

CONTRACT DOCUMENTS

AND

TECHNICAL SPECIFICATIONS

FOR

***HVAC UPGRADES
TO SECOND AND THIRD FLOORS AT
GRETNA CITY HALL***

***FOR THE
CITY OF GRETNA, LOUISIANA***

740 SECOND STREET
GRETNA, LOUISIANA

22 MARCH 2024

BURGDahl & GRAVES, AIA ARCHITECTS
2550 Belle Chasse Highway, Suite 130, Gretna, LA 70053

GVA ENGINEERING
2615 Edenborn Ave., Suite C, Metairie, LA 70002

**HVAC UPGRADES
TO SECOND AND THIRD FLOOR OF
GRETNA CITY HALL**

**FOR THE
CITY OF GRETNA, LOUISIANA**

TABLE OF CONTENTS

TITLE PAGE
TABLE OF CONTENTSTC

DIVISION 0 – BID DOCUMENTS

BIDDING REQUIRMENTS:

INVITATION TO BIDI-1
INSTRUCTIONS TO BIDDERS.....B-1
LOUISIANA UNIFORM PUBLIC WORK BID FORM.....LAUPWBF
BID BOND.....BB-1
AFFIDAVIT.....AF-1
ATTESTATIONS AFFIDAVITAA-1
PROSPECTIVE PRIME SUPPLIER’S (BIDDER) STATEMENT
 ABOUT EQUAL OPPORTUNITY CLAUSEEO-1
CERTIFICATION OF NONSEGREGATED FACILITIES.....NF-1
BIDDER’S REPRESENTATION.....BR-1

CONTRACT FORMS:

AGREEMENTA1
PERFORMANCE AND PAYMENT BOND.....PB-1

CONDITIONS OF CONTRACT:

STANDARD GENERAL CONDITIONS OF THE
 CONSTRUCTION CONTRACT00700
SUPPLEMENTARY CONDITIONS TO THE STANDARD
 GENERAL CONDITIONS OF THE CONSTRUCTION
 CONTRACT00810

DIVISION 1 – GENERAL REQUIREMENTS

GENERAL REQUIREMENTS – PROJECT REQUIREMENTS1A
GENERAL REQUIREMENTS - SUBMITTALS.....1B
GENERAL REQUIREMENTS – MOBILIZATION AND DEMOBILIZATION1C
GENERAL REQUIREMENTS - SPECIAL PROVISIONS1SP
PROJECT DESCRIPTION AND SCOPE OF WORK01010
MEASUREMENT AND PAYMENT.....01025
PROJECT COORDINATION/ CONTRACTOR’S USE OF PREMISES01040
QUALITY CONTROL01410
REFERENCE STANDARDS AND DEFINITIONS01420
BARRIERS AND ENCLOSURES.....01530
SECURITY.....01540
TRAFFIC CONTROL AND COORDINATION01555
TEMPORARY CONTROLS.....01560
PRODUCT REQUIREMENTS.....01600

PRODUCT SUBSTITUTION PROCEDURES	01630
SUBSTITUTION REQUEST FORM	01631
CLOSEOUT PROCEDURES	01770
CLOSEOUT SUBMITTALS	01778

DIVISION 2 – SITE WORK

DEMOLITION.....	02110
-----------------	-------

DIVISION 3 – CONCRETE

NOT USED

DIVISION 4 – MASONRY

NOT USED

DIVISION 5 – METALS

NOT USED

DIVISION 6 – WOOD AND PLASTICS

ROUGH CARPENTRY.....	06100
----------------------	-------

DIVISION 7 – THERMAL AND MOISTURE PROTECTION

SEALANTS	07900
----------------	-------

DIVISION 8 – DOORS AND WINDOWS

NOT USED

DIVISION 9 – FINISHES

PLASTER	09230
METAL STUD AND GYPSUM WALLBOARD SYSTEMS	09260
PAINTING.....	09900

DIVISION 10 – SPECIALTIES

NOT USED

DIVISION 11 – EQUIPMENT

NOT USED

DIVISION 12 – FURNISHINGS

NOT USED

DIVISION 13 – SPECIAL CONSTRUCTION

NOT USED

DIVISION 14 – CONVEYING SYSTEMS

NOT USED

DIVISION 15 – MECHANICAL

MECHANICAL GENERAL PROVISIONS.....	15010
PLUMBING SYSTEMS	15400
FIRE PROTECTION SYSTEMS	15500
HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS.....	15600
HEATING, VENTILATING AND AIR CONDITIONING CONTROL SYSTEMS	15650

END OF CONTENTS

D I V I S I O N

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BID DOCUMENTS

INVITATION TO BID

**HVAC UPGRADES TO SECOND AND THIRD FLOORS
AT GRETNA CITY HALL
FOR THE CITY OF GRETNA, LOUISIANA**

Sealed Bids will be received by the City of Gretna in the Mayor's Office, Gretna City Hall, 2nd Street and Huey P. Long Avenue, Gretna, Louisiana 70053, **August 12, 2024, until 10:00 a.m.**, local time, for the HVAC Upgrades to Second and Third Floors at Gretna City Hall.

At 10:05 a.m. local time on the same day, in the Mayor's Office, Gretna City Hall, Gretna, Louisiana, all Bids that have been duly received will be publicly opened and read aloud.

Without limiting the scope of work described herein, the proposed bid provides for HVAC upgrades to existing building (second and third floor) with associated architectural, mechanical and electrical work as detailed within the Construction Documents.

All Bids must be in accordance with the Contract Documents on file with the City of Gretna's Director of Public Works, 224 4th Street, Gretna, Louisiana, 70054, and at the office of Burghahl & Graves Architects, 2550 Belle Chasse Hwy, Suite 130, Gretna LA 70053.

Copies of the Bidding Documents and Contract Documents, consisting of drawings and specifications for use in preparing Bids may be secured from the office of BURGDAHL & GRAVES ARCHITECTS, 2550 Belle Chasse Hwy., Gretna, LA 70053 at (504) 366-4433 by licensed contractors upon payment of \$70.00 per set. Deposit on the first set of documents furnished bona fide prime bidders will be fully refunded upon return of the documents in good condition no later than ten calendar days after receipt of bids. On other sets of documents furnished to prime bidders, the deposit less \$35.00 will be refunded upon return of the documents in good condition no later than ten calendar days after receipt of bids. Good condition is defined as free of all pencil, pen and other marks. All sets furnished to subcontractors and suppliers are non-refundable. Partial sets will not be issued. Request for mailing Contract Documents will be handled by either Federal Express or UPS, provided the addressee supplies his courier's account number and "street" address (no P.O. Box addresses).

As an option to obtaining hard copies per the procedure above, complete bidding documents for this project are also available in electronic form. They may be obtained without charge and without deposit from www.publicpurchase.com, www.gretnala.com, bmorgan@gretnala.com or tmipro@burghahlgraves.com.

To be listed as a plan holder and receive notification of Addenda and other project related information if electronic documents are obtained, interested parties must register at the website. An email address is required to receive project notifications.

Each Bidder must obtain a contractor's license from the state of Louisiana prior to submitting his bid.

The work for this project is classified as Building Construction or Mechanical Work. **ONLY** Contractors with these classifications may submit bids for this project. Bids received by Contractors without this classification will not be opened.

Bids will be received on a lump sum basis as described in the Contract Documents.

All work is to commence within 30 days after the Date of Contract. Completion of the work is required within 240 calendar days. All time limits commencing upon the date of issuance by registered mail of the Owner's "Notice to Proceed."

Bid security in the amount of 5 percent (5%) of the total Bid must accompany each Bid.

The successful Bidder will be required to furnish a Performance and Payment Bond guaranteeing faithful performance and the payment of all bills and obligations arising from the performance of the contract.

Sureties will be required to meet qualifications set forth in the Contract Documents.

Bidders are invited to a prebid conference to discuss the project. Prebid conference details are set forth in the Bidding Documents. **The Mandatory Prebid Conference** will be held on **August 1, 2024** and shall be held at Gretna City Hall, 740 Second Street, Gretna, LA 70053, conference room.

No Bid may be withdrawn within a period of 45 days after the date fixed for opening Bids.

The City of Gretna reserves the right to reject all Bids and to reject nonconforming, nonresponsive, or conditional Bids.

CITY OF GRETNA

BELINDA C. CONSTANT
MAYOR
CITY OF GRETNA

Publish:
August 17, 2024
August 24, 2024
August 31, 2024

INSTRUCTIONS TO BIDDERS - LIST OF SUBJECTS

- B-1. CROSS REFERENCE TO PRIMARY STATEMENTS
- B-2. QUALIFICATIONS OF BIDDERS
- B-3. LOUISIANA LICENSE REQUIREMENTS
- B-4. FAMILIARIZATION WITH THE WORK
 - B-4.01. Site Conditions
 - B-4.02. Pre-Bid Conference
- B-5. INTERPRETATIONS
- B-6. TAXES AND PERMITS
- B-7. BID SECURITY
- B-8. RETURN OF BID SECURITY
- B-9. CONTRACT TIME
- B-10. SUBCONTRACTORS AND SUPPLIERS
 - B-10.01. Subcontractor Qualification
 - B-10.02. Suppliers
- B-11. BIDS
 - B-11.01. Bid Form
 - B-11.02. Bid Pricing
 - B-11.03. Not Used
 - B-11.04. Submission of Bids
 - B-11.05. Modification and Withdrawal of Bids
 - B-11.06. Bids to Remain Open
- B-12. AWARD OF CONTRACT
- B-13. EXECUTION OF AGREEMENT
- B-14. COPIES OF CONTRACT DOCUMENTS
- B-15. LOCAL MATERIALS AND FIRMS
- B-16. - 20. NOT USED
- B-21. PERFORMANCE AND PAYMENT BOND QUALIFICATIONS
- B-22. BIDDER'S CHECKLIST

INSTRUCTIONS TO BIDDERS

B-1. CROSS REFERENCE TO PRIMARY STATEMENTS. Definitions, requirements, and limitations affecting the bidding are contained in the various Contract Documents and are not necessarily repeated in these instructions. The following is a partial list of applicable provisions and their locations:

Availability of Land	General Conditions and Division 1
Bonds and Insurance	General and Supplemental Conditions
Definitions	General and Supplemental Conditions
Detailed Description of the Work	Division 1
Liquidated Damages	Agreement and Special Provisions
Laws and Regulations	General and Supplemental Conditions
Retainage	Agreement and Special Provisions
Subsurface Investigations	General and Supplemental Conditions

B-2. QUALIFICATIONS OF BIDDERS. Bidders may be required to submit evidence that they have a practical knowledge of the particular Work bid upon, and that they have the financial resources to complete the proposed Work.

In determining the Bidder's qualifications, the following factors will be considered: Work previously completed by the Bidder and whether the Bidder (a) maintains a permanent place of business, (b) has adequate plant and equipment to do the Work properly and expeditiously, (c) has the financial resources to meet all obligations incident to the Work, and (d) has appropriate technical experience. In accordance with Louisiana Public Contract Law (38:2281), preference will be given to bidders domiciled in Louisiana.

Each Bidder may be required to show that he has handled former work so that no just claims are pending against such work. No Bid will be accepted from a Bidder who is engaged on any work which would impair his ability to perform or finance this Work.

