belt tension.
- B. Fan Motors shall be heavy duty, open drip-proof, operable at 460 Volts, 60 Hz, 3-phase.
- C. V-Belt Drive shall be variable pitch rated at 1.2 times the motor nameplate.
- D. Manufacturer shall provide for each fan a nameplate with the listed information to assist air balance contractor in start up:
 - 1. Fan and motor Sheave part number
 - 2. Fan and motor bushing part number
 - 3. # of belts and part numbers
 - 4. Design RPM and Motor HP
 - 5. Belt tension and deflection
 - 6. Center distance between shafts

2.05 COILS

- A. Coils shall be manufactured by the same company as the supplier of the air handling unit. Install coils such that headers and return bends are enclosed by unit casings.
- B. Construct coils of configuration plate fins and seamless tubes. Fins shall have collars drawn, belled and firmly bonded to tubes by means of mechanical expansion of tubes. Do not use soldering or tinning in bonding process.
- C. Construct coil casings of galvanized steel with formed end supports and top and bottom channels. If two or more coils are stacked in unit, install intermediate drain channels between coils to drain condensate to main drain pans without flooding lower coils or passing condensate through airstream.
- D. Refrigerant Cooling Coils
 - 1. Clearly label suction and liquid connections on outside of units.
 - 2. Proof test coils to 450 psig air under water and leak test coils to 300 psig air pressure under water. Dry insides of coils after testing and seal all connections.
 - 3. Construct suction headers of copper tubing. Suction connections shall penetrate unit casings to allow for sweat connections to refrigerant lines.
 - 4. Coils shall have equalizing type vertical distributors sized in conjunction with capacities of coils.

2.06 DRAIN PAN CONSTRUCTION

- A. Provide sealed double-wall drain pans constructed of G90-U galvanized steel exterior panels and G90-U galvanized steel interior liner. Encase insulation between exterior and interior walls. Drain pans shall be sloped in 2 planes; cross break interior pans and pitch toward drain connections to ensure complete condensate drainage. Units with cooling coils shall have drain pans under complete cooling coil section. Units with heating coils shall have a drain pan under complete heating coil segment to ensure proper drainage during cleaning. All drain pan connections will be to the side of the unit to enable proper trapping. Units without 2-way sloped drain pans shall coat drain pans with anti-microbial treatment.

2.07 FILTERS

- A. Provide factory-fabricated filter section of the same construction and finish as unit casings. Filter sections shall have filter guides and full height, double-wall, hinged, removable access doors for filter removal. Construct doors in accordance with Article 2.03 Paragraph E. Provide filter blockoffs as required to prevent air bypass around filters.
- B. Provide 2 inch flat filter sections with 30% efficiency pleated media filters. Filters shall be removable from one side(s) of filter sections. See Section 15841 "Filters".

2.08 DAMPERS

- A. Provide internally mounted ultra low leak outside air dampers as scheduled on drawings. Dampers shall be Ruskin CD60 double-skin airfoil design or equivalent. Construct damper blades and damper frames of galvanized steel. Provide parallel blade action with metal compressible jamb seals and extruded vinyl blade edge seals. Blades shall rotate on stainless steel sleeve bearings. Damper blade lengths shall not exceed 60 inches. Leakage rate shall not exceed 5 CFM/square foot at one inch water gauge and 9 CFM/square foot at 4 inches water gauge. All leakage testing and pressure ratings will be based on AMCA Publication 500.
- B. Provide a factory-mounted ASHRAE Standard 62-89 airflow monitoring and control station in the outdoor air opening of the mixing box. The monitor shall track a variable outside air quantity for ventilation demand flow control and ventilation flow documentation. The airflow monitoring station shall be factory-mounted, factory-calibrated, and the installation certified by the airflow monitor manufacturer.
 - 1. The air handling unit mixing box shall also include a low lead modulating outside air damper mounted in series with the air flow monitor.
 - 2. The outside air damper blades shall be galvanized steel, housed in a galvanized steel frame with edge and seals and mechanically fastened to a normally closed, spring return, electric actuator through a solid steel shaft which shall rotate in permanently lubricated bearings. All linkages, crank arms, jack shafts and mounting hardware shall be provided.
 - 3. The airflow measurement station shall be calibrated to measure a variable airflow from 15% of nominal cfm up to 100% of design airflow, maintaining an accuracy of plus or minus five (5%) percent of actual cfm, for air measuring between -40F up to +158F.
 - 4. Manufacturer shall submit test data to demonstrate compliance.
 - 5. The airflow monitoring station shall provide a proportional output velocity signal (2-10 vdc). The velocity sensor shall have an automatic zeroing function and it shall be programmed to recalibrate the device's transducer a minimum of once per day. Power requirements shall not exceed 100VA per monitor at 24 VAC with power being provided by the Building Automation System (BAS) contractor. The monitor manufacturer shall provide to the Building Automation System (BAS) contractor a certified conversion table for the signal provided.

- 2.09 ACCESS SECTIONS: Access for inspection and cleaning of the unit drain pan, coils and fans sections shall be provided. The unit shall be installed for proper access. Procedure for proper access, inspection and cleaning of the unit shall be included in the maintenance manual. Access section shall have double wall, hinged, removable access doors on one sides of sections.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Contractor, prior to installing any equipment, shall examine the conditions under which the equipment is to be installed, and shall notify the Architect of conditions detrimental to the proper installation of the equipment.
- B. All equipment shall be installed in accordance with the latest manufacturer's written instructions, and in accordance with governing codes and recognized industry standards and practices.
- C. Coordinate all work with other trades as necessary for proper interfacing.
- D. All proper equipment shall be protected from any form of damage. Any damaged equipment shall be replaced without additional cost.

3.02 START-UP

- A. An authorized representative of the equipment manufacturer shall provide the initial start-up. Said start-up shall include verification of proper installation and wiring and verification of proper operation of the airflow control systems. The balancing sub-contractor shall be responsible for final verification and reporting of all air flow rates and pressurization.
- B. The air flow control system manufacturer shall furnish a minimum of four hours of Owner training to provide an overview of the job specific airflow control components and general troubleshooting procedures.

3.03 ADJUSTMENT: The equipment shall be tested and adjusted to ensure the scheduled capacities as indicated. All controls shall be tested and adjusted.

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.

1.02 COORDINATION: The grilles, registers and diffusers of one manufacturer have been used as the basis of design. Any modifications to ductwork, controls, building structure, etc., that result from the use of any other units shall be coordinated with all trades. This coordination shall occur before delivery of equipment from the manufacturer. Any modifications shall be performed without incurring any additional costs to the Contract.

1.03 ACCEPTABLE MANUFACTURERS

- A. Manufacturers listed below are acceptable. Approved equal products which are ADC tested, rated and certified may be Price or Titus.
- B. All devices selected must meet or exceed all the requirements of these contract documents.

PART 2 PRODUCTS

2.01 DESCRIPTION

- A. Color of all grilles, registers and diffusers are to be selected by Architect. Also, ceiling mounted items shall be selected to fit the ceiling in which they are applied.
- B. Air distribution devices shall be as follows:
 - 1. Exhaust air register shall have a fixed core of 1/2" x 1/2" x 1/2" aluminum squares. Register shall have opposed blade dampers.
 - 2. Return air grilles (ceiling mounted) shall have a fixed core of 1/2" x 1/2" x 1/2" aluminum squares. Finish shall be white baked enamel.
 - 3. Supply air diffusers (square) shall be as scheduled extruded aluminum rectangular to round neck diffusers with T-Bar flange frames.
 - 4. Sidewall air registers shall be aluminum face bars on 1/2" centers. Unit shall have off-white finish.
- C. The Contractor shall verify that all air distribution devices are suitable for the ceiling and wall types in which they are installed.
- D. All air distribution devices shall be shown in grille, register and diffuser schedule.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Grilles, registers and diffusers shall be installed as indicated in conformance with the manufacturer's recommendations. Coordinate the actual units to be provided with all trades.
- B. All grilles, registers and diffusers shall be selected and submitted at an NC level of 35 or less.
- C. The grilles, registers and diffusers shall be tested and adjusted to provide the scheduled capacities.

END OF SECTION

SECTION 15887

UVC EMITTER ULTRAVIOLET DISINFECTION

PART 1 - GENERAL

- 1.01 RELATED WORK: See Section 15025 and Division 16 for Motors, starters, disconnects, power wiring of HVAC equipment, variable frequency drives and UVC Emitters.
- 1.02 QUALITY ASSURANCE: UL Compliance: Comply with UL 984 – Safety Standards for Hermetic Motor Compressors. Comply with UL Standard 1570 – Fluorescent Fixtures, UL 935 for Fluorescent Lighting Ballasts and UL 840, Pollution Degree 2 – Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment for Outdoor I Rating of Damp Location Fixture for UVC Emitters.
- 1.03 DELIVERY, STORAGE AND HANDLING: Store UVC Emitters in a clean dry place and protect from weather and construction traffic. Handle UVC Emitters carefully to avoid damage to components, enclosures and finish. Leave factory-shipping covers in place until installation. Do not install damaged components; replace and return damaged components to equipment manufacturer. Comply with manufacturer's installation instructions placement, wiring and testing.
- 1.04 SUBMITTALS: In accordance with Section 15010, MECHANICAL GENERAL, furnish the following manufacturer's literature and data for UVC emitters, housing, wiring diagrams, and all specified accessories

PART 2 – PRODUCTS

2.01 UVC EMITTERS

- A. **Acceptable Manufacturers: Steril-Aire, Inc. Model DE, SEN or SE Series or as approved by the engineer.**

1. Units shall be shipped, where indicated, in factory supplied 12" deep housings with flat plate transitions to direct mate to the specified air-handling manufacturer without increasing the in-line depth of 12". Housing shall include integral tracks for slide-in access with two (2) access doors. Each unit shall include a NEMA 4X disconnect switch for one-point supply power connection by others. Housing must be constructed of aluminum for a surface reflectance value of 60-90%. SEN Units shall be shipped with factory supplied NEMA 4 weatherproof housing for outdoor installations.

- B. Quality Assurance Qualifications: Each component and product is to be 100% inbound and outbound tested before shipment.
- C. Warranty: Fixture, Emitters and controls shall be warranted non-prorated for a period of one year from date of Owner's acceptance.

2.02 DESIGN REQUIREMENTS

- A. Irradiation - Emitters and fixtures are to be installed in sufficient quantity and in such an arrangement so as to provide an equal distribution of UVC energy on the coil and in the drain pan. To maintain energy efficiency, the UVC energy produced shall be of the lowest possible reflected and shadowed losses.

- B. Intensity - The minimal UVC energy striking the leading edge of all the coil fins shall not be less than 900 $\mu\text{W}/\text{cm}^2$ at the closest point and through placement, not less than 70% of that value at the farthest point. This therefore sets the minimum quantity of fixtures to be installed and their placement. Additionally, equal amounts are to strike the drain, either directly or indirectly through reflection.
- C. Installation - Emitters and fixtures shall be installed at right angles to the conforming lines of the coil fins, such that through incident angle reflection, UVC energy bathes all surfaces of the coil and drain pan as well as all of the line of sight airstreams.

2.03 EQUIPMENT

- A. Units shall be very high output, HVAC-type, germicidal UVC light sources, factory assembled and tested. Components shall include a housing, reflector, high efficiency electronic power source, Emitter sockets and Emitter tube, all constructed to withstand inner HVAC environments.
- B. Sterilight shall consist of a housing, power supply, Emitter sockets and two Emitters. The entire fixture is UL and CSA listed for damp locations for safe use in all HVAC environments. Housing is constructed of galvanized steel for years of worry-free service. Components are incorporated into one integral assembly that is mounted outside the equipment. The Emitters protrude into the airstream and are held in place by a tube mount section that allows for quick and easy removal during lamp change out.
- C. Reflectors shall be constructed of high spectral finished aluminum alloy with a minimum 85% reflectance of 254-nm UVC radiance.
- D. High efficiency electronic power sources shall be 115 Vac, 80 watts. They shall be UL class P2 type capable of igniting each Emitter at temperatures from 35- 170° F in airflow velocities to 1000 fpm. Their conversion efficiency shall not be less than 70% and they shall be designed so as to enhance plasma vapor pressure for maximum photon production in cold airstreams. They shall be equipped with RF and line noise suppression.
- E. Emitter tube shall be of the very high output, hot cathode, T5 (15mm) diameter, and medium bi-pin type. They shall produce 95% of their energy at 253.7 nm and be capable of producing the specified output at airflow velocities to 1000 fpm at temperatures of 32-165° F. UVC Emitters shall produce no ozone or other secondary contamination.

2.04 ACCESSORIES

- A. A 6-ft corded soft-wired kit shall be provided and installed as indicated. Kit shall include a 600-volt, UL listed 3-wire cord with a "U" ground plug at one end and pre-stripped tinned wires at the other. Ground wire nut and cord restraints shall also be provided.
- B. Radiometer shall be factory assembled and tested. It shall consist of a housing, LCD readout, steady-state electronic module, terminal block, sensor and sensor cable. Housing shall be constructed of high impact polystyrene and shall totally enclose the electronic module. It shall accommodate the sensor plug, terminal block, adjusting taps and LCD readout. It shall be capable of operating in temperatures of 32-113° F.

PART 3 – INSTALLATION

3.01 INSTALLATION OF UVC EMITTERS

- A. Coordinate with installation of HVAC equipment and install Emitters as indicated after such equipment is properly installed.
- B. Provide an interlock switch on the access to the UVC Emitters to turn the lights off when the access is opened.
- C. If specified to include a Steril-Aire stationary radiometer, install the radiometer and adjust and set in accordance with manufacturer recommendations.
- D. Install provided Caution Labels on all accesses to the Emitters.
- E. Provide (1) spare set of Emitter Tubes to the Owner for each AHU.

END OF SECTION

SECTION 15900

AUTOMATIC TEMPERATURE CONTROLS

PART 1: GENERAL

1.01 DESCRIPTION

- A. General: The control system shall be as indicated on the drawings and described in the specifications.
- B. Direct Digital Control (DDC) technology shall be used to provide the functions necessary for control of mechanical systems on this project.
- C. The control system shall accommodate simultaneous multiple user operation. Access to the control system data should be limited only by operator password. Multiple users shall have access to all valid system data. An operator shall be able to log onto any workstation on the control system and have access to all appropriate data.
- D. The control system shall be designed such that each mechanical system will be able to operate under stand-alone control. As such, in the event of a network communication failure, power failure (system shall be equipped with a **UPS backup**), or the loss of any other controller, the control system shall continue to independently operate under control.
- E. Communication between the control panels and all workstations shall be over a high-speed network. All nodes on this network shall be peers. The operator shall not have to know the panel identifier or location to view or control an object. Application Specific Controllers shall be constantly scanned by the network controllers to update point information and alarm information.

1.02 SYSTEM PERFORMANCE

- A. Performance Standards. The system shall conform to the following:
 - 1. Graphic Display. The system shall display a graphic with a minimum of [20] dynamic points. All current data shall be displayed within [20] seconds of the request.
 - 2. Graphic Refresh. The system shall update all dynamic points with current data within [30] seconds.
 - 3. Object Command. The maximum time between the command of a binary object by the operator and the reaction by the device shall be [10] seconds. Analog objects shall start to adjust within [10] seconds.
 - 4. Object Scan. All changes of state and change of analog values shall be transmitted over the high-speed network such that any data used or displayed at a controller or workstation will be current, within the prior [60] seconds.
 - 5. Alarm Response Time. The maximum time from when an object goes into alarm to when it is annunciated at the workstation shall not exceed [45] seconds.
 - 6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every [5] seconds. The Contractor shall be responsible for selecting execution times consistent with the mechanical process under control.
 - 7. Performance. Programmable Controllers shall be able to execute DDC PID control loops at a selectable frequency from at least once every [5] seconds. The controller shall scan and update the process value and output generated by this calculation at this same frequency.
 - 8. Multiple Alarm Annunciation. All workstations on the network shall receive alarms within [5] seconds of each other.

1.03 WARRANTY

A. Warrant all work as follows:

1. Labor & materials for control system specified shall be warranted free from defects for a period of twelve (12) months after final completion acceptance by the Owner. Control System failures during the warranty period shall be adjusted, repaired, or replaced at no charge or reduction in service to the Owner. The Contractor shall respond to the Owner's request for warranty service within 24 hours during customary business hours.

1.04 SCOPE OF WORK

- A. The Energy Management & Control System (EMCS) manufacturer shall furnish and install an extension and/or upgrade to the existing **Trane Tracer** system. This new extension and/or upgrade shall be fully integrated building automation system, incorporating direct digital controls (DDC) for energy management, equipment monitoring and control, and sub-systems with open communications capabilities as herein specified.
- B. The system shall be complete with dynamic color graphics using symbols, icons, abbreviations, and layouts identical to existing graphics, and developed on the existing **Trane Tracer Summit** Software. Graphics will display all applicable inputs, outputs, setpoints, statuses, etc. updating changes as they occur. The EMCS shall communicate with the existing campus facility management system (FMS).
- C. All materials and equipment used shall be standard components, regularly manufactured for this and/or other systems and not custom designed specially for this project. All systems and components shall have been thoroughly tested and proven in actual use for at least two years.
- D. EMCS manufacturer shall be responsible for all EMCS and Temperature Control wiring for a complete and operable system. All wiring shall be done in accordance with all local and national codes.
- E. The EMCS shall reside on the existing campus Fiber Optic Network in such a manner to allow for viewing and controlling points in this building from anywhere on the existing network. It is the intention of this specification that the EMCS components supplied here be an extension of the existing campus-wide system.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. The Trane Company Commercial Division.