B-3. LOUISIANA LICENSE REQUIREMENTS. Only Bids of Contractors licensed under LSA R.S. - 37:2150 et seq., will be considered. Licensing is supervised by the Louisiana Licensing Board for Contractors, State Capitol Building, Baton Rouge, Louisiana. Contractors desiring to bid shall submit with their Bids evidence that they hold a valid license in the proper classification. This work is classified as Building Construction or Mechanical Work. **ONLY** Contractors with these classifications may submit bids for this project. Bids received by Contractors without this classification will not be opened.

B-4. FAMILIARIZATION WITH THE WORK. Before submitting his Bid, each prospective Bidder shall familiarize himself with the Work, the site where the Work is to be performed, local labor conditions and all laws, regulations and other factors affecting performance of the Work. He shall carefully correlate his observations with requirements of the Contract Documents and otherwise satisfy himself of the expense and difficulties attending performance of the Work. The submission of a Bid will

constitute a representation of compliance by the Bidder. There will be no subsequent financial adjustment for lack of such familiarization.

B-4.01. Site Conditions. Each Bidder shall visit the site of the Work and completely inform himself relative to construction hazards and procedure, the availability of lands, the character and quantity of surface and subsurface materials, and utilities to be encountered, the arrangement and condition of existing structures and facilities, the character of construction equipment and facilities needed for performance of the Work, and facilities for transportation, handling, and storage of materials and equipment. All such factors shall be properly investigated and considered in the preparation of the Bid.

B-4.02. Prebid Conference. A **Mandatory Prebid Conference** will be held at Gretna City Hall, 740 Second Street, Gretna, Louisiana, 70053 on **August 1, 2024, at 10:00 A.M.** Representatives of Burgdahl & Graves Architects, will be present to discuss the Project and answer questions. Bidders, subcontractors, and suppliers are encouraged to attend and participate in the conference. Contractors and subcontractors shall be responsible for all matters discussed at the pre-bid conference as well as decisions made at that time.

B-5. INTERPRETATIONS. All questions about the meaning or intent of the Contract Documents shall be submitted to the Architect in writing. Replies will be issued by Addenda, mailed or delivered to all parties recorded by the Architect as having received the bidding documents. Addenda will be issued at least 72 hours (excluding weekends and holidays) prior to the time stated for opening bids. Questions received less than seven calendar days prior to the date for opening Bids will not be answered. Only answers furnished by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

B-6. TAXES AND PERMITS. Attention is directed to the requirements of the General and Supplementary Conditions regarding payment of taxes and obtaining permits. All taxes that are lawfully assessed against Owner or Contractor in connection with the Work shall be paid by the Contractor. The bid prices shall include all such taxes and the costs of all required permits.

B-7. BID SECURITY. The amount of bid security is stated in the Invitation to Bid. The required security must be in the form of a certified or bank cashier's check or a bid bond. The bid bond must be executed by a surety meeting the requirements set forth in General Conditions.

The bid security shall be made payable without condition to the Department of Public Works, City of Gretna, hereinafter referred to as Owner. The bid security may be retained by and shall be forfeited to the Owner as liquidated damages if the Bid is accepted and a contract based thereon is awarded and the Bidder shall fail to enter into a contract in the form prescribed, with legally responsible sureties, within ten days after contract has been delivered to the Bidder by the Owner.

B-8. RETURN OF BID SECURITY. The bid security of the successful Bidder will be retained until he has executed the Agreement and furnished the required Contract Security, whereupon checks furnished as bid security will be returned; if he fails to execute and deliver the Agreement and furnish the required Contract Security within

twelve days after the Contract has been delivered to the Bidder by the Owner, Owner may annul the Notice of Award and the bid security of that Bidder will be forfeited. The bid security of any Bidder whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the seventh day after the executed Agreement is delivered by Owner to Contractor and the required Contract Security is furnished but not to exceed 45 days after the Bid opening. Checks furnished as bid security by other Bidders will be returned within seven days of the Bid opening.

B-9. CONTRACT TIME. The Contract Time is an essential part of the contract and it will be necessary for each Bidder to satisfy Owner of his ability to complete the Work within the time set forth in the Bid Form. Provisions for delays, liquidated damages, and extensions of time are set forth in the General and Supplementary Conditions.

B-10. SUBCONTRACTORS AND SUPPLIERS. Within seven days after Bids are opened, the apparent low Bidder, and any other Bidder so requested, shall submit a list of all Subcontractors he expects to use in the Work.

B-10.01. Subcontractor Qualification. Particular consideration will be given to the qualifications of each Subcontractor proposed to perform more than ten per cent (10%) of the Work. An experience statement with pertinent information as to similar projects and other evidence of qualification shall be furnished for each named Subcontractor, as requested by the Owner. If Owner or Architect after due investigation has reasonable objection to any proposed Subcontractor, he may before giving the Notice of Award request the apparent low Bidder to submit an acceptable substitute without an increase in his Bid. If the apparent low Bidder declines to make any such substitution, Notice of Award shall not be given to such bidder, but in declining to make substitution he will not thereby sacrifice his bid security. Any Subcontractor so listed and to whom Owner or Architect does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to the Owner and Architect.

Contractor shall not be required to employ any subcontractor against whom he has reasonable objection.

The use of subcontractors listed by the Bidder and accepted by the Owner prior to the Notice of Award will be required in the performance of the Work.

B-10.02. Suppliers. The list of subcontractors shall also include the suppliers and manufacturers of principal items of materials and equipment the Bidder expects to use in the Work.

B-11. BIDS.

B-11.01. Bid Form. Bids/Proposals shall be prepared in accordance with these specifications and other applicable statutory requirements.

Forms to be completed and submitted at the time of bid are as follows:

1. Louisiana Uniform Public Work Bid Forms
 - a. Public Work Bid Form (with appropriate attachments if any)
 - b. Unit Price Form

c. Bid Bond Form (with appropriate attachments if any)

In case of conflict between these specifications and the above required Forms, said Forms will govern.

Other documentation or Forms contained in these specifications may be requested such as Forms AF-1, EO-1, NF-1, and BR-1; said requests shall be submitted within ten (10) days of notification of being the low bidder.

The bidder shall sign his proposal correctly. If the proposal is made by an individual, his name and post office address must be shown. If made by a corporation, partnership, or other entity the name and position or title of the individual signing the proposal must be shown. A resolution authorizing the signature should be attached to the proposal except as set forth on the form.

All blank spaces in the Bid Form shall be filled. A bid price shall be indicated for all lump sum and/or unit price items and the total Bid. The total Bid will be determined as the sum of the lump sum of the work within the Contract Documents including any and all unit prices.

The bidder must record his bid in ink and all prices shall be stated in figures and only figures. Unit prices shall control.

The bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.

No alterations in Bids, or in the printed forms therefore, by erasures, interpolations, or otherwise will be acceptable unless each such alteration is signed or initialed by the Bidder; if initialed, Owner may require the Bidder to identify any alteration so initialed.

B-11.02. Bid Pricing. The Bid shall be based on the Work as indicated on the drawings and as specified. The Bidder shall complete the schedule of unit prices included in the Bid Form (when used).

The total Bid price quoted for the Work shall be stated in figures and in words. The price quoted in the Bid Form shall include all costs necessary for the complete performance of the work in full conformity with the conditions of the Contract Documents, and shall include all applicable Federal, State, County or Parish, Municipal or other taxes.

The final Contract Price, when used with Unit Price Basis, will be subject to adjustment according to final measured, used, or delivered quantities, and the unit prices in the Bid will apply to such final quantities.

B-11.03. NOT USED

B-11.04. Submission of Bids. Each Bid and accompanying documents shall be enclosed in a sealed opaque envelope or wrapping, addressed to: Gretna City Hall, Mayor's Office, 740 Second Street, Gretna, Louisiana 70053 and identified on the outside with the Bidder's name; return address; the words "HVAC Upgrades to Second

and Third Floors at Gretna City Hall” or submitted electronically through the website www.publicpurchase.com.

If the bid is in the amount of \$50,000 or more, the state license number of the bidder, unless otherwise accepted by law. (Amended by Resolution No. 47418) If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "BID ENCLOSED" on the face thereof.

Bids shall be deposited at the designated location prior to the time and date for receipt of Bids indicated in the Invitation to Bid, or the modified time and date indicated by Addendum. Bids received after the time and date for receipt of Bids will be returned unopened.

Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

Oral, telephone, or telegraph Bids are invalid and will not receive consideration.

No Bidder may submit more than one Bid. Multiple Bids under different names will not be accepted from one firm or association.

B-11.05. Modification and Withdrawal of Bids. Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

B-11.06. Bids to Remain Open. All Bids shall remain open for 45 days after the day of the Bid opening. Owner shall release bids and return bid securities as specified in this section under "Return of Bid Security".

B-12. AWARD OF CONTRACT. Owner shall award a contract to the Bidder who, in Owner's judgment, is the lowest responsive, responsible Bidder. Owner reserves the right to reject any or all Bids, to waive informalities, and to reject nonconforming, nonresponsive, or conditional Bids.

In evaluating Bids, Owner shall consider the qualifications of the Bidders, and whether or not the Bids comply with the prescribed requirements. Owner may consider the qualifications and experience of Subcontractors and other persons and organizations (including those who are to furnish the principal items of material) and may reject the Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.

If the contract is awarded, Owner shall give the apparent successful Bidder a Notice of Award within 45 days after the date of the Bid opening.

B-13. EXECUTION OF THE AGREEMENT. Architect will furnish to Contractor six copies of the Agreement and other Contract Documents bound therewith. Within 12 days, Contractor shall execute the Agreement; insert executed copies of the required bonds and power of attorney and submit all copies to the Owner. The date of contract

on the Agreement and Bond forms shall be left blank for filling in by Owner. The certification date on the power of attorney also shall be left blank for filling in by Owner.

Owner will execute all copies, insert the date of contract on the Agreement, Bonds, and power of attorney, and return all copies to Architect for review and distribution. Distribution of signed copies shall be two copies each to Owner and Contractor, and one copy each to Surety and Architect.

Owner will file one complete copy of the executed Contract Documents with the Recorder of Mortgages in Jefferson Parish and will bill Contractor.

B-14. COPIES OF CONTRACT DOCUMENTS. Copies of the Bidding Documents and Contract Documents, consisting of drawings and specifications for use in preparing Bids may be secured from the office of BURGDahl & Graves Architects, 2550 Belle Chasse Hwy., Suite 130, Gretna, Louisiana 70053 at (504) 366-4433 by licensed contractors upon payment of \$[70.00] per set. Deposit on the first set of documents furnished bona fide prime bidders will be fully refunded upon return of the documents in good condition no later than ten calendar days after receipt of bids. On other sets of documents furnished to prime bidders, the deposit less \$[35.00] will be refunded upon return of the documents in good condition no later than ten calendar days after receipt of bids. Good condition is defined as free of all pencil, pen and other marks. All sets furnished to subcontractors and suppliers are non-refundable. Partial sets will not be issued.

The Contractor to whom a contract is awarded will be furnished 6 (six) copies of the specifications and the drawings, together with all Addenda thereto.

B-15. LOCAL MATERIALS AND FIRMS. By statutory authority, preference is hereby given to materials, supplies, and provisions produced, manufactured, or grown in Louisiana, quality being equal to articles offered by competitors outside of the State (LSA R.S. - 38:2251), and preference is hereby given to firms doing business in the State of Louisiana (LSA R.S. - 38:2253).

B-16. through B-20. NOT USED

B-21. PERFORMANCE AND PAYMENT BOND QUALIFICATIONS. All performance and payment bonds for contracts with the City of Gretna are to be provided by a company or companies with at least an "A" or better financial rating according to the latest A.M. Best Company rating.

B-22. BIDDER'S CHECKLIST. Bidders shall refer to the Bidder's Check List to ensure all required documents and instructions are followed prior to submitting the Bid. Failure to submit required documents may render a bid informal. (See page B-8).

BIDDER'S CHECK LIST

Check off each box as you complete the instructions.

- _____ Bid Surety equal to 5% of total bid in the form of a certified check, cashiers check, or bid bond. Bid Bond must have attached appropriate and satisfactory power of attorney and certificate as to corporate principal. (Res. No. 10677, Section I-1-A and LRS 38:2214) (Pages BB-1 through BB-3).
- _____ Proper affidavit attached to bid, signed and notarized. (Page AF-1).
- _____ Satisfactory evidence of the authority of the person signing on behalf of the individual, firm, partnership, or corporation must be attached. In the case of a corporation, said authority must be in the form of a Corporate Resolution.
- _____ If bid is \$50,000.00 or more, your Louisiana State Contractor's license number must be affixed to the outside of your bid envelope and to the bid form. (Res. No. 10677 as amended by Res. No. 13385 Sec. I-1-A).
- _____ Your bid package must be submitted with original typed or in ink and receipt of all Addenda acknowledged with date. (Pages LUPWBF-1 through LUPWBF-7).
- _____ Bid documents shall be enclosed in a sealed opaque envelope or wrapping properly addressed and identified on the outside with Bidder's name, return address, Louisiana State License Number, Title of Project and Proposal Number or submitted electronically through the website www.publicpurchase.com.
- _____ Check terms, delivery, and/or starting and completion times.
- _____ Bid forms signed and state license no. shown. (Pages LUPWBF-1 through LUPWBF-7).

LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: CITY OF GRETNA
740 2ND STREET
GRETNA, LA 70053

(Owner to provide name and address of owner)

BID FOR: HVAC UPGRADES TO SECOND AND THIRD FLOORS AT GRETNA CITY HALL

(Owner to provide name of project and other identifying information)

The undersigned bidder hereby declares and represents that she/he: a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: Burgdahl & Graves Architects and dated: March 22, 2024

(Owner to provide name of entity preparing bidding documents.)

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:** (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) _____ .

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid" * but not alternates) the sum of:

_____ Dollars (\$ _____)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

Alternate No. 1 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

N/A Dollars (\$ _____)

Alternate No. 2 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

N/A Dollars (\$ _____)

Alternate No. 3 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

N/A Dollars (\$ _____)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

THE FOLLOWING ITEMS ARE TO BE INCLUDED WITH THE SUBMISSION OF THIS LOUISIANA UNIFORM PUBLIC WORK BID FORM:

* The Unit Price Form shall be used if the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

** **A CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5).

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA R.S. 38:2218(A) attached to and made a part of this bid.

BID BOND

KNOW ALL MEN BY THESE PRESENTS that we, the undersigned,

as PRINCIPAL, and

as SURETY, are held and firmly bound unto the City of Gretna, hereinafter called the "OWNER", in the penal sum of:

DOLLARS (\$ _____) lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the accompanying Bid dated _____, 20____, for

NOW, THEREFORE, if the Principal shall not withdraw said Bid within the period specified therein after the opening of the same or, if no period be specified, within ninety (90) days after the said opening, and shall within the period specified therefor or, if no period be specified, within twelve (12) days after the prescribed forms are presented to him for signature, enter into a written Contract with the Parish in accordance with the Bid as accepted, and give bond with good and sufficient surety or sureties, as may be required, for the faithful performance and proper fulfillment of such Contract; or in the event of the withdrawal of said Bid within the period specified, or the failure to enter into such Contract and give such bond within the time specified, if the Principal shall pay the Parish the difference between the amount specified in said Bid and the amount for which the Parish may procure the required work or supplies, or both, if the latter be in excess of the former, then the above obligation shall be void and of no effect, otherwise, to remain in full force and virtue.

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under their several seals this _____ day of _____, 20__, the name and corporate seal of each corporate party being hereto affixed and these presents signed by its undersigned representative, pursuant to authority of its governing body.

In Presence of:

(Individual Principal)

(Business Address, including Zip Code)

(Partnership)

(Seal)

(Business Address, including Zip Code)

ATTEST:

BY: _____

(Corporate Principal)

(Business Address, including Zip Code)

BY: _____

AFFIX CORPORATE SEAL

ATTEST:

(Corporate Surety)

BY: _____

AFFIX SEAL

Countersigned:

BY: _____

Attorney-in-Fact*

State of _____

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the
_____, Secretary of the
Corporation names as Principal in the within bond; that _____
_____ who signed the said
bond on behalf of the Principal was then _____
of said Corporation; that I know his signature, and his signature thereto is genuine; and that said
bond was duly signed, sealed, and attested to for and in behalf of said corporation by authority
of this governing body.

(Corporate Seal)

(Title)

* Power-of-Attorney for person signing for surety company must be
attached to bond.

AFFIDAVIT

STATE OF LOUISIANA
CITY OF GRETNA

BEFORE ME, the undersigned authority, personally came and appeared _____ who after being by me duly sworn, deposed and said that he is the fully authorized _____ of _____ (hereinafter referred to as bidder) the party who submitted a bid for _____

_____ which bid was received by the City of Gretna on _____ and said affiant further said:

(1) That bidder employed no person, corporation, firm, association, or other organization, either directly or indirectly, to secure the public contract under which he received payment, other than persons regularly employed by the bidder whose services in connection with the construction of the public building or project or in securing the public contract were in the regular course of their duties for bidder; and

(2) That no part of the contract price received by bidder was paid or will be paid to any person, corporation, firm, association, or other organization for soliciting the contract, other than the payment of their normal compensation to persons regularly employed by the bidder whose services in connection with the construction of the public building or project were in the regular course of their duties for bidder.

(3) Said bid is genuine and the bidder has not colluded, conspired or agreed directly or indirectly with any other bidder to offer a sham or collusive bid.

(4) Said bidder has not in any manner directly or indirectly agreed with any other person to fix the bid price of affiant or any other bidder, or to fix any overhead profit or cost element of said bid price, or that of any other bidder, or to induce any other person to refrain from bidding.

(5) Said bid is not intended to secure an unfair advantage of benefit from the Parish of Jefferson or in favor of any person interested in the proposed contract.

(6) All statements contained in said bid are true and correct.

(7) Neither affiant nor any member of his company has divulged information regarding said bid or any data relative thereto to any other person, firm or corporation.

SWORN TO AND SUBSCRIBED
BEFORE ME THIS _____

Signed: _____

DAY OF _____, 20_____

Title

NOTARY PUBLIC

STATE OF LOUISIANA
CITY OF GRENTA

ATTESTATIONS AFFIDAVIT

Before me, the undersigned notary public, duly commissioned and qualified in and for the parish and state aforesaid, personally came and appeared Affiant, who after being duly sworn, attested as follows:

LA. R.S. 38:2227 PAST CRIMINAL CONVICTIONS OF BIDDERS

A. No sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes:

(a) Public bribery (R.S. 14:118)

(c) Extortion (R.S. 14:66)

(b) Corrupt influencing (R.S. 14:120)

(d) Money laundering (R.S. 14:23)

B. Within the past five years from the project bid date, no sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes, during the solicitation or execution of a contract or bid awarded pursuant to the provisions of Chapter 10 of Title 38 of the Louisiana Revised Statutes:

(a) Theft (R.S. 14:67)

(f) Bank fraud (R.S. 14:71.1)

(b) Identity Theft (R.S. 14:67.16)

(g) Forgery (R.S. 14:72)

(c) Theft of a business record
(R.S.14:67.20)

(h) Contractors; misapplication of
payments (R.S. 14:202)

(d) False accounting (R.S. 14:70)

(i) Malfeasance in office (R.S. 14:134)

(e) Issuing worthless checks
(R.S. 14:71)

LA. R.S. 38:2212.10 Verification of Employees

A. At the time of bidding, Appearer is registered and participates in a status verification system to verify that all new hires in the state of Louisiana are legal citizens of the United States or are legal aliens.

B. If awarded the contract, Appearer shall continue, during the term of the contract, to utilize a status verification system to verify the legal status of all new employees in the state of Louisiana.

C. If awarded the contract, Appearer shall require all subcontractors to submit to it a sworn affidavit verifying compliance with Paragraphs (A) and (B) of this Subsection.

HVAC UPGRADES TO SECOND AND THIRD FLOORS AT GRETNA CITY HALL
Name of Project

NO. _____
Project No.

NAME OF BIDDER

NAME OF AUTHORIZED SIGNATORY OF BIDDER

DATE

TITLE OF AUTHORIZED SIGNATORY OF BIDDER

**SIGNATURE OF AUTHORIZED
SIGNATORY OF BIDDER/AFFIANT**

Sworn to and subscribed before me by Affiant on the _____ day of _____ ,
20____ .

Notary Public

PROSPECTIVE PRIME SUPPLIER'S
(BIDDER) STATEMENT ABOUT
EQUAL OPPORTUNITY CLAUSE

- () I have participated in previous contract(s) or subcontract(s) subject to the equal opportunity clause under Executive Orders 11246 and 11375 or preceding Executive Orders 10925 and 11114. I have filed all reports due under the requirements contained in 40 CRF, Part C, 8.11.
- () I have not participated in previous contract(s) subject to the equal opportunity clause under Executive Orders 11246 and 11375 or preceding Executive Order 10925 and 11114.

I will obtain a similar statement from any proposed subcontractor(s), when appropriate.

(Signature and Title of Prospective Prime or Subcontractor's Representative)

(Printed or typed Name and Title of Prospective Prime or Subcontractor's Representative)

(Name and address of Prospective Prime or Subcontractor)

CERTIFICATION OF NONSEGREGATED FACILITIES

The Bidder certified that he does not maintain nor provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location under his control, where segregated facilities are maintained. The bidder certified further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location under his control where segregated facilities are maintained. The bidder agrees that a breach of this certification would be a violation of the Equal Opportunity clause in any contract resulting from acceptance of this bid. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, timeclocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or otherwise. The bidder agrees that (except where he has obtained identical certification from proposed subcontractors) prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause, and that he will retain such certifications in his files.