- B. With prior approval, other manufacturers may be substituted provided that all products fully integrate within the existing systems. The contractor must provide any gateway/integrator hardware throughout all facilities. It shall be the responsibility of this contractor to make the campus-wide system fully functional as one system. The contractor must provide, adjacent to his main communication panels for each building, a gateway/integrator panel. The gateway/integrator panel shall translate the language of the new systems installed under this contract to that of Trane Process Control Language (TPCL). The contractor shall provide all labor and software to accomplish programming his database into the TPCL language in the gateway/integrator panel, such that all points, programs, and commands are operable from the existing front-end software as well as existing panels in all buildings.

2.02 OPERATOR INTERFACE

- A. Operator Interface. A touch screen display is factory mounted on the front of the controller. The operator display has graphical images that show the type of equipment controlled by the head end controller. The screen will be used for viewing equipment and system status information, making changes to time of day schedules, changing system setpoints, viewing the alarm and event log, performing timed overrides.

B. System Software

1. Operating System. Furnish a commercially available, concurrent multi-tasking operating system. The operating system shall also support the use of other common software applications that operate under DOS or Microsoft Windows. Acceptable operating systems are Windows NT, and Windows 95/98.
2. System Graphics. The Operator Workstation software shall be graphically oriented. The system shall allow display of up to 10 graphic screens at once for comparison and monitoring of system status. Provide a method for the operator to easily move between graphic displays and change the size and location of graphic displays on the screen. The system graphics shall be able to be modified while on line. An operator with the proper password level shall be able to add, delete, or change dynamic points on a graphic. Dynamic points shall include analog and binary values, dynamic text, static text, and animation files. Graphics shall have the ability to show animation of equipment. Graphics shall be capable of launching other PC applications.
 - a) Custom Graphics. Custom graphic files shall be created with the use of commonly available graphics packages such as PC Paint. The graphics generation package shall create and modify graphics that are saved in industry standard formats such as PCX, BMP, GIF and JPEG. The graphics generation package shall also provide the capability of capturing or converting graphics from other programs such as Designer, or AutoCAD.
 - b) Graphics Library. Furnish a complete library of standard HVAC equipment such as chillers, boilers, air handlers, terminals, fan coils, and unit ventilators. This library shall also include standard symbols for other equipment including fans, pumps, coils, valves, piping, dampers, and ductwork. The library shall be furnished in a file format compatible with the graphics generation package program.
 - c) Engineering Units. Allow for selection of the desired engineering units (i.e. Inch pound or SI) in the system. Unit selection shall be able to be customized by locality to select the desired units for each measurement. Engineering units on this project shall be: Standard Inch Pound.

- C. System Applications. Each workstation shall provide operator interface and off-line storage of system information. Provide the following applications at each workstation.
1. Automatic System Database Save and Restore. Each workstation shall store on the hard disk a copy of the current database of each building controller. This database shall be updated whenever a change is made in any panel in the system. The storage of this data shall be automatic and not require operator intervention. In the event of a database loss in a building management panel, the first workstation to detect the loss shall automatically restore the database for that panel.
 2. Manual Database Save and Restore. A system operator with the proper password clearance shall be able to archive the database from any system panel and store on magnetic media. The operator shall also be able to clear a panel database and manually initiate a download of a specified database to any panel in the system.
 3. System Configuration. The workstation software shall provide a graphical method of configuring the system. The user with proper security shall be able to add new devices, and assign modems to devices. This shall allow for future system changes or additions.
 4. On-Line Help and Training. Provide a context sensitive, on line help system to assist the operator in operation and editing of the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext. Provide an interactive tutorial CD, which will act as on-line training/help for the systems operator.
 5. Security. Each operator shall be required to log on to the system with a user name and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system supervisor shall have the ability to set passwords and security levels for all other operators. Each operator password shall be able to restrict the operator's access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected. This auto logoff time shall be set per operator password. All system security data shall be stored in an encrypted format.
 6. System Diagnostics. The system shall automatically monitor the operation of all workstations, printers, modems, network connections, building management panels, and controllers. The failure of any device shall be annunciated to the operator.
 7. Alarm Processing. Any object in the system shall be configurable to alarm in and out of normal state. The operator shall be able to configure the alarm limits, warning limits, states, and reactions for each object in the system.
 - a) Alarm Reactions. The operator shall be able to determine what actions, if any, are to be taken, by object (or point), during an alarm. Actions shall include logging, printing, starting programs, displaying messages, dialing out to remote stations, paging, forwarding to an e-mail address, providing audible annunciation or displaying specific system graphics. Each of these actions shall be configurable by workstation and time of day. An object in alarm that has not been acknowledged within an operator specified time period shall be re-routed to an alternate operator specified alarm receipt device.
 - b) Binary Alarms. Each binary object shall be set to alarm based on the operator-specified state. Provide the capability to disable alarming when the associated equipment is turned off or is being serviced.

- c) Analog Alarms. Each analog object shall have both high and low alarm limits and warning limits. Alarming must be able to be automatically and manually disabled.
8. Trend Logs. The operator shall be able to define a custom trend log for any data in the system. This definition shall include interval, start-time, and stop-time. Trend intervals of 1, 5, 15, 30, and 60 minutes as well as once a shift (8 hours), once a day, once a week, and once a month shall be selectable. All trends shall start based on the hour. Each trend shall accommodate up to 64 system objects. The system operator with proper password shall be able to determine how many samples are stored in each trend. Trend data shall be sampled and stored on the Building Controller panel and be archived on the hard disk. Trend data shall be able to be viewed and printed from the operator interface software. Trends must be viewable in a text-based format or graphically. They shall also be storable in a tab delimited ASCII format for use by other industry standard word processing and spreadsheet packages.
 9. Dynamic Graphical Charting. The operator shall be able to select system values to be charted in real time. Up to three values at one time can be selected for each chart. The type of chart (bar, line, 3-D, etc.) shall be selectable.
 10. Alarm and Event Log. The operator shall be able to view all logged system alarms and events from any location in the system. The operator shall be able to sort and filter alarms. Events shall be listed chronologically. An operator with the proper security level may acknowledge and clear alarms. All that have not been cleared by the operator shall be archived to the hard disk on the workstation.
 11. Object and Property Status and Control. Provide a method for the operator with proper password protection to view, and edit if applicable, the status of any object and property in the system. These statuses shall be available by menu, on graphics, or through custom programs.
 12. Clock Synchronization. The real time clocks in all building control panels and workstations shall be synchronized on command of an operator. The system shall also be able to automatically synchronize all system clocks; daily from any operator designated device in the system. The system shall automatically adjust for daylight savings and standard time if applicable.
 13. Reports and Logs. Provide a reporting package that allows the operator to select, modify, or create reports. Each report shall be definable as to data content, format, interval, and date. Report data shall be archived on the hard disk for historical reporting. Provide the ability for the operator to obtain real time logs of designated lists of objects. Reports and logs shall be stored on the PC hard disk in a format that is readily accessible by other standard software applications including spreadsheets and word processing. Reports and logs shall be readily printed to the system printer. The operator shall be able to designate reports that shall be printed or stored to disk at selectable intervals.
 - a) Custom Reports: Provide the capability for the operator to easily define any system data into a daily, weekly, monthly, or annual report. These reports shall be time and date stamped and shall contain a report title and the name of the facility.

2.03 SYSTEM SOFTWARE

- A. Furnish the following applications software for building and energy management. All software applications shall reside and run in the system controllers. Editing of applications shall occur at the operator workstation.

B. System Security

1. User access shall be secured using individual security passwords and user names.
2. Passwords shall restrict the user to only the objects, applications, and system functions as assigned by the system manager.
3. User logon/logoff attempts shall be recorded.
4. The system shall protect itself from unauthorized use by automatically logging off following the last keystroke. The delay time shall be user definable.

C. Scheduling. Provide the capability to schedule each object or group of objects in the system. Each of these schedules shall include the capability for start, stop, optimal start, optimal stop, and night economizer actions. Each schedule may consist of up to [10] events. When a group of objects are scheduled together, provide the capability to define advances and delays for each member. Each schedule shall consist of the following:

1. Weekly Schedule. Provide separate schedules for each day of the week.
2. Exception Schedules. Provide the ability for the operator to designate any day of the year as an exception schedule. This exception schedule shall override the standard schedule for that day. Exception schedules may be defined up to a year in advance. Once an exception schedule is executed it will be discarded and replaced by the standard schedule for that day of the week.
3. Holiday Schedules. Provide the capability for the operator to define up to [99] special or holiday schedules. These schedules may be placed on the scheduling calendar and will be repeated each year. The operator shall be able to define the length of each holiday period.
4. Optimal Start/Stop. The scheduling application outlined above shall support an optimal start/stop algorithm. This shall calculate the thermal characteristics of a zone and start the equipment prior to occupancy to achieve the desired space temperature at the specified occupancy time. The algorithm shall calculate separate sets of heating and cooling rates for zones that have been unoccupied for less than and greater than 24 hours. Provide the ability to modify the start/stop algorithm based on outdoor air temperature. Provide an early start limit in minutes to prevent the system from starting before an operator determined time limit.
5. Timed Override. Building will be divided into seven zones for timed override activation using the touchscreen. Timed override period will be user defined.