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

Date _____, 20____
Name of Bidder _____

Official Address (Including Zip Code):

BY: _____

BIDDER'S REPRESENTATION

By the act of submitting a bid for the proposed contract, the Bidder represents that:

1. The Bidder and all subcontractors the Bidder intends to use have carefully and thoroughly reviewed the drawings, specifications and other construction contract documents and have found them free from ambiguities and sufficient for the purpose intended; further that,
2. The Bidder and all workmen, employees and subcontractors the Bidder intends to use are skilled and experienced in the type of construction represented by the construction contract documents bid upon; further that,
3. Neither the Bidder nor any of the Bidder's employees, agents, intended suppliers or subcontractors have relied upon any verbal representations, allegedly authorized or unauthorized from the Owner, or the Owner's employees or agents including architects, engineers or consultants, in assembling the bid figure; and further that,
4. The bid figure is based solely upon the bid documents and the construction contract documents and properly issued written addenda and not upon any other written representation.

Contractor's Name

By (Signature)

Typed or Clearly Printed Name and Title

Date

AGREEMENT

THIS AGREEMENT, made on the _____ day of _____, 20____, by and between, The City of Gretna, Louisiana, referred to in these Contract Documents as "Owner" acting through its Mayor and his authorized agents, and _____ is referred to in these Contract Documents as "Contractor":

WITNESSETH:

THAT WHEREAS: in accordance with law, Owner has caused Contract Documents to be prepared and an Invitation to Bid to be published, for and in connection with HVAC Upgrades to Second and Third Floors at Gretna City Hall. Without limiting the scope of work described herein, the proposed bid provides for HVAC upgrades to existing building (second and third floor) with associated architectural, mechanical and electrical work as detailed within the Construction Documents.

WHEREAS, Contractor, in response to the Invitation to Bid, has submitted to Owner, in the manner and at the time specified, a sealed Bid in accordance with Instructions to Bidders; and

WHEREAS, Owner, in the manner prescribed by law, has publicly opened, examined, and canvassed the Bids submitted, and has determined Contractor to be the lowest and best Bidder for the Work and duly awarded to Contractor a contract therefor, for the sum or sums named in Contractor's Bid.

NOW, THEREFORE, in consideration of the compensation to be paid to Contractor and of the mutual agreements herein contained, the parties to these presents have agreed and hereby agree, Owner for itself and its successors, and Contractor for itself, himself, or themselves, and its, his, or their successors and assigns, and its, his, or their executors and administrators, as follows:

ARTICLE I. All notices, letters, and other communication directed to Owner shall be delivered or addressed and mailed, postage prepaid to:

Director of Public Works
224 Fourth Street
Gretna, Louisiana 70053

The business address of Contractor given in the Bid Form and Contractor's office in the vicinity of the Work are both hereby designated as the places to which all notices, letters, and other communication to Contractor will be mailed or delivered.

All duties and responsibilities assigned to Architect in the Contract Documents, with the corresponding rights and authority, will be assumed by Burgdahl & Graves Architects and their authorized agents.

Owner or Contractor may change its address at any time by written notification to Architect and the other party.

ARTICLE II. The Contractor shall perform all Work, including the assumption of all obligations, duties and responsibilities necessary to the successful completion of the contract and the furnishing of all materials and equipment required to be incorporated in and form a permanent part of the Work; tools, equipment, supplies, transportation, facilities, labor, superintendence and services required to perform the Work; and Bonds, insurance and submittals, all as indicated or specified in the Contract Documents to be performed or furnished by Contractor for the Work included in and covered by Owner's official award of this contract to Contractor, such award being based on the acceptance by Owner of Contractor's Bid, as follows:

Without limiting the scope of work described herein, the proposed bid provides for HVAC upgrades to existing building (second and third floor) with associated architectural, mechanical and electrical work as detailed within the Construction Documents.

ARTICLE III. That Owner shall pay to Contractor for performance of the Work embraced in this contract, and Contractor shall accept as full compensation therefor, the sum (subjected to the adjustment as provided in the Contract Documents for all Work covered by and included in the contract award and designated in the foregoing Article I; payment thereof to be made in current funds in the manner provided in the Contract Documents.

ARTICLE IV. That Contractor shall complete all Work for the Bid within 365 calendar days after the commencement of Contract Time (as defined in General Conditions).

ARTICLE V. Time is an essential condition of the contract. Should Contractor fail to perform the Work within the Contract Time stipulated herein, Contractor shall pay to Owner, as liquidated damages and not as a penalty, \$500 per day of default unless the Contract Time is extended by Owner.

The expiration of the Contract Time shall ipso facto constitute a putting in default where Contractor has failed to perform the Work, and Owner need not formally place the Contractor in default. Contractor hereby waives any and all notices of default.

ARTICLE VI. Pursuant to LSA R.S. - 38:2248 (Public Contract Law), Owner shall retain (five/ten) percent of each progress payment until payment is due under the terms and conditions governing substantial completion or final payment.

ARTICLE VII. That the Contract Documents which comprise the contract between Owner and Contractor, attached hereto and made a part hereof, consist of the documents listed in Table of Contents, and the documents identified below.

Addenda numbers: _____

Information submitted by Contractor with the Bid: Bid Form, Signature of Bidder, Affidavit, Bidders Representation.

Information submitted by Contractor prior to the time Owner issues Notice of Award:
Equal Opportunity Clause, Certification of Non-Segregated Facilities, Bid Bond, Certificate as to Corporate Principal, Power of Attorney, Payment and Performance Bond, Certificate of Insurance

Notice of Award.

Notice to Proceed.

Any Modifications (as defined in General Conditions) duly delivered after execution of this Agreement.

ARTICLE VIII. In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

1. Contractor has familiarized himself with the nature and extent of the Contract Documents, Work, locality, and with all local conditions and federal, state and local laws, ordinances, rules and regulations that in any manner may affect cost, progress or performance of the Work.
2. Contractor has studied carefully all reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of the Work which were relied upon by Engineer in the preparation of the Drawings and Specifications and which have been identified in the Supplementary Conditions.
3. Contractor has made or caused to be made examinations, investigations and tests and studies of such reports and related data in addition to those referred to in paragraph 2 as he deems necessary for the performance of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents; and no additional examinations, investigations, tests, reports or similar data are or will be required by Contractor for such purposes.
4. Contractor has correlated the results of all such observations, examinations, investigations, tests, reports and data with the terms and conditions of the Contract Documents.
5. Contractor has given Engineer written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by Engineer is acceptable to Contractor.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement the day and year first above written.

(Contractor)

By _____ (SEAL & ATTEST)

Title _____

Date _____

(Joint Venturer)

CITY OF GRETNA

(Owner)

By _____ (SEAL & ATTEST)

Belinda C. Constant
Mayor - City of Gretna

Approved As to Form

(Attorney for Owner)

PERFORMANCE AND PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS that we, _____
_____ of _____, hereinafter referred to as
"Contractor", a corporation organized under the laws of the State of _____
and _____, as "Surety", a corporation organized
under the laws of the State of _____ and
authorized to transact business in the State of Louisiana, are held and firmly bound unto the
City of Gretna, Louisiana, hereinafter referred to as "Owner", in the penal sum of

dollars (\$ _____), for the payment of which sum, well and truly to be made,
we bind ourselves and our heirs, executors, administrator, successors, and assigns, jointly and
severally, by these presents:

WHEREAS, on the _____ day of _____, 20____, the Contractor entered into
a written contract with the Owner for furnishing materials, supplies, and equipment not furnished
by the Owner, construction tools, equipment, and plant, and the performance of all necessary
labor, for and in connection with the construction of certain improvements described in the
attached contract documents; and

WHEREAS, it was a condition of the contract award by the Owner that these presents be
executed by the Contractor and Surety;

NOW, THEREFORE, if the Contractor shall, in all particulars, well, duly, and faithfully observe,
perform, and abide by each and every covenant, condition, and part of the said contract, and
the conditions, specifications, drawings, and other contract documents thereto attached or, by
reference, made a part thereof, according to the true intent and meaning in each case, then this
obligation shall be null and void; otherwise it shall remain in full force and effect.

PROVIDED FURTHER, that if the Contractor shall fail to pay all just claims and demands by, or
in behalf of, any employee or other person, or any firm, association, or corporation, for labor
performed or materials, supplies, or equipment furnished, used, or consumed by the Contractor
or his subcontractors in the performance of the work, then the Surety will pay the full value of all
such claims or demands in any total amount not exceeding the amount of this obligation,
together with interest as provided by law.

THE UNDERSIGNED SURETY, for value received, hereby agrees that no extension of time,
change in, addition to, or other modification of the terms of the contract or work to be performed
thereunder, or of the specifications or other contract document, shall in any way affect its
obligation on this bond, and the Surety does hereby waive notice of any such extension of time,
change, addition, or modification.

IN TESTIMONY WHEREOF, the Contractor has hereunto set his hand and the Surety has
caused these presents to be executed in its name and its corporate seal to be affixed by its
attorney-in-fact at

_____ on this the _____ day
of _____ 20____.

ATTEST

Witness of Principal

_____(SEAL)
CONTRACTOR

By: _____
Principal

By: _____

Title: _____

Address

ATTEST

Witness as to Surety

SURETY COMPANY

By: _____ (SEAL)
Attorney-in-Fact

By: _____

Title: _____

Address

(Accompany this bond with attorney-in-fact's authority from the Surety Company certified to include the date of the bond)



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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by



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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1 – Definitions and Terminology	1
1.01 Defined Terms	1
1.02 Terminology	5
Article 2 – Preliminary Matters	6
2.01 Delivery of Bonds and Evidence of Insurance	6
2.02 Copies of Documents	6
2.03 Before Starting Construction	6
2.04 Preconstruction Conference; Designation of Authorized Representatives	7
2.05 Initial Acceptance of Schedules	7
2.06 Electronic Transmittals	7
Article 3 – Documents: Intent, Requirements, Reuse	8
3.01 Intent	8
3.02 Reference Standards	8
3.03 Reporting and Resolving Discrepancies	8
3.04 Requirements of the Contract Documents	9
3.05 Reuse of Documents	10
Article 4 – Commencement and Progress of the Work	10
4.01 Commencement of Contract Times; Notice to Proceed	10
4.02 Starting the Work	10
4.03 Reference Points	10
4.04 Progress Schedule	10
4.05 Delays in Contractor’s Progress	11
Article 5 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions	12
5.01 Availability of Lands	12
5.02 Use of Site and Other Areas	12
5.03 Subsurface and Physical Conditions	13
5.04 Differing Subsurface or Physical Conditions	14
5.05 Underground Facilities	15

5.06	Hazardous Environmental Conditions at Site	17
Article 6 – Bonds and Insurance		19
6.01	Performance, Payment, and Other Bonds	19
6.02	Insurance—General Provisions	19
6.03	Contractor’s Insurance	20
6.04	Owner’s Liability Insurance	23
6.05	Property Insurance	23
6.06	Waiver of Rights	25
6.07	Receipt and Application of Property Insurance Proceeds	25
Article 7 – Contractor’s Responsibilities		26
7.01	Supervision and Superintendence	26
7.02	Labor; Working Hours	26
7.03	Services, Materials, and Equipment.....	26
7.04	“Or Equals”	27
7.05	Substitutes	28
7.06	Concerning Subcontractors, Suppliers, and Others	29
7.07	Patent Fees and Royalties	31
7.08	Permits	31
7.09	Taxes	32
7.10	Laws and Regulations.....	32
7.11	Record Documents	32
7.12	Safety and Protection.....	32
7.13	Safety Representative	33
7.14	Hazard Communication Programs	33
7.15	Emergencies	34
7.16	Shop Drawings, Samples, and Other Submittals.....	34
7.17	Contractor’s General Warranty and Guarantee.....	36
7.18	Indemnification	37
7.19	Delegation of Professional Design Services	37
Article 8 – Other Work at the Site		38
8.01	Other Work	38
8.02	Coordination	39
8.03	Legal Relationships.....	39

Article 9 – Owner’s Responsibilities.....	40
9.01 Communications to Contractor.....	40
9.02 Replacement of Engineer	40
9.03 Furnish Data	40
9.04 Pay When Due.....	40
9.05 Lands and Easements; Reports, Tests, and Drawings	40
9.06 Insurance	40
9.07 Change Orders.....	40
9.08 Inspections, Tests, and Approvals.....	41
9.09 Limitations on Owner’s Responsibilities	41
9.10 Undisclosed Hazardous Environmental Condition.....	41
9.11 Evidence of Financial Arrangements.....	41
9.12 Safety Programs	41
Article 10 – Engineer’s Status During Construction.....	41
10.01 Owner’s Representative.....	41
10.02 Visits to Site.....	41
10.03 Project Representative.....	42
10.04 Rejecting Defective Work.....	42
10.05 Shop Drawings, Change Orders and Payments.....	42
10.06 Determinations for Unit Price Work	42
10.07 Decisions on Requirements of Contract Documents and Acceptability of Work	42
10.08 Limitations on Engineer’s Authority and Responsibilities.....	42
10.09 Compliance with Safety Program.....	43
Article 11 – Amending the Contract Documents; Changes in the Work	43
11.01 Amending and Supplementing Contract Documents	43
11.02 Owner-Authorized Changes in the Work	44
11.03 Unauthorized Changes in the Work	44
11.04 Change of Contract Price	44
11.05 Change of Contract Times	45
11.06 Change Proposals	45
11.07 Execution of Change Orders.....	46
11.08 Notification to Surety.....	47
Article 12 – Claims.....	47

12.01	Claims	47
Article 13 –	Cost of the Work; Allowances; Unit Price Work.....	48
13.01	Cost of the Work	48
13.02	Allowances	50
13.03	Unit Price Work	51
Article 14 –	Tests and Inspections; Correction, Removal or Acceptance of Defective Work.....	52
14.01	Access to Work.....	52
14.02	Tests, Inspections, and Approvals.....	52
14.03	Defective Work.....	53
14.04	Acceptance of Defective Work.....	53
14.05	Uncovering Work	53
14.06	Owner May Stop the Work	54
14.07	Owner May Correct Defective Work.....	54
Article 15 –	Payments to Contractor; Set-Offs; Completion; Correction Period	55
15.01	Progress Payments.....	55
15.02	Contractor’s Warranty of Title	58
15.03	Substantial Completion.....	58
15.04	Partial Use or Occupancy	59
15.05	Final Inspection	59
15.06	Final Payment.....	59
15.07	Waiver of Claims	61
15.08	Correction Period	61
Article 16 –	Suspension of Work and Termination	62
16.01	Owner May Suspend Work	62
16.02	Owner May Terminate for Cause	62
16.03	Owner May Terminate For Convenience	63
16.04	Contractor May Stop Work or Terminate	63
Article 17 –	Final Resolution of Disputes	64
17.01	Methods and Procedures.....	64
Article 18 –	Miscellaneous	64
18.01	Giving Notice	64
18.02	Computation of Times.....	64
18.03	Cumulative Remedies	64

18.04	Limitation of Damages	65
18.05	No Waiver	65
18.06	Survival of Obligations	65
18.07	Controlling Law	65
18.08	Headings.....	65

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer

has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner’s acceptance of the Bid.
27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor’s plan to accomplish the Work within the Contract Times.
30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or “RPR” includes any assistants or field staff of Resident Project Representative.
33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals and the performance of related construction activities.
35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
 1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:*
 1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
 1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).
- E. *Furnish, Install, Perform, Provide:*
 1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or

computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

- A. Standards Specifications, Codes, Laws and Regulations
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies:*
 - 1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict,

error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 2. abnormal weather conditions;
 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.

- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

- A. *Limitation on Use of Site and Other Areas:*
 - 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 - 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part

by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
 - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

- c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after

becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. Contractor gave the notice required in Paragraph 5.05.B.
 - 2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 - 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
- I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:
 - 1. include at least the specific coverages provided in this Article.
 - 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 - 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 - 4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
 - 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 - 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
 - 3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 - 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the

policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 Supervision and Superintendence

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 Labor; Working Hours

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 Services, Materials, and Equipment

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 "Or Equals"

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense:* Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
 - 1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
 - 3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design,
 - 2) be similar in substance to that specified, and
 - 3) be suited to the same use as that specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from that specified, and

- 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
 - C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
 - D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
 - E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
 - F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
 - C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
 - D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
 - E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
 - F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
 - G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or

exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to

provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples:*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- D. *Engineer's Review:*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.
 5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
 6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
 7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.

- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, 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 Engineer.

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner for whom the Owner is responsible causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during

or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.07 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on

the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.04.C.2.a and 11.04.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under

the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 Execution of Change Orders

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
 4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12 – CLAIMS

12.01 *Claims*

- A. *Claims Process:* The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
 - 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 - 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
 - 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim

submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable

thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes

other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

- B. *Cash Allowances*: Contractor agrees that:
 - 1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 Access to Work

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.02 Tests, Inspections, and Approvals

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
 - 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 - 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 - 3. by manufacturers of equipment furnished under the Contract Documents;
 - 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 - 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to

cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will

include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments:*
1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- C. *Review of Applications:*
1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

- a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
 4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
 6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

- e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due:*

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner:*

- 1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. the Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. the Contract Price has been reduced by Change Orders;
 - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - l. there are other items entitling Owner to a set off against the amount recommended.
- 2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount

remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
 - 2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

- A. *Application for Payment:*
 - 1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of

inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all disputes that Contractor believes are unsettled; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses,

and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for

expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agree with the other party to submit the dispute to another dispute resolution process; or
 - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

D I V I S I O N

1

GENERAL REQUIREMENTS

GENERAL REQUIREMENTS

SECTION 1A - PROJECT REQUIREMENTS

1A-1 GENERAL DESCRIPTION OF WORK.

Without limiting the scope of work described herein, the proposed bid provides for HVAC upgrades to existing building (second and third floor) with associated architectural, mechanical and electrical work as detailed within the Construction Documents.

1A-2 NOT USED

1A-3 NOT USED

1A-4 RESPONSIBILITY FOR MATERIALS AND EQUIPMENT.

1A-4.1 Items Furnished by Contractor. Contractor shall be fully responsible for all materials and equipment which he/she has furnished and shall furnish necessary replacements at any time prior to expiration of the Correction Period.

1A-5 OFF-SITE STORAGE.

Off-site storage arrangements for Contractor-furnished equipment shall be acceptable to Owner for all materials and equipment not incorporated into the work but included in Applications for Payment. Such off-site storage arrangements shall be presented in writing and shall afford adequate and satisfactory security and protection. Off-site storage facilities shall be accessible to the Architect.

1A-6 EQUIVALENT MATERIALS AND EQUIPMENT.

In accordance with Louisiana Public Contract Statute (LSA R.S. - 38:2295), these Contract Documents include provisions for use of equivalent materials and equipment. Requests for review of equivalency shall be submitted in accordance with the General Conditions.

- A. Material and equipment incorporated into the Work:
 - 1. Conform to applicable specifications and standards.
 - 2. Comply with size, make, type and quality specified or as specifically approved in writing by the Architect.
 - 3. Do not use material or equipment for any purpose other than that for which it is designed or is specified.
 - 4. Whenever an article, device or piece of equipment specified herein (or as indicated on the Drawings) is referred to in the singular number, such reference shall apply to as many such articles as are indicated on the Drawings or required to complete the installation within the general intent of the Contract Documents.
- B. Any items damaged in removal, storage or handling through carelessness or improper procedures shall be replaced by Contractor in kind or with new items.
- C. Existing materials and equipment removed by Contractor shall not be reused in the Work except where so specified or indicated.

- D. All items mentioned in these Contract Documents shall be handled in conformance with this Section, instructions in the related Sections, and manufacturer's literature.
- E. The security of Owner furnished equipment shall become the responsibility of the Contractor upon taking delivery of the items at the office of the Owner.

1A-6.1 Manufacturer's Instructions.

- A. When Contract Documents require that installation of Work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to Architect.
 - 1. Maintain one set of complete instructions at the job site during installation and until project completion.
- B. Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformity with specified requirements.
 - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Architect for further instructions.
 - 2. Do not proceed with such Work without clear instructions.
- C. Perform Work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1A-7 PREPARATION FOR SHIPMENT.

All materials shall be suitably packaged to facilitate handling and protect against damage during transit and storage. Coated surfaces shall be protected against impact, abrasion, discoloration, and other damage. All coated surfaces which are damaged prior to acceptance of material shall be repaired to the satisfaction of Architect. If the Architect deems the damage to be too extensive for repair, the material will be rejected and disposed of by the Contractor at No Direct Pay.

1A-7.1 Each item, package, or bundle of material shall be tagged or marked as identified in the delivery schedule. Complete packing lists and bills of material shall be included with each shipment. Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflicts and delays with Work and conditions at the site.

1A-7.2 Deliver products in undamaged condition, in manufacturer's original containers or packaging with identifying labels intact and legible. Labels shall indicate manufacturer and product name, description, mixing and application instructions, limitations, cautions and warnings.

1A-8 SALVAGE OF MATERIALS AND EQUIPMENT.

Existing materials, unless otherwise noted on the contract drawings, removed, shall not be reused, as a part of the Work and shall become the property of the Contractor. Contractor shall dispose of material at an off-site location at no direct cost to the Owner.

1A-9 NOT USED.

1A-10 NOT USED.

1A-11 NOTICES TO OWNERS AND AUTHORITIES.

Contractor shall, as provided in General Conditions, notify owners of adjacent property and utilities when prosecution of Work may affect them.

- 1A-11.1 When it is necessary to temporarily deny access by owners or tenants to their property, or when any utility service connection must be interrupted, Contractor shall give notices sufficiently in advance to enable the affected persons to provide for their needs. Notices shall conform to any applicable local ordinance and, whether delivered orally or in writing, shall include appropriate information concerning the interruption and instructions on how to limit their inconvenience.

Utilities and other concerned agencies shall be contacted at least 24 hours prior to cutting or closing streets or other traffic areas or excavating near underground utilities or pole lines.

1A-12 MEASUREMENT AND PAYMENT.

The project shall be constructed complete as shown and indicated on the Contract Drawings and as described in the Contract Specifications.

Payment shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labors, operations, and incidentals as necessary to complete the various items of work all in accordance with the requirements of the Contract Documents, including all costs of compliance with the regulations of public agencies having jurisdiction. The Contractor is hereby on notice that no separate payment will be made for any item not specifically called out, but that is required to properly complete the project.

The Total Bid Price shall cover all work required by the Contract Documents. All costs in connection with the proper and successful completion of the work, including furnishing all materials, equipment, supplies, and appurtenances; providing all construction equipment, and tools; and performing all necessary labor and supervision to fully complete the work, shall be included in the unit and lump sum prices bid. All work not specifically set forth as a pay items in the Bid Form shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the prices bid.