D. Alarm Reporting. The operator shall be able to determine the action to be taken in the event of an alarm. Alarms shall be routed to the appropriate workstations based on time and other conditions. An alarm shall be able to start programs, be logged in the event log, printed, generate custom messages graphics.**E. Remote Communications.** The system shall have the ability to dial out in the event of an alarm. Receivers shall include PC Workstations, and alphanumeric pagers. The alarm message shall include the name of the calling location, the device that generated the alarm, and the alarm message itself. The operator shall be able to remotely access and operate the system using dial up communications.**F. Maintenance Management.** The system shall monitor equipment status and generate maintenance messages based upon user designated run time, starts, and/or calendar date limits.

- G. PID Control. A PID (proportional-integral-derivative) algorithm with direct or reverse action and anti-wind-up shall be supplied. The algorithm shall calculate a time-varying analog value used to position an output or stage a series of outputs. The controlled variable, set-point, and PID gains shall be user-selectable. The set-point shall optionally be chosen to be a reset schedule.
- H. Staggered Start. This application shall prevent all controlled equipment from simultaneously restarting after a power outage. The order in which equipment (or groups of equipment) is started, along with the time delay between starts shall be user-selectable.
- I. System Calculations. Provide software to allow instantaneous power (e.g. KW), flow rates (e.g. L/s [GPM]) to be accumulated and converted to energy usage data. Provide an algorithm that calculates a sliding-window KW demand value. Provide an algorithm that calculates energy usage and weather data (heating and cooling degree days). These items shall all be available for daily, previous day, monthly and the previous month.
- J. Anti-Short Cycling. All binary output points shall be protected from short cycling. This feature shall allow minimum on-time and off-time to be selected.
- K. Building Controller Operator Display. The building controller shall include an operator display allowing the user to perform basic daily operations tasks on the building automation system. At a minimum this operator display shall:
 1. Be installed on the building controller and require no additional power source.
 2. Consist of a one-quarter VGA touch screen with 320 X 240-pixel resolution. The brightness and the contrast of the backlit touch screen shall be adjustable to allow for easy reading of information on the screen.
 3. Be capable of having unique user identification and passwords that can be programmed to limit access to the system and operator functions.
 4. Display the current state of an input/output point and equipment controller connected to the system.
 5. Give the operator the ability to override the current state of an output point or HVAC equipment controller connected to the building controller.
 6. Allow the operator to modify the start and stop times of any time-of-day schedule within the system.
 7. Provide a visual indication that a system alarm exists and allow for an optional audible alarm annunciation.
 8. Provide the ability to view and acknowledge alarms that are annunciated at that building controller.
 9. Allow the operator to view custom graphical displays with dynamic status information.
 10. Automatically update displayed system information every 10 seconds.

2.04 INPUT/OUTPUT INTERFACE

- A. Hard-wired inputs and outputs may tie into the system through Building, Custom, or Application Specific Controllers. The points list will be included and demonstrated to the owner and professional.
- B. All input points and output points shall be protected such that shorting of the point to itself, another point, or ground will cause no damage to the controller. All input and output points shall be protected from voltage up to 24V of any duration, such that contact with this voltage will cause no damage to the controller.

2.05 LOCAL CONTROL PANELS

- A. All indoor control cabinets shall be fully enclosed NEMA 1 Type construction with [hinged door], key-lock latch, and removable sub-panels. A single key shall be common to all field panels and sub-panels.
 - 1. Interconnections between internal and face-mounted devices pre-wired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL listed for 600-volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring. Control termination's for field connection shall be individually identified per control drawings.
 - 2. Provide on/off power switch with over-current protection and main air gauge for control power sources to each local panel.

PART 3 EXECUTION

3.01 WIRING: All control and interlock wiring shall comply with the national and local electrical codes and Division 16 of these specifications. Where the requirements of this section differ with those in Division 16, the requirements of this section shall take precedence. EMT Conduit where exposed and plenum cable elsewhere.

3.02 CONTROLLERS

- A. Provide a separate Controller for each major piece of HVAC equipment. Points used for control loop reset such as outside air or space temperature are exempt from this requirement.
- B. Building Controllers and Custom Application Controllers shall be selected to provide a minimum of [15%] spare I/O point capacity for each point type found at each location. If input points are not universal, [15%] of each type is required. If outputs are not universal, [15%] of each type is required. A minimum of one spare is required for each type of point used.
- C. Future use of spare capacity shall require providing the field device, field wiring, points database definition, and custom software. No additional Controller boards or point modules shall be required to implement use of these spare points.

3.03 PROGRAMMING

- A. Provide sufficient internal memory for the specified control sequences and trend logging. There shall be a minimum of 25% of available memory free for future use.
- B. Point Naming: System point names shall be modular in design, allowing easy operator interface without the use of a written point index.
- C. Software Programming
 - 1. Provide programming for the system as per specifications and adhere to the strategy algorithms provided. All other system programming necessary for the operation of the system but not specified in this document shall also be provided by the Control System Contractor. Imbed into the control program sufficient comment statements to clearly describe each section of the program. The comment statements shall reflect the language used in the sequence of operations.

D. Operators' Interface

1. Standard Graphics. Provide graphics for each major piece of equipment and floor plan in the building. This includes each Chiller, Air Handler, VAV Terminal, Fan Coil, Boiler, and Cooling Tower. These standard graphics shall show all points dynamically as specified in the points list.
2. The controls contractor shall provide all the labor necessary to install, initialize, start-up, and trouble-shoot all operator interface software and their functions as described in this section. This includes any operating system software, the operator interface data base, and any third party software installation and integration required for successful operation of the operator interface.
3. As part of this execution phase, the controls contractor will perform a complete test of the operator interface. Test duration shall be a minimum of [16] hours on-site. Tests shall be made in the presence of the Owner or Owner's representative.

E. Demonstration: A complete demonstration and readout of the capabilities of the monitoring and control system shall be performed. The contractor shall dedicate a minimum of 16 hours on-site with the Owner and his representatives for a complete functional demonstration of all the system requirements. This demonstration constitutes a joint acceptance inspection, and permits acceptance of the delivered system for on-line operation.

3.04 TRAINING: Provide a minimum of 1 classroom training sessions, 8 hours each.

3.05 DUCT SMOKE DETECTION

- A. Provide complete submittal data to controls system contractor for coordination of duct smoke detector interface to HVAC systems. Smoke Detectors furnished by Div 16, mounted by Div 15, powered by Div 16, control wiring by ATC(Div 15).
- B. Div 16 contractor shall provide a dry-contact alarm output in the same room as the HVAC equipment to be controlled.

PART 4 SEQUENCE OF OPERATION

4.01 VAV AIR HANDLING UNIT WITH VENTILATION RESET AND STATIC PRESSURE OPTIMIZATION

A. Occupied Cooling Mode/Pre-Occupancy Ventilation Mode

When the AHU is in the Occupied Cooling Mode, the Supply Fan shall operate continuously, the Inlet Vanes (or Frequency Inverter) shall modulate to maintain the Duct Static Pressure, and the Cooling Valve, Heating Valve, and Economizer Dampers shall modulate in sequence to maintain the cooling Discharge Air Temperature. The outdoor airflow, as measured at the air handling unit outdoor air intake, shall be maintained at a value equal to or higher than the minimum required outdoor airflow setpoint. Determination of the Minimum Required Outdoor Airflow Setpoint shall be per the Minimum Required Outdoor Airflow Setpoint section of the AHU System Level Operation section of this specification.

Building CO₂ shall be monitored and the Outside Air Damper shall be modulated to maintain CO₂ levels (1000 ppm). Outside Air shall be reset below minimum at a rate of 200 CFM/hr as long as CO₂ levels are maintained. Outside Air quantities shall not be allowed to go below building exhaust air volume.

B. Unoccupied Mode

When the AHU is in the Unoccupied Mode, the Supply Fan shall be OFF, the Inlet Vanes (or Frequency Inverter), Outdoor Air Damper, and Cooling Valve shall be closed, and the Heating Valve shall be fully open.

C. Night Setback (NSB) / Morning Warm-Up Heating Mode (MWU)

When the AHU is in the Night Setback / Morning Warm-up Heating Mode, the Supply Fan shall operate continuously, the Inlet Vanes (or Frequency Inverter) shall modulate to maintain the Duct Static Pressure, the Outdoor Air Damper and Cooling Valve shall be closed, the Return Air Damper shall be fully open, and the Heating Valve shall modulate to maintain the maximum heating Discharge Air Temperature setpoint. All VAV Terminal Units shall disable local heat and operate in their VAV heating mode until the NSB/MWU criteria is satisfied and the AHU returns to the occupied or unoccupied mode.

D. Supply Fan Control

The Supply Fan shall operate continuously whenever the AHU is in either the Occupied Cooling Mode or the Night Setback / Morning Warm-up Heating Mode. The Supply Fan shall be OFF whenever the AHU is in the Unoccupied Mode, the Stop / Auto interlock is open, the Mixed Air Low Limit is tripped, or the Supply Fan Status indicates a failure (after a two minute delay). The Low Limit and the Fan Failure require a manual reset.