All estimated quantities stipulated in the Bid Form or other Contract Documents are approximate and are to be used only (a) as a basis for estimating the probable cost of the work, and (b) for the purpose of comparing the bids submitted for the work. The actual amounts of work done and materials furnished under until price items may differ from the estimated quantities. The basis of payment for work and materials will be the actual amount of work done and materials furnished. No compensation will be given for any quantities not used.

1A-13 LINES AND GRADES.

All Work shall be done to the lines, grades, and elevations shown on the Contract Drawings.

Basic horizontal and vertical control points will be established or designated by Architect. These points shall be used as datum for the Work. All additional survey, layout, and measurement Work shall be performed by Contractor as a part of the Work (No Direct Payment).

Contractor shall provide an experienced instrument man, competent assistants, and such instruments, tools, stakes, and other materials required to complete the survey, layout and measurement Work. In addition, Contractor shall furnish, without charge, competent men from his/her force and such tools, stakes, and other materials as Architect may require in establishing or designating control points, in establishing construction easement boundaries, or in checking survey, layout, and measurement Work performed by Contractor.

The Contractor shall keep Architect informed, a reasonable time in advance, of the times and places at which he/she wishes to do Work, so that horizontal and vertical control points may be established, and any checking deemed necessary by Architect may be done with minimum inconvenience to Architect and minimum delay to Contractor. The Contractor shall remove and reconstruct Work which is improperly located.

1A-14 EASEMENTS AND RIGHT-OF-WAY (SERVITUDE).

The easements and rights-of-way for the work will be provided by the Owner, Contractor shall confine his/her construction operations within the limits indicated on the drawings, and shall use due care in placing construction tools, equipment, excavated materials, and pipeline materials and supplies, so as to cause the least possible damage to property and interference with traffic.

All Work performed and all operations of Contractor, his/her employees or Subcontractors, within the limits of rights-of-way, shall be in conformity with the requirements and be under the control (through Owner) of the authority owning, or having jurisdiction over and control of, the right-of-way.

1A-15 CONNECTIONS TO EXISTING FACILITIES.

Unless otherwise specified or indicated, Contractor shall make all necessary connections to existing facilities including structures, drain lines and utilities such as water, sewer, gas, telephone, and electricity if required. In each case, Contractor shall receive permission from Owner or the owning utility prior to undertaking connections. Contractor shall protect facilities against deleterious substances and damage.

Connections to existing facilities which are in service shall be thoroughly planned in advance, and all required equipment, materials and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously (around the clock) if necessary, to complete connections in the minimum time. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

Materials shall be cut and removed to the extent indicated on the Plans or as required to complete the Work. Materials shall be removed in a careful manner with

no damage to adjacent facilities or materials. Materials which are not salvageable shall be removed from the site by Contractor.

All Work and existing facilities affected by cutting operations shall be restored with new materials, or with salvaged materials acceptable to Architect, to obtain a finished installation with the strength, appearance, and functional capacity required. If necessary, entire surfaces shall be patched and refinished.

1A-16 UNFAVORABLE CONSTRUCTION CONDITIONS.

Contractor shall confine his/her operations to work which will not be affected adversely by unfavorable weather, wet ground, or other unsuitable construction conditions. No portion of the Work shall proceed under conditions which would affect adversely the quality or efficiency of the Work, unless suitable special precautions or countermeasures are taken by Contractor. These special precautions or countermeasures must be approved by the Architect.

1A-17 CUTTING AND PATCHING.

1A-17.1 DESCRIPTION: As provided in the General Conditions and herein, Contractor shall perform all cutting and patching required for the Work, and as may be necessary in connection with uncovering Work for inspection or for the correction of defective Work. Contractor shall perform all cutting and patching required for the installation of improperly timed Work and to remove samples of installed materials for testing.

Contractor shall not undertake any cutting or demolition which may affect the structural stability of the existing facilities without Architect's concurrence. Contractor shall provide all shoring, bracing, supports, and protective devices necessary to safeguard all Work during cutting and patching operations.

Materials shall be cut and removed to the extent indicated on the drawings or as required to complete the Work. Materials shall be removed in a careful manner with no damage to adjacent facilities or materials. Materials which are not salvageable shall be removed from the site by Contractor.

All Work and existing facilities affected by cutting operations shall be restored with new materials, or with salvaged materials acceptable to Architect, to obtain a finished installation with the strength, appearance, and functional capacity required. If necessary, entire surfaces shall be patched and refinished.

1A-18 PROTECTION OF SITE AND STORAGE.

1A-18.1 GENERAL. The Contractor is responsible for his/her methods and means of construction. He/she shall provide all shoring, bracing, supports, and protector devices necessary to safeguard all work performed in this area.

1A-18.2 DESCRIPTION. All materials shall be suitably packaged (in manufacturer's original packaging with labels and seals intact) to facilitate handling and protect against damage during storage. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of the Architect.

Each item, package, or bundle of material shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall accompany each shipment.

1A-18.3 STORAGE GENERAL

- A. Store products, immediately on delivery, in accordance with manufacturer's instructions. Protect until installed.
- B. Arrange storage in a manner to provide access for maintenance of stored items and for inspection.
- C. Store and handle paints and products subject to spillage in areas where spills will not deface surfaces.
- D. Flammable or hazardous materials:
 - 1. Store minimum quantities in protected areas.
 - 2. Provide appropriate type fire extinguishers near storage areas.
 - 3. Observe manufacturer's precautions and applicable ordinances and regulations.

1A-18.4 EXTERIOR STORAGE

- A. Provide substantial platforms, blocking, or skids, to support fabricated products above ground; slope to provide drainage. Protect products from soiling and staining.
- B. For products subject to discoloration or deterioration from exposure to the elements, cover with impervious sheet material. Provide ventilation to avoid condensation.
- C. Store loose granular materials on clean, solid surfaces such as pavement, or on rigid sheet materials, to prevent mixing with foreign matter.
- D. Provide surface drainage to prevent erosion, pollution by mixing and ponding of water.
- E. Prevent mixing of refuse or chemically injurious materials or liquids.

1A-18.5 MAINTENANCE OF STORAGE

- A. Periodically inspect stored products on a scheduled basis.
- B. Verify that storage facilities comply with manufacturer's product storage requirements.
- C. Verify that manufacturer's required environmental conditions are maintained continually.
- D. Verify that surfaces of products exposed to the elements are not adversely affected; that any weathering of finishes is acceptable under requirements of Contract Documents.

1A-19 CLEANING.

As required by the General Conditions and as specified herein, Contractor shall keep the premises free at all times from accumulations of waste materials and rubbish. Contractor shall provide adequate trash receptacles about the site and shall promptly empty the containers when filled.

Construction materials, such as concrete forms and scaffolding shall be neatly stacked by Contractor when not in use. Contractor shall promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids and cleaning solutions from surfaces to prevent marring or other damage.

Volatile wastes shall be properly stored in covered metal containers and removed daily.

Wastes shall not be buried or burned on the site or disposed of into storm drains, sanitary sewers, streams, or waterways. All wastes shall be removed from the site and disposed of in a manner complying with local ordinances and antipollution laws.

Adequate cleanup will be a condition for recommendation of progress payment applications.

1A-20 APPLICABLE CODES.

References in the Contract Documents to local codes mean all codes enforceable in the unincorporated City of Gretna and the State of Louisiana.

Other standard codes which apply to the Work are designated in the specifications.

1A-21 REFERENCE STANDARDS.

1A-21.1 GENERAL. Reference to the standards of any technical society, organization, or association, or to codes of local or state authorities, shall mean the latest standard, code, specifications, or tentative standard adopted and published at the date of receipt of bids, unless specifically stated otherwise.

1A-21.2 REFERENCE STANDARDS

- A. Reference to the standards of any technical society, organization, or association, or to codes of local or state authorities, shall mean the latest standard, code, specification, or tentative standard adopted and published at the date of receipt of bids, unless specifically stated otherwise.

1A-22 NOT USED.

1A-23 NOT USED.

1A-24 PROJECT MEETING, PRECONSTRUCTION CONFERENCE AND PROGRESS MEETING.

1A-25.1 PROJECT MEETING: The Owner's Representative may schedule and administer pre-bid and pre-construction meetings, periodic progress meetings, and specially called meetings throughout the progress of the work. Specially called meetings may be held at the job site during normal working hours, as necessary to expedite the

progress of the job. The Owner's Representative shall direct individuals attending the meeting to:

1. Prepare agenda for meetings.
2. Distribute written notice of each meeting.
3. Preside at meetings.
4. Record the minutes; include all significant proceedings and decisions.
5. Reproduce and distribute copies of minutes.

Representatives of Contractors, subcontractors and suppliers attending the meetings shall be qualified and authorized to act on behalf of the entity each represents.

1A-25.2 PRE-CONSTRUCTION CONFERENCE/ MEETING: In accordance with the General Conditions, prior to the commencement of Work at the site, a preconstruction conference will be held at a mutually agreed time and place. The conference shall be attended by:

1. Contractor and his/her superintendent.
2. Principal Subcontractors
3. Representatives of principal suppliers and manufacturers, as appropriate.
4. Architect and his/her Resident Project Representative.
5. Representatives of Owner.
6. Others as requested by Contractor, Owner, or Architect.

A. **Unless previously submitted to Architect, Contractor shall bring to the conference** a tentative schedule for each of the following:

1. **Traffic Control and Detour Route Plan.**
2. Schedule of Values.
3. List of Subcontractors.
4. List of major material suppliers
5. Construction Schedule/Procurement Schedule
6. Shop Drawings and Submittal Schedule
7. Excavation Plan Progress.

See SECTION 1B - SUBMITTALS for full list of Submittals.

B. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda will include the following topics for review:

1. **Traffic Control Plan.**
2. Contractor's tentative schedules.
3. Transmittal, review, and distribution of Contractor's submittals.
4. Processing applications for payment.
5. Maintaining record documents.
6. Critical Work sequencing.
7. Field decisions and Change Orders.
8. Use of premises, office and storage areas, security, housekeeping, and Owner's needs.
9. Major equipment deliveries and priorities.
10. Contractor's assignments for safety and first aid.
11. Submitted of executed bonds and insurance certificates if not previously submitted.

Architect will preside at the conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

1A-25.3 PROGRESS MEETINGS:

- A. Progress meetings will be scheduled by the Owner's Representative or the Architect after consulting with the Owner and the Using Agency. These meetings shall be no more often than one per week as required by progress of the work, exclusive of any other meetings scheduled by the Owner's Representative, Owner or Using Agency.
 - 1. It shall be the responsibility of the Owner's Representative to notify the Owner, Using Agency, and the Contractor of the time, place and date of the "Progress Meeting".
 - 2. It shall be the responsibility of the Contractor to notify all suppliers and subcontractors.
- B. The purpose of these regular meetings is to assess, realistically, the current status and progress of the work, to effect coordination, cooperation and assistance in every practical way and to discuss changes in scheduling, and to resolve other problems that may develop. This should maintain the progress of the project on schedule and complete the project within the contract time.
- C. These meetings will be called as required during progress of the work.
- D. Location of the meetings: The project field office or other location directed by the Owner's Representative.
- E. Attendance:
 - 1. Owner's representative.
 - 2. Using Agency's representative.
 - 3. Architect, his/her professional consultants, and his/her Project Representative.
 - 4. Contractor.
 - 5. Contractor's Superintendent.
 - 6. Principal Subcontractors, and all subcontractors active on the site.
 - 7. Principal Suppliers and Manufacturer's Representatives.
 - 8. Others as appropriate.
- F. Suggested Addendum:
 - 1. Review and approve minutes of previous meeting.
 - 2. Review of work progress since previous meeting.
 - 3. Note field observations, problems, or conflicts.
 - 4. Identify problems that impede Construction Schedule.
 - 5. Develop corrective measures and procedures to regain projected schedule.
 - 6. Revise Construction Schedule as required.
 - 7. Plan progress, schedule, during succeeding work period.
 - 8. Coordination of schedules.
 - 9. Review submittal schedules; expedite as required to maintain schedule.
 - 10. Review maintenance of quality and work standards.
 - 11. Review proposed changes for the effect on Construction Schedule, completion date, and coordination

12. Complete other current business.

1A-26 CONSTRUCTION PHOTOGRAPHS.

The Contractor shall be responsible for the production of construction photographs showing the regular progress of the Work.

Before commencement of the Work and continuing through the duration of the contract, the Contractor shall take not less than ten (10) exposures consisting of different subjects or angles of view for each exposure. The exposures shall be taken from various locations on the construction site for adequate documentation of the Work. The photographer shall attempt to use the same locations for four (4) exposures at each interval. The exposures shall be taken at intervals not exceeding two (2) weeks in duration. The Contractor shall take ten (10) additional exposures at the completion of the Work as directed by the Architect. All photographs shall be furnished to the Architect within two (2) weeks after each exposure.

All photographs shall be produced by a competent photographer and shall be color photographs of commercial quality. All digital image files and two 4" x 6" prints of each view shall be submitted, bound in 3-ring, hard cover binders, OR ELECTRONIC FILES OF ALL PHOTOS (with descriptions), PROVIDED TO THE ARCHITECT AND THE OWNER. Prints shall be identified with contract number, description of view and date. Prints shall be enclosed in clear plastic sheets in binders and marked with the name and number of the contract, name of Contractor, description and location of view, and date photographed. Photographs shall be glossy printed on single weight paper and shall be taken with an 8.0 megapixel or greater digital formatted cameras. All photography shall be at the Contractor's expense. Architect shall transmit, suitably bound, one copy of each photograph to Owner.

1A-27 SITE ADMINISTRATION.

Contractor shall be responsible for all areas of the site used by him, and all Subcontractors in the performance of the Work. he/she will exert full control over the actions of all employees and other persons with respect to the use and preservation of property and existing facilities, except such controls as may be specifically reserved to Owner or others. Contractor has the right to exclude from the site all persons who have no purpose related to the Work or its inspection and may require all persons on the site (except Owner's employees) to observe the same regulations as he/she requires of his/her employees.

The Contractor shall coordinate scheduling, submittals and work of the various sections of the Specification to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items to be installed later.

Each Contractor and subcontractor involved shall assume all liability, financial or otherwise, in connection with his/her work and shall protect and save harmless the Owner from any and all damages or claims that may arise because of inconvenience, delay or loss experienced by him/her because of the presence and operations of any other Contractors working within the limits of this project.

The Contractor shall arrange his/her work and shall place and dispose of the materials being used so as not to interfere with operations of others working in the surrounding area. he/she shall join his/her work with that of others in an acceptable manner and shall perform it in proper sequence to that of the others.

The contracting agency will not be responsible for any delays or inconvenience to the Contractor in carrying on his/her work while any public utility companies or agencies are making necessary adjustments of their fixtures or appurtenances, nor will the contracting agency be responsible for any cost incurred by the Contractor or utility owners for making said adjustments, by delays, etc.

1A-28 PROGRESS REPORTS.

Architect's representative (Inspector) shall write progress report and furnish it to Architect with each application for progress payment. If the Work falls behind schedule, it is Contractor's responsibility to notify the Architect and the Architect's representative of that delay and the Architect's representative shall document that delay at such intervals as Architect may request.

Each progress report shall include sufficient narrative to describe current and anticipated delaying factors, their effect on the construction schedule, and proposed corrective actions. Any Work reported complete, but which is not readily apparent to Architect, must be substantiated with satisfactory evidence.

Each progress report shall also include three prints of the accepted graphic schedule marked to indicate actual progress.

1A-29 PROJECT CLOSEOUT.

1A-29.1 CLEANING

- A. Before final acceptance, the Contractor shall remove from the site and adjacent property all surplus materials, weeds, bushes, rubbish and temporary structures; shall satisfactorily restore all property which has been worn, rutted or damaged during the work; and shall leave the site in a presentable condition. Upon completion of work in connection with drainage structures, the Contractor shall remove all obstructions to the flow of water from inside all structures, channels, and culverts whether new or old. No direct payment will be made for this work.
- B. Remove all temporary labels.
- C. Clean site. Sweep paved areas.
- D. Remove all waste and surplus material from site.

1A-29.2 SUBSTANTIAL COMPLETION

- A. When Contractor considers the Work is substantially complete, he/she shall submit to the Architect (3 copies each):
 - 1. A written notice that the Work, or designated portion thereof, is substantially complete.
 - 2. A list of items to be completed or corrected. The punch list will include the cost estimate for the particular items of work based on mobilization, labor, material and equipment costs for correcting each punch list item.

- B. Within a reasonable time after receipt of such notice, the Architect will make an inspection to determine the status of completion.
- C. Should the Architect determine that the Work is not substantially complete:
 - 1. Architect will promptly notify the Contractor in writing, giving the reasons therefor.
 - 2. Contractor shall remedy the deficiencies in the Work and send a second written notice of substantial completion to the Architect.
 - 3. Architect will re-inspect the Work.
- D. When the Architect finds that the Work is substantially complete, he/she may:
 - 1. Prepare and deliver to the Owner a notification of Substantial Completion on an appropriate form with the Contractor's list of items to be completed or corrected as verified and amended by the Architect before final payment.
 - 2. After consideration of any objections made by the Owner as provided in Conditions of the Contract, and when Architect considers that the Work is substantially complete, he/she will countersign and deliver to the Owner and the contractor a definite notification of Substantial Completion with a revised list of items to be completed or corrected.

1A-29.3 FINAL INSPECTION

- A. When Contractor considers the Work is complete, he/she shall submit written notification that (3 copies):
 - 1. Contract Documents have been reviewed.
 - 2. Work has been inspected for compliance with Contract Documents.
 - 3. Work has been completed in accordance with Contract Documents.
 - 4. Work is completed and ready for final inspection.
 - 5. All items noted from the Substantial Completion inspection have been completed or corrected.
- B. Architect will make an inspection to verify the status of completion with reasonable promptness after receipt of such notification.
- C. Should Architect consider that the Work is incomplete or defective:
 - 1. Architect will promptly notify the Contractor in writing, listing the incomplete or defective work.
 - 2. Contractor shall take immediate steps to remedy the stated deficiencies and send a second written notification to Architect stating that the Work is complete.
 - 3. Architect will reinspect the Work.
- D. When the Architect finds that the Work is acceptable under the Contract Documents, he/she shall request the Contractor to make closeout submittals, including Application for Final Payment.

1A-29.4 RE-INSPECTION FEES

- A. Should Architect perform re-inspection due to failure of the Work to comply with the claims of status of completion made by the Contractor:

1. Owner will compensate Architect for such additional services.
2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1A-29.5 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ARCHITECT

- A. Project Record Documents.
- B. Warranties, Guarantees and Bonds. All warranty periods shall begin on the date of Final Acceptance.
- C. Spare parts and Maintenance Materials.
- D. Reports of all required tests and demonstrations.
- E. Evidence of Payment and Release of Liens: In accordance with requirements of General and Supplementary Conditions. Additionally, there is to be a 45 day period prior to the request for the clear lien and privilege certificate.

1A-29.6 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to the Architect.
- B. Statement shall reflect all adjustments to the Contract Sum:
 1. The original Contract Sum.
 2. Additions and deductions resulting from:
 - a. Previous Change Orders.
 - b. Quantity reconciliations.
 - c. Deductions for liquidated damages.
 - d. Deductions for re-inspection payments.
 - e. Deductions for overtime inspection payments.
 - f. Other adjustments.
 3. Total Contract Sum, as adjusted.
 4. Previous payments.
 5. Sum remaining due.
- C. Architect will prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.
- D. The Contractor shall furnish a set of "As-Built" drawings upon completion of the work and prior to final inspection. These drawings shall be a legibly marked set of prints of the Contract Drawings, revised to show clearly all field changes. There shall be no direct payment for the keeping of as-built plans.

1A-29.7 FINAL APPLICATION FOR PAYMENT

- A. Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the General and Supplementary Conditions of the Contract.

1A-29.10 SUPPLEMENTAL LIQUIDATED DAMAGES

After the establishment of a date of Substantial Completion, the Contractor shall have 45 days to complete any outstanding items of Work remaining to be completed or corrected as listed on a final punch list made a part of the Substantial Completion Package. If upon expiration of said 45 days the outstanding items of Work have not been completed, liquidated damages in the amount agreed to in this contract will be reinstated for every day in which the outstanding items of Work have not been completed. Furthermore, the Owner shall not release monies withheld until all outstanding items of Work have been completed.

1A-30 BARRIERS AND ENCLOSURES.

1A-30.1 RELATED WORK

Furnish, install and maintain suitable barriers as required to maintain security to prevent public entry and to protect the Work and existing facilities from construction operations. Remove the barriers when no longer needed, or at completion of Work.

1A-30.2 REQUIREMENTS OF REGULATORY AGENCIES

- A. Comply with federal, state and local codes and regulations.

1A-30.3 BARRICADES AND LIGHTS

- A. All streets, roads, driveways and other thoroughfares which are closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning signs. Barricades shall be located at the nearest intersection on each side of the blocked section.
- B. All open trenches and other excavations shall have suitable barricades, signs and lights to provide adequate protection to the public. Obstructions such as material piles and equipment shall be provided with similar warning signs and lights.
- C. All barricades and obstructions shall be illuminated with warning lights from sunset to sunrise. Material storage and conduct of the Work on or alongside streets and driveways shall cause the minimum obstruction and inconvenience to the traveling public as possible.
- D. All barricades, lights and other protective devices shall be installed and maintained in conformity with the "Louisiana Manual on Uniform Traffic Control Devices", latest revision.

1A-30.4 FENCES

- A. All existing fences affected by the Work shall be maintained by Contractor until completion of the Work. Fences which interfere with construction operations shall not be relocated or dismantled until written permission is obtained from the owner of the fence, and the period the fence may be left relocated and dismantled has been agreed upon. Where fences must be maintained across the construction easement, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use. Fences or gates which have been disturbed or which have been

opened must be closed when directed by the Owner or Architect within 12 hours of any such direction. If the Contractor fails to comply with any of this type of direction the Owner shall retain the right to remedy any fence removal with other forces and deduct monies spent from monies due the Contractor.