E. Frequency Inverter Control

When the Supply Fan is ON, the Inlet Vanes (or Frequency Inverter) shall slowly ramp (adjustable) up and modulate to maintain the proper Discharge Duct Static Pressure Setpoint. Determination of the Discharge Duct Static Pressure Setpoint shall be per the Discharge Duct Static Pressure Setpoint section of the AHU System Level Operation section of this specification. The Inlet Vanes shall close if the Supply Fan is OFF or the Duct Static Pressure Sensor fails.

F. Heating Valve Control

The Heating Valve shall modulate to maintain the Discharge Air Temperature at the NSB/MWU Discharge Air Heating Setpoint. The Heating Valve shall be enabled to operate during the occupied cooling mode so it can maintain the cooling discharge air temperature setpoint as required. The Heating Valve shall be closed if the outdoor airflow rate exceeds the required minimum airflow setpoint by more than 10% or if the Cooling Valve is open. The Heating Valve shall be fully open if the Supply Fan is OFF.

G. Cooling Valve Control

The Cooling Valve shall modulate to maintain the Discharge Air Temperature at the Discharge Cooling Setpoint. If the Economizer function is enabled and the Outdoor Air Damper is not fully opened, the Cooling Valve shall be closed. The Cooling Valve shall be closed if the AHU is in the Heating mode, the Supply Fan is OFF, or the Discharge Air Sensor has failed.

H. Operator Display

The custom application controller shall include an operator display allowing the user to perform basic daily operations tasks. At a minimum this operator display shall:

1. Be installed on the custom application controller and require no additional power source.
2. Consist of a one-quarter VGA touch screen with 320 x 240-pixel resolution. The touch screen shall be backlit. The brightness and contrast shall be adjustable to allow for easy reading of information on the screen.
3. Provide on-screen graphical icons to identify common user functions including viewing point data, alarms, scheduling, output overrides, and controller setup.
4. Be capable of having unique user identification and passwords that can be programmed to limit access to the system and operator functions.
5. Display the current state of all input/output points connected to the controller.
6. Allow for up to 24 individual custom display screens that allow 24-character English descriptions of controller data.
7. Give the operator the ability to override the current state of all binary and analog output points connected to the controller. The controller shall have this capability prior to any on-site programming.
8. Include a time clock that shall maintain correct time for at least 7 days during a power loss to the controller.
9. Allow the operator to modify the start and stop times of the time-of-day schedule within the controller. Scheduling function shall provide for 7-day control, with 2 start and stop events per day.
10. Provide a unique visual alarm indicator such as a flashing LED, separate from the display screen.
11. Automatically update displayed system information every 10 seconds.

I. Building Automation System Interface

The Building Automation System (BAS) shall send the AHU a Discharge Air Temperature Setpoint, a Discharge Duct Static Pressure Setpoint and a Minimum Required Outdoor Airflow Setpoint. The BAS shall also send Start-up, Occupied, Pre-Occupancy Ventilation, Unoccupied, Morning Warm-up, Heating / Cooling, Economizer enable, Timed Override, Startup, Coastdown, Demand Limit, Duty Cycle, Night Setback, Purge, and Priority Shutdown commands.

If communication with the BAS is lost, the AHU uses its default setpoints and operates in the Occupied Cooling mode. The Economizer function is enabled based on the AHU Outdoor Air Temperature Sensor. The last known Minimum Required Outdoor Airflow Setpoint shall be maintained.

J. AHU System Level Operation

1. Minimum Required Outdoor Airflow Setpoint
 - a. The air handler Outdoor Air Damper shall be controlled to deliver required outdoor airflow to each individual VAV zone at all load conditions. The minimum outdoor airflow setpoint shall be determined using ASHRAE Standard 62-99, Equation 6.1. The actual outdoor airflow shall be sensed at the outdoor air intake.

- b. The ventilation fraction (design ventilation airflow for the zone divided by primary airflow) shall be continuously calculated for each VAV terminal zone. Continuously determine the maximum zone ventilation fraction (Z), the sum of the outdoor air requirements for all VAV terminal zones (Von) and the total supply airflow (Vst). This information shall be used in Equation 6.1 of ASHRAE Standard 62-99 to calculate the minimum required outdoor airflow (Vot). The minimum required outdoor airflow (Vot) setpoint shall be regularly recalculated based on the prevailing VAV zone conditions.
- c. The contractor shall submit a written sequence of operation and sample programming required to determine the minimum required outdoor airflow (Vot) setpoint.
- d. Prior to final system acceptance, a trend log of actual air system operation over a typical forty-eight hour period shall be required by the engineer and owner. System operating conditions to be logged include: critical space ventilation fraction, system supply air flow, calculated outdoor airflow setpoint, and actual measured outdoor airflow at 30-minute intervals.

2. Discharge Duct Static Pressure Setpoint

- a. The building automation system shall continuously monitor the damper position of all VAV terminal units. The discharge duct static pressure shall be sensed directly at the discharge of each air handler. The sensor must be mounted in a non-turbulent location.
- b. When any damper is more than 95% (adj.) open, the supply fan discharge duct static pressure setpoint shall be reset upward by 5% (adj.) of the maximum system static pressure setpoint at a frequency of 10 minutes (adj.) until no damper is more than 95% open or the static pressure setpoint has reset upward to the system maximum setting or the inlet vanes (or frequency inverter) are at their maximum setting.
- c. When all dampers are less than 85% (adj.) open, the supply fan discharge duct static pressure setpoint shall be reset downward by 5% (adj.) of the maximum system static pressure setpoint at a frequency of 10 minutes (adj.) until any damper is more than 85% open or the static pressure setpoint has reset downward to the system minimum setting or the inlet vanes (or frequency inverter) are at their minimum setting.
- d. The control bands, setpoint increment values, setpoint decrement values and adjustment frequencies shall be adjusted to maintain maximum static pressure optimization with stable system control and maximum comfort control.

K. Factory- Mounted DDC Controls

- 1. The programmable DDC controller and a majority of the control components shall be selected, mounted, wired and tested by the AHU manufacturer. Unit mounted controls shall be covered by the AHU manufacturer's standard warranty of one year from AHU startup or 18 months from shipment, whichever comes first. Factory mounting will facilitate temporary heating, cooling, ventilation and/or timely completion of the project.

2. A dedicated stand-alone programmable DDC controller shall be provided with each AHU. Control of more than one unit from a controller is not acceptable. This will ensure that a controller failure will not affect more than one AHU.
3. The programmable DDC controller shall be fully compatible with a Building Automation System. Complete communications and diagnostics including all AI, BI, AO, BO, set points and alarms shall only require a twisted pair of wires. System optimization strategies shall be available to perform such energy management functions as resetting duct static downward until one VAV box is fully open, and resetting chilled water temperature upward until one valve is fully open.
4. All programming required for operation shall be retained in permanent memory. Battery backup for a minimum of 72 hours is also permissible.
5. Each controller shall have an LCD screen and keypad for user interface mounted on the unit it is controlling. System passwords are required to prevent unauthorized use. A portable service tool is acceptable, but one must be permanently mounted at each AHU. Local access to AHU status, set points and alarms is critical. No exceptions will be permitted.
6. Traq Comfort System: Outdoor airflow shall be sensed at the intake and maintained at the minimum outdoor airflow setpoint for the air handler as determined using ASHRAE STANDARD 62-89 EQUATION 6-1. The building automation system shall dynamically calculate equation 6-1 taking into account all connected space to determine the minimum outdoor airflow setpoint.
7. Damper Actuators shall be selected, sized, mounted, wired and tested by the air handling unit manufacturer. Actuators shall be direct coupled to minimize linkage. Manual overrides shall be available.
8. Manual reset low limit switches with will shut down the fan, close the outside air damper and open the heating valve to protect the unit. The low limit switches shall be factory mounted to maximize coil coverage. Field installation will be acceptable if the proper capillary clips are used and all four corners of the coil and the coil face are uniformly protected. Units with greater than 21 square feet of coil shall have at least two low limits. Averaging sensors must be installed with the same quality procedures across the coil face.
9. Valves shall be provided by the air handling unit manufacturer. They shall be shipped directly to the job site or mechanical contractor. The piping contractor shall install them. Quick connect electrical connections shall simplify field wiring.

4.02 VARIABLE AIR VOLUME TERMINAL UNITS

A. Direct Digital Controls

1. General. DDC Controls, actuator and factory costs to mount, calibrate and test the system shall be the responsibility of Section 15080 ATC/Building Management System Contractor.
2. Terminal unit manufacturer shall provide price for factory mounting and continuity check of direct digital controls to the ATC contractor. Field mounted DDC controls are not acceptable.
3. Multi-point, multi-axis flow ring or cross sensor to be furnished and mounted by terminal unit manufacturer. Single point or flow bar sensors are not acceptable. Shall be capable of maintaining airflow to within +/- 5 percent of rated unit airflow setpoint with 1.5 duct diameters straight duct upstream from the unit.

B. Variable Air Volume (VAV) Terminal Unit Control

1. The VAV terminal units shall be individually controlled by a DDC VAV controller per VAV terminal unit. The DDC VAV controller, damper motor, transducer and transformer shall be supplied by the BAS contractor and furnished to the terminal unit supplier. The cost to factory mount, calibrate and test the controller, transducer, transformer and actuator shall be coordinated prior to bid day and included in the BAS price.
 - a. To assure proper operation and control, the BAS contractor as part of this bid shall recalibrate the transducers six (6) months after acceptance of the BAS system to correct any deviations as a result of transducer drift.
2. Submit a copy of the recalibration report to the Engineer, Mechanical Contractor, Test, Adjust and Balance Contractor and Owner.
 - a. Refer to Section 15740 Terminal Units for requirements.
3. The BAS shall perform the following VAV Terminal unit control strategies and provide the points as listed on the DDC/VAV point list and the specified monitoring and diagnostics.
 - a. Grouping - The BAS shall be able to group VAV boxes via keyboard commands. These groups shall make it possible for the operator to send a common command to all boxes in a group to operate in the same mode. A sample of this group report must be provided in the submittal package for approval by engineer and owner. BAS shall also compile on a group basis, the following:
 1. Minimum group temperature
 2. Maximum group temperature
 3. Average group temperature
 4. Current airflow through boxes in group (total)
 - b. Setpoint Control - The BAS shall edit the zone space temperature setpoint of each VAV box. The zone temperature setpoint shall be operator adjustable. Individual zone setpoint and control logic shall reside at the zone level, and not be dependent upon the BAS for control. In the event of communication loss, the box will continue to control to current setpoints.
 - c. Cooling Valve Control - The BAS shall control the cooling air valve to a fully open, fully closed, maximum CFM, or minimum CFM position based on operator commands. The operator shall also have the capability to adjust the maximum & minimum airflow limits of the air valve through the BAS.
 - d. Operating Mode - The BAS shall place the box in either the occupied or unoccupied mode based on an operator adjustable time schedule. Separate heating & cooling setpoints shall be enterable for each mode through the BAS. Other modes available for special applications shall include full open, full closed, maximum flow, and minimum flow.
 - e. Control Offset - The BAS shall be capable of offsetting the cooling or heating setpoints of one or more groups of boxes by an operator adjustable amount. This capability will allow for automatic zone setpoint changes based on system requirements, such as demand limiting.

- f. Automatic Recalibration - The system shall automatically recalibrate its air flow sensing & air valve position measurement system at system startup and on a scheduled basis.
 - g. Remote Setpoint Adjustment - The BAS zone temperature setpoint programmed in software shall be capable of being manually overridden by a remote adjustment at the temperature sensor. This manual readjustment feature may be disabled through the BAS, if desired.
 - h. Override Button - The VAV box shall be capable of being placed in the "occupied" mode by pressing an override button mounted on the zone temperature sensor.
 - i. Terminal unit status reports - For each terminal unit, the BAS shall provide an operating status summary of all unit sensed values (zone temperature, CFM, etc.), setpoints, and modes.
 - j. Terminal unit group report - For each group of VAV terminal units, the BAS shall report the group mode, heating and cooling airflow, average zone temperature, minimum zone temperature, and maximum zone temperature. The report shall also display for each terminal unit in the group the present temperature control setpoints and the current zone temperature.
4. Zone Sensors
- a. The zone sensor shall be accurate to within 0.5 F. The sensor shall be a product of the VAV box controls manufacturer and designed specifically for the installed controller.
 - b. The zone sensor shall have the following features:
 - 1.) Zone setpoint adjustment
 - 2.) Night setback temperature override button to provide occupied conditions during unoccupied times.
 - 3.) Night setback override cancel button to end the override condition.
5. Terminal box diagnostics.
- a. If zone temperature sensor input fails above its high range, unit shall control at its maximum CFM setpoint. If sensor input fails below its low range, unit shall control to its minimum CFM setpoint.
 - b. In both cases, all heat outputs shall be disabled. a diagnostic message shall be displayed upon operator inquiry.
 - c. If flow measuring system fails, unit shall automatically convert to a pressure dependent, damper position based algorithm. Diagnostic message shall be displayed upon operator inquiry.
 - d. If zone temperature setpoint potentiometer on zone sensor fails, unit shall automatically control to programmed occupied setpoints. Diagnostic message shall be displayed upon operator inquiry.

- d. If the zone temperature sensor fails, the UCM shall remove it from the averaging calculation and use the remaining sensors if applicable. If averaging is not implemented the UCM shall switch to the backup zone sensor. VAV controller shall send an alarm message to the building automation system.

If the zone temperature sensor fails, the UCM shall remove it from the averaging calculation and use the remaining sensors, if applicable. If averaging is not implemented, the UCM shall switch to the backup zone sensor. VAV controller shall send an alarm message to the building automation system. A report shall be printable that shows sensor assignments by serial number, time since the last transmission was received and the signal strength of the transmission.

- e. If communications are lost, controller shall continue to operate in the current mode of operation. All setpoints shall be retained in nonvolatile memory. If communications are not restored within 15 minutes, unit shall automatically initiate a reset-recalibrate.

4.03 SEQUENCE OF OPERATION, SPACE TEMPERATURE CONTROL

A. DDC Controls

1. Shutoff VAV Terminals

- a. On a rise in space temperature, the unit will modulate to provide maximum CFM. As space temperature decreases, the box will modulate down to its minimum CFM.

2. Shutoff VAV terminals with reheat

- a. On a rise in temperature above the cooling setpoint, the VAV terminal unit shall modulate to its maximum CFM. As the space temperature drops below the cooling setpoint, the terminal unit shall modulate to its minimum CFM. As the space temperature continues to fall to the heating setpoint, the terminal shall modulate to its heating minimum CFM. At this point, the heat will be staged on as follows:

- 1.) Staged Electric - Stage on electric heat with a 1 degree interval per stage.

4.04 DIRECT DIGITAL VAV CONTROLS

A. Direct Digital Controls

- 1. General. Direct digital controls (DDC) and factory costs to mount, calibrate and test the system shall be the responsibility of Section 15900 Automatic Temperature Control (ATC) / Building Automation System (BAS) Contractor.
- 2. Terminal unit manufacturer shall provide price for factory mounting, continuity check, calibrating, and testing of direct digital controls to the automatic temperature controls contractor. Field mounted DDC controls are not acceptable.

3. Multi-point, multi-axis flow ring or cross sensor to be furnished and mounted by terminal unit manufacturer. Single point or flow bar sensors are not acceptable. Flow sensing device shall be capable of maintaining airflow to within +/- 5 percent of rated unit airflow setpoint when installed with 1.5 duct diameters straight duct, of the same size as the primary airflow inlet, upstream from the unit.

B. Variable Air Volume (VAV) Terminal Unit Control

1. The VAV terminal units shall be individually controlled by a DDC VAV controller per VAV terminal unit. The DDC VAV controller, damper motor, transducer and transformer shall be supplied by the BAS contractor and furnished to the terminal unit supplier. The cost to factory mount, calibrate and test the controller, transducer, transformer and actuator shall be coordinated prior to bid day and included in the BAS price.
 - a. To assure proper operation and control, the BAS contractor as part of this bid shall recalibrate the transducers six (6) months after acceptance of the BAS system to correct any deviations as a result of transducer drift.
2. Submit a copy of the calibration report to the Engineer, Mechanical Contractor, Test, Adjust and Balance Contractor and Owner.
3. The BAS shall perform the following VAV Terminal unit control strategies and provide the points as listed on the DDC/VAV point list and the specified monitoring and diagnostics.
 - a. Grouping - The BAS shall be able to group VAV boxes via keyboard commands. These groups shall make it possible for the operator to send a common command to all boxes in a group to operate in the same mode. A sample of this group report must be provided in the submittal package for approval by engineer and owner. BAS shall also compile on a group basis, the following:
 1. Minimum group temperature
 2. Maximum group temperature
 3. Average group temperature
 4. Group boxes total airflow
 - b. Setpoint Control - The BAS shall edit the zone space temperature setpoint of each VAV box. The zone temperature setpoint shall be operator adjustable. Individual zone setpoint and control logic shall reside at the zone level, and not be dependent upon the BAS for control. In the event of communication loss, the box will continue to control to current setpoints.
 - c. Cooling Valve Control - The BAS shall control the cooling air valve to a fully open, fully closed, maximum CFM, or minimum CFM position based on operator commands. The operator shall also have the capability to adjust the maximum & minimum airflow limits of the air valve through the BAS.
 - d. Operating Mode - The BAS shall place the box in either the occupied or unoccupied mode based on an operator adjustable time schedule. Separate heating & cooling setpoints shall be editable for each mode through the BAS. Other modes available for special applications shall include full open, full closed, maximum flow, and minimum flow.

- e. Control Offset - The BAS shall be capable of offsetting the cooling or heating setpoints of one or more groups of boxes by an operator adjustable amount. This capability will allow for automatic zone setpoint changes based on system requirements, such as demand limiting.
 - f. Automatic Calibration - The system shall automatically calibrate its air flow sensing & air valve position measurement system at system startup and on a scheduled basis.
 - g. Remote Setpoint Adjustment - The BAS zone temperature setpoint programmed in software shall be capable of being manually overridden by a remote adjustment at the temperature sensor. This manual readjustment feature may be disabled through the BAS, if desired.
 - h. Override Button - The VAV box shall be capable of being placed in the "occupied" mode by pressing an override button mounted on the zone temperature sensor.
 - i. Terminal unit status reports - For each terminal unit, the BAS shall provide an operating status summary of all unit sensed values (zone temperature, CFM, etc.), setpoints, and modes.
 - j. Terminal unit group report - For each group of VAV terminal units, the BAS shall report the group mode, heating and cooling airflow, average zone temperature, minimum zone temperature, and maximum zone temperature. The report shall also display for each terminal unit in the group the present temperature control setpoints and the current zone temperature.
4. Terminal box diagnostics.
- a. If zone temperature sensor input fails above its high range, unit shall control at its maximum CFM setpoint. If sensor input fails below its low range, unit shall control to its minimum CFM setpoint.
 - b. In both cases, all heat outputs shall be disabled. a diagnostic message shall be displayed upon operator inquiry.
 - c. If flow measuring system fails, unit shall automatically convert to a pressure dependent, damper position based algorithm. Diagnostic message shall be displayed upon operator inquiry.
 - d. If zone temperature setpoint potentiometer on zone sensor fails, unit shall automatically control to programmed occupied setpoints. Diagnostic message shall be displayed upon operator inquiry.
 - e. If communications are lost, controller shall continue to operate in the current mode of operation. All setpoints shall be retained in nonvolatile memory. If communications are not restored within 15 minutes, unit shall automatically initiate a reset and then calibrate the flow sensor and damper position.

C. Zone Sensors

1. The zone sensor shall be accurate to within 0.5 F. The sensor shall be a product of the VAV box controls manufacturer and designed specifically for the installed controller.
2. The zone sensor shall have the following features:
 - a. Zone setpoint adjustment
 - b. Night setback temperature override button to provide occupied conditions during unoccupied times.
 - c. Night setback override cancel button to end the override condition.

D. Testing/ Verification

1. Factory run-test all fan powered units.
2. Factory set and check all analog electronic and pneumatic controllers to within 5% of scheduled maximum and minimum settings. Base performance on tests conducted in accordance with ARI 880.
3. Maximum Casing Leakage: 1 percent of nominal air flow at 0.5 in wg inlet static pressure.
4. Maximum Damper Leakage: 1 percent of design air flow at 4 in wg inlet static pressure.

END OF SECTION

(SEE ATTACHED 3 PAGES POINT LIST)

SECTION 16010

ELECTRICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

- A. This Division and the accompanying electrical drawings cover furnishing all labor, equipment and materials and performing all operations in connection with the installation of 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 plans 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.
- 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 and Supplementary Conditions. Substitutions require "prior approval."
- 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, and marked, and with contents of no less than one specification section, as indicated below, per individual submission. Submittals not called for herein and/or submittals pertaining to the actual construction process will not be reviewed.

- I. SECTION 16100

- 1. Conduit and fittings
- 2. Wire and cable
- 3. Junction boxes
- 4. Pull boxes
- 5. Supporting devices
- 6. Wire connection
- 7. Cable Tray

- II. SECTION 16200

- 1. Circuit breakers
- 2. Panelboards
- 3. Disconnect switches
- 4. Fuses
- 5. Distribution Panel Breaker

- B. Shop drawings and/or catalog data submittals on all items of equipment and materials shall be submitted in conformity with requirements of the General and Supplementary Conditions. Do not submit more than the required number of sets.
- C. A submittal including a list of the manufacturers of the principal items of material: wire, conduit, connectors, panelboards, switchboards, motor control centers, generators, etc., shall be submitted prior to the first shop drawing submission and within 30 days of contract award.

- D. All material lists and shop drawing submittals shall include a stamped indication signifying that the submittals have been previously reviewed for compliance with the Contract Documents, that all coordination required prior to field installation has occurred and that the material being submitted is approved for installation. The stamped indication shall include the name of the contracting firm, the date of the review and the signature of the contractor. The Engineer will not review the shop drawing submittals without the contractor's stamped approval already on the shop drawings. The responsibility of complying with the Contract Documents will not be relieved by the Engineer's review.
- E. All pricing is to be based upon the products, manufacturers, and processes described in the Contract Documents. Requests for approval of substitutions shall be written and delivered to the Owner and/or Engineer's office no later than 10 days before bid date.
- F. Samples of all materials proposed for use shall be presented to the Owner and/or Engineer for his approval when requested.

2.03 AS-BUILT (RECORD) DRAWINGS

- A. Maintain on the job site at all times during construction a set of "As-Built" mylar sepias with all changes during construction marked thereon. Include any sketches or "marked-up" drawing prints as may be generated on the job site to assist in recording the changes.
- B. The "As-Built" sepias shall show all changes and deviations from the Contract Drawings including relocation of outlets, conduit and equipment. Record final dimensioned locations of switchboards, panelboards, transformers, disconnect switches, etc. Make sufficient measurements to locate all underground conduit.
- C. At the completion of construction, the sepia drawings, sketches and mark-up prints shall be presented to the Owner and/or Engineer.

2.04 MAINTENANCE AND INSTRUCTION MANUALS: Submit to the Owner and/or Engineer, upon completion of the work, three (3) copies of maintenance and instruction manuals for equipment provided.

2.05 SUBMISSION OF DRAWINGS: Submission of Engineers drawings for shop drawings and unaltered Engineer's drawings for "As-Built" will not be acceptable.

PART 3 EXECUTION

3.01 COORDINATION

- A. 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. 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

BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.01 DESCRIPTION

- A. All work specified in this Section shall comply with the provisions of Section 16010.
- 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. Flexible metal conduit (FLX) shall be flexible steel conduit tubing and shall meet Underwriters Laboratories Standard for Flexible Steel Conduit.
- C. Steel conduit approved manufacturers are Allied, Southwire, Triangle, Republic, Wheatland and Pittsburg.

2.02 CONDUIT FITTINGS

- A. GRC conduit fittings shall be zinc-coated, ferrous metal and taper threaded type.
- B. 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.
- C. 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.
- D. Conduit fittings approved manufacturers are Raco, Steel City, O.Z Gendy, Thomas & Betts, Efcor and Appleton.

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 or stranded 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, Racco, 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.

2.06 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. 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 type. 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. 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.
- D. Provide a cabinet in which to store all spare fuses.

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. GRC shall be used for all underground feeders.
- C. Conduit shall be continuous from outlet to outlet, from outlet to cabinet, junction box and pull box. Conduit shall enter and be secured to all boxes, etc., in such a manner that each system will be electrically continuous from service to all outlets. All conduit from cabinets and junction boxes shall terminate in approved outlet boxes or conduit fittings. Conduit connections to any box which has no threaded hub shall be double locknuttet.
- D. 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.
- E. All conduit shall be concealed unless indicated otherwise. Install exposed conduit parallel with or at right angles to the building walls and support from walls or ceilings at intervals required by Code with approved galvanized 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.
- F. 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".
- G. At couplings, conduit ends shall be threaded so that they meet in the coupling. Right and left hand couplings shall not be used.
- H. Provide watertight conduit hubs on conduit terminating in a box or cabinet exposed to the weather.

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 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:
- 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.

3.04 GROUNDING

- A. Ground connections shall be in accordance with the 2002 National Electrical Code.
- 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.

3.05 CONNECTION TO EQUIPMENT: 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.

3.06 EQUIPMENT ANCHORING

- A. 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.

END OF SECTION

SECTION 16200

SERVICE AND DISTRIBUTION

PART 1 GENERAL

1.01 DESCRIPTION

- A. All work specified in this Section shall comply with the provisions of Section 16010.
- B. Provide a complete electrical distribution system. The system shall include the secondary service entrance, feeders, panelboards, etc., to provide a complete system.
- C. All distribution switchgear (branch circuit panelboards, 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 SECONDARY ELECTRICAL SERVICE

- A. The secondary service to the building is 120/240 volts, 3 phase, 4 wire, 60 Hertz AC, as exists. Provide all conduit and wire as specified from the terminals of the automatic transfer switch to the main switchboard.
- B. The contractor shall provide ground rods, ground cables, and ground wires, so as to provide a complete grounding system as per NEC 250.
- C. Make all arrangements with the power company and pay all charges made by the power company for permanent electric service. Coordinate all termination points and requirements.

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 of tin plated aluminum 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 22,000 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 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 Square D, Cutler Hammer, or 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

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, or 3500 K.
 - 2. Floor lamps shall be listed by manufacturer as suitable for use on the ballasts intended for use.
- C. Incandescent Lamps:
 - 1. "A" type lamps shall be inside frosted, except where specified to be clear.
 - 2. "R" and "PAR" type lamps shall have the beam type (spot or flood) as specified in the lighting fixture schedule.
 - 3. Quartz tubes shall be frosted.

4. All incandescent lamps, except quartz tubes, shall be rated for 120 volt operation.

5. Incandescent lamps shall be as specified in Lighting Fixture Schedule.

D. 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. Energy conserving fluorescent ballasts shall be CBM certified for full light output. Energy conserving rapid start lamp ballasts shall have an average input wattage of 86 watts when operating two (2) F40T12 rapid start fluorescent lamps in ambient of 77 F. Energy conserving ballasts shall be CBM certified for operation of standard fluorescent lamps as well as energy conserving lamps specified herein.

D. Ballasts for High Intensity Discharge (HID) lamps shall be Constant Wattage Autotransformer (CWA) type or equal type with 90% minimum power factor.

E. Ballast for Octron or other T-8 lamps shall be electronic ballast as manufactured by Howard Industries, Advance or equal.

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 for exterior lighting. Photocontrol shall operate to energize the circuits whenever natural lighting falls below 25 footcandles.
- B. The time control center shall be a 7-day calendar dial type. Time switch dial shall permit different on-off settings for each day of the week with provision for omitting selected days. The time center shall have capability of controlling three circuits:

Circuit A: Dusk (photocell/on - preset(time switch) off
Circuit B: Dusk (photocell) on - dawn (photocell) off
Circuit C: Preset (time switch) on - preset (timeswitch) off.

The time control center shall be a Tork Model T-930L or approved equal.

- C. Provide 30A multipole contactors as required to control exterior lighting.
- D. Sequence of control for exterior lighting shall be as determined by the owner.

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.

END OF SECTION

SECTION 16721 FIRE ALARM SYSTEM

PART 1 GENERAL

1.01 GOVERNING STATEMENT:

- A. The Contractor shall furnish and install in conduit, complete and ready for the installation of any additional fire alarm devices associated with the new mechanical system, including smoke detectors and duct smoke detectors.. The final revised Fire Alarm System shall conform to the standards of the National Electrical Codes, NFPA, Federal, State and Local laws and ordinances.
- B. The system devices shall be addressable, and shall be Class B electrically supervised against both short and open wiring faults in the detection and alarm circuits. A short, open wiring fault, or ground occurring in these circuits shall cause an audible alarm and visual trouble indication at the control panel.

PART 2 OPERATION

2.01 SYSTEM DESCRIPTION

- A. Furnish and install where indicated on the plans a all fire alarm control devices and connect to the existing fire alarm control panel.

2.02 SYSTEM SUPERVISION

- A. Actuation of any new initiating device shall cause the following to occur:
 - 1. Activate the general alarm audible and visual devices.
 - 2. Activate zone indicators at the central control panel.
 - 3. Interrupt power to AHU's as indicated.

2.03 EQUIPMENT REQUIREMENTS

- A. Automatic Detectors-Photoelectric:
 - 1. Furnish and install where indicated on the plans photoelectric smoke detectors. The combination detector head and twist-lock base shall be UL listed and be compatible with the fire alarm control unit. The photoelectric detector shall be interchangeable with a companion ionization unit without changing the detector base or wiring. Detector removal for any reason shall cause a trouble condition at the fire alarm panel. Detector shall have NO-NC contacts for air handling unit shut down.
 - 2. The photoelectric detector shall include a flashing status indicating LED for visual supervision. Upon detection of a smoke condition, the flashing LED will latch on steady at full brilliance and the detector shall activate the fire alarm control panel. The detector may be reset by operation of the fire alarm panel reset switch.
 - 3. It shall be possible to perform a functional test of the detector without the need for generating smoke. The test method shall simulate the effects of smoke in the sensing chamber to insure the testing of all detector circuitry.

4. To facilitate installation the detector shall be non-polarized. By using the furnished jumper, it shall be possible to check initiating circuit loop prior to installation of the detector head. Voltage and shielded cable shall not be required. The detector heads shall not be installed until construction has been completed.
 5. The detector base shall have provisions for connection of a remote indicator. The remote indicator shall visually verify normal operation and an alarm condition on the detector. The remote indicator shall be an LED type mounted on a single gang stainless steel plate located where indicated on the drawings. The operation of the integral LED on the detector shall not be compromised.
- E. Automatic Detectors-Thermal:
1. Install in those areas indicated, combination rate of rise/fixed and/or fixed temperature units with thermal ratings as indicated on the drawings. Detectors shall be of low profile construction and be colored white to blend in with the ceiling. The rate of rise section of the detector shall be self restoring, fixed temperature section when actuated, shall give a mechanical indication of operation and shall not self restore.
- F. Automatic Detectors-Duct Type:
1. The air duct detector for the fire and smoke detection system shall be equipped with a photoelectric detector head. The detector shall provide detection of combustion gases and smoke in air conditioning ducts in compliance with the National Fire of Air Conditioning and Ventilating Systems, NFPA 90A. The detector shall be UL listed specifically for the use in air handling systems. The detector shall operate at air velocities ranging from 500 feet per minute to 3100 feet per minute without requiring compensation for operation at specific air velocities. Sampling tubes of sufficient length shall be provided so that the sampling tube can be cut to exact length at the installation site to match duct width at the installed location. One duct detector shall be installed in the supply duct downstream of filter and one in the return duct near unit and upstream of outside air duct connection.
 2. The duct detector shall interface directly with various remote indicators and control accessories such as the Remote Indicator.
- G. The equipment designations are to establish a minimum standard of quality. Equipment of other manufacturers will be considered if in the opinion of the Architect it conforms to the quality and functions of that specified.

PART 3 EXECUTION

- A. All wiring shall be checked and tested by the installing contractor in accordance with instructions provided by the manufacturer of the fire alarm equipment to insure that the system is free of grounds and shorts. Wiring size shall be as recommended by manufacturer and consistent color coding shall be maintained.
- B. System components shall be as manufactured by the same manufacturer as the existing fire alarm control panel.

END OF SECTION

SECTION 16920

MOTOR CONTROLS AND WIRING

PART 1 - GENERAL

1.01 SCOPE

- A. All work specified in this Section shall comply with the provisions of Section 16011.
- B. All motors shall be provided under Division 15.
- C. All motor starters shall be furnished under Division 16 for each motor except for package units which will be furnished with integral starters. Motor starters shall be installed either in a Motor Control Center or separately mounted adjacent to the motor served, as indicated on plans.
- D. Motor power wiring is defined as those conductors between the energy source and the motor. This power wiring shall be terminated at the motor terminals.
- E. All control wiring required for automatic starting and stopping of motors shall be provided under Division 15 unless specifically shown on the electrical drawings.
- F. Power wiring shall be connected through all line voltage control devices such as firestats and thermostats provided by Division 15.

PART 2 - PRODUCTS

2.01 MOTOR STARTERS

- A. Starters for motors 1/3 horsepower or smaller shall be manual unless remote or automatic starting is required, in which case the starters shall be magnetic, full voltage, non-reversing, single-speed, unless otherwise indicated. All other starters shall be magnetic.
- B. Each starter for a three-phase motor shall be furnished with three (3) overload relays sized for the full load running current of the motor actually provided. Provide an external "RESET" button or "HAND-OFF-AUTO" selector switch as scheduled with red "RUNNING" light. Provide a green pilot light to indicate motor "STOPPED." Each pilot light shall have a legend plate indicating reason for signal.
- C. Each overload relay shall have a normally open alarm contact which will close only when actuated by an overload (not to be confused with N.O. or N.C. auxiliary contacts). These contacts shall be properly wired to their respective blue pilot light provided on the starter front cover and having a "TRIPPED" legend plate.
- D. Individually mounted motor starters shall be in a NEMA Type 1 general purpose enclosure in unfinished areas and shall be flush mounted in all finished areas. Each starter shall have a laminated nameplate to indicate Division 15 unit number, function and circuit number. Starters installed outdoors shall be NEMA 3R.
- E. All motor starters, push buttons and pilot lights shall be of the same manufacture as the switchboard and shall be Westinghouse, Square D, Cutler Hammer, or ITE/Siemens.

2.02 COMBINATION STARTERS

- A. Combination starters shall consist of a circuit breaker or fused switch and a motor starter mounted in a common NEMA Type 1 general purpose enclosure.
- B. The motor starter components shall be as specified in paragraph 2.01 for motor starters.
- C. The circuit breaker component shall be a minimum 22,000 RMS interrupting capacity and shall be as required in Section 16200.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide power wiring to and install all motor starters, unless integrally factory mounted on a piece of equipment.
- B. Provide power wiring to all motors except packaged units that are prewired between the starter and motor.
- C. Where line voltage control devices are mounted at, on or inside a unit, such as aquastats, firestat for single phase devices, etc., the power wiring to the unit shall be connected through such a control device.
- D. On final inspection, it shall be demonstrated to the Architect or his representative that each overload relay control circuit is properly wired and functioning correctly by manually tripping each overload relay individually, one at a time. This inspection procedure shall not involve removing of any wiring or disconnecting any current carrying parts.

END OF SECTION