- B. Upon completion of the Work, Contractor shall restore all fences to their original or to a better condition and to their original location as needed.

1A-30.5 PRODUCTS

- A. Materials may be new or used suitable for the intended purpose but must not violate requirements of applicable codes and standards.

1A-31 SECURITY.

1A-31.1 PROTECTION OF WORK

- A. Contractor shall be responsible for protection of the site, and all work, materials, equipment and existing facilities thereon, against theft, vandals, and other unauthorized persons.
- B. No claim shall be made against Owner by reason of any act of an employee or trespasser, and Contractor shall make good all damage to Owner's property resulting from his failure to provide security measures as specified.
- C. Security measures shall be at least equal to those usually provided to protect the existing facilities during normal operation, but shall also include such additional security fencing, barricades, lighting, watchman services and other measures as required to protect the site.
- D. Maintain security of the limited access areas as required by the Owner.
- E. The work shall be under the charge and care of the Contractor until final acceptance. The Contractor shall take precautions against damages to the work by action of the elements or from other cause, and shall satisfactorily repair any damaged work at his expense. In case of suspension of work, the Contractor shall be responsible for all materials and shall properly store them if necessary, and shall erect temporary structures where necessary.

1A-31.2 PROTECTION OF PUBLIC AND PRIVATE PROPERTY

- A. Contractor shall protect, shore, brace, support and maintain all above ground and underground pipes, conduits, drains and infrastructure items uncovered or otherwise affected by his construction operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences and other surface structures affected by construction operations, together with all sod and shrubs in yards and parkings, shall be restored to their original conditions, whether within or outside the easement.
- B. All replacements shall be made with new materials. No trees shall be removed outside of the permanent easement, except where authorized by Architect. Whenever practicable, Contractor shall tunnel beneath trees in yards and parking

areas when on or near the line of trench. Hand excavation shall be employed as necessary to prevent injury to trees. Trees standing shall be adequately protected against damage by construction operations.

- C. Contractor shall be responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges and any other public or private property, regardless of location or character, which may be caused by transporting equipment, materials or men to or from the Work or any part of site thereof, whether by him or his Subcontractors. Contractor shall make satisfactory and acceptable arrangements with the owner of, or the agency or authority having jurisdiction over, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage.
- D. All fire hydrants, water control valves, and other facilities of public use shall be kept free from obstruction and available for use at all times. Fire hydrants to be removed and relocated shall be done as quickly as possible.

1A-31.3 PERFORMANCE OF SECURITY MEASURES

- A. If the Contractor fails to comply with the provisions of this section, the Architect will immediately notify the Contractor, in writing, of such noncompliance. If the Contractor fails to remedy unsatisfactory maintenance within 48 hours after receipt of such notices, the Architect may immediately proceed to maintain the project, and the cost of this maintenance will be deducted from payments for the work.
- B. If the unsatisfactory maintenance results in a condition that is hazardous to life, health or property, the Architect will immediately affect necessary repairs and deduct the cost of such repairs from payments for the work.

1A-32 TEMPORARY CONTROLS.

1A-32.1 DUST CONTROL

- A. Contractor shall take reasonable measures to prevent or minimize unnecessary airborne dust. Earth surfaces subject to dusting shall be kept moist with water or by application of a chemical dust suppressant. Dusty materials in piles or in transit shall be covered to prevent blowing.
- B. Buildings or operating facilities which may be affected adversely by dust shall be adequately protected from dust.

1A-32.2 NOISE CONTROL

- A. Contractor shall take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound muffling devices and operated in a manner to cause the least noise consistent with efficient performance of the Work.
- B. During construction activities on or adjacent to occupied buildings, and when appropriate, Contractor shall erect screens or barriers effective in reducing noise in

the building; and shall conduct his operations to avoid unnecessary noise which might interfere with the activities of building occupants.

1A-32.3 POLLUTION CONTROL

- A. Contractor shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris and other substances resulting from construction activities. No sanitary wastes will be permitted to enter any drain or watercourse other than sanitary sewers.
- B. No sediment, debris or other substance will be permitted to enter sanitary sewers and reasonable measures will be taken to prevent such materials from entering any drain or watercourse.

1A-32.4 SURFACE WATER CONTROL

- A. The facilities to be constructed are located in an area that may be subject to heavy rainfall and flooding. During the construction period, Contractor shall provide temporary protection as necessary to prevent flood damage to new and existing facilities and shall be responsible for any damage that may result from flooding. Additionally, the Contractor shall provide adequate flow area to the existing stations as to not impede its pumping capacity.

1A-32.5 DEBRIS CONTROL

- A. Remove debris, empty crates, waste, etc. from building and site at the end of each day's work and leave grounds clean and orderly. Keep driveways, entrances and walks clean and clear at all times.

1A-33 TEMPORARY CONTROLS.

1A-33.1 QUALITY CONTROL, GENERAL

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship on this project.
- B. Perform work only by persons qualified by equivalent applicable union standards to produce workmanship of the specified quality.
- C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.
- D. Comply with manufacturer's instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, notify and request clarification from Architect before proceeding.

1A-33.2 SITE INVESTIGATION AND CONTROL

- A. The Contractor shall verify all dimensions in the field and shall check field conditions continuously during construction. The Contractor shall be solely responsible for any inaccuracies built into the Work due to his failure to comply with this requirement.

- B. The Contractor shall inspect related, adjacent, and appurtenant Work and shall report in writing to the Architect any conditions that will prevent proper completion of the Work. Failure to report any such conditions shall constitute acceptance of all site conditions, and any required removal, repair or replacement caused by unsuitable conditions shall be performed by the Contractor at their sole cost and expense.

1A-33.3 INSPECTION OF THE WORK

- A. The Work shall be conducted under the general observation of the Architect and shall be subject to inspection by representatives of the Architect acting on behalf of the Owner to ensure strict compliance with the requirements of the Contract Documents. Such inspection may include mill, plant, shop or field inspection, as required. The Architect shall be permitted access to all parts of the Work, including plants where materials or equipment are manufactured or fabricated.
- B. The presence of the Architect or any inspector(s), however, shall not relieve the Contractor of the responsibility for the proper execution of the work in accordance with all requirements of the Contract Documents. Compliance is a duty of the Contractor and said duty shall not be avoided by any act or omission on the part of the Architect or any inspector(s).
- C. All materials and articles furnished by the Contractor shall be subject to rigid inspection, and no materials or articles shall be used in the Work until they have been inspected and accepted by the Owner or his representative. No Work shall be backfilled, buried, cast in concrete, hidden or otherwise covered until it has been inspected. Any Work so covered in the absence of inspector shall be subject to uncovering. Where uninspected work cannot be uncovered, such as in concrete cast over reinforcing steel, all such Work shall be subject to demolition, removal and reconstruction under proper inspection, and no additional payment will be allowed therefor.

1A-33.4 TIME OF INSPECTIONS AND TESTS

- A. Samples and test specimens required under these Specifications shall be furnished and prepared for testing in ample time for the completion of the necessary tests, analyses and reporting of results before said articles or materials are to be used. The Contractor shall furnish and prepare all required test specimens at its own expense. Except as otherwise provided in the Contract Documents, performance of the required tests will be by the Owner, and all costs thereof will be borne by the Owner at no extra cost to the Contractor; except, that the costs of any tests which show unsatisfactory results shall be borne by the Contractor.
- B. Whenever the Contractor is ready to backfill, bury, cast in concrete, hide or otherwise cover any Work under the Contract, the Architect shall be notified not less than 24 hours in advance to request inspection before beginning any such Work of covering. Failure of the Contractor to notify the Architect at least 24 hours in advance of any such inspections shall be reasonable cause for the Architect to order a sufficient delay in the Contractor's schedule to allow time for such inspections and any remedial or corrective Work required, and all costs of such delays, including its effect upon other portions of the Work, shall be borne by the Contractor. Payment for

items that are built, uninspected, or unverified may be delayed by the Architect until satisfactory evidence of compliance is attained.

1A-33.5 SAMPLING AND TESTING

- A. When not otherwise specified, all sampling and testing shall be in accordance with methods prescribed in the current standards of the ASTM or related standard entity, as applicable to the class and nature of the article or materials considered; however, the Owner reserves the right to use any generally-accepted system of inspection which, in the opinion of the Architect, will insure the Owner that the quality of the workmanship is in full accordance with the Contract Documents.
- B. Any waiver of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial Work, shall not be construed as a waiver of any technical or qualitative requirements of the Contract Documents.
- C. Notwithstanding the existence of such waiver, the Architect shall reserve the right to make independent investigations and tests as specified in the following paragraph and, upon failure of any portion of the Work to meet any of the quantitative requirements of the Contract Documents, shall be reasonable cause for the Architect to require the removal or correction and reconstruction of any such Work.
- D. In addition to any other inspection or quality assurance provisions that may be specified, the Architect shall have the right to independently select, test and analyze, at the expense of the Owner, additional test specimens of any or all of the materials to be used. Results of such tests and analyses shall be considered along with the tests and analyses made by the Contractor to determine compliance with the applicable specifications for materials so tested or analyzed; provided that wherever any portion of the Work is discovered, as a result of such independent inspection and investigation, and all costs of removal, correction and reconstruction, or repair of any such Work shall be borne by the Contractor.

1A-33.6 RIGHT OF REJECTION

- A. The Architect, acting for the Owner, shall have the right, at all times and places, to reject any articles or materials to be furnished herein which, in any respect, fail to meet the requirements of the Contract Documents, regardless of whether the defects in such articles or materials are detected at the point of manufacture or after completion of the Work at the site. If the Architect or inspector, through an oversight or otherwise, has accepted materials or Work which is defective or which is contrary to the Contract Documents, such material, no matter in what stage or condition of manufacture, delivery or erection, may be rejected by the Architect or the Owner.
- B. The Contractor shall promptly remove rejected articles or material from the site of the Work after notification of rejection.
- C. All costs of removal and replacement of rejected articles or materials from the site of the Work after notification of rejection shall be borne by the Contractor.

1A-33.7 TESTING LABORATORY SERVICES

- A. The Owner will select and pay for the services of an independent testing laboratory to perform specified testing quality control and services.
 - 1. Contractor shall cooperate with the laboratory to facilitate the execution of its required services.
 - 2. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.
- B. Related Requirements
 - 1. Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities as mentioned in the Conditions of the Contract.
 - 2. Certification of Products indicated in respective Specification Sections.
- C. Testing laboratory inspecting, sampling, and testing is required for, but not limited to:
 - 1. Sludge composition
 - 2. Tank and Roof material
- D. Qualification of Laboratory
 - 1. Meet "Recommended Requirements of Independent Laboratory Qualification," latest edition, published by American Council of Independent Laboratories.
 - 2. Meet basic requirements of ASTM E 329, "Standard Recommended Practice for inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction".
 - 3. Authorized to operate in the State in which the Project is located.
- E. Laboratory Duties
 - 1. Cooperate with Architect and Contractor; provide qualified personnel after due notice.
 - 2. Perform specified inspections, sampling and testing and reporting of results of materials and methods of construction:
 - a. Comply with specified standards.
 - b. Ascertain compliance of materials with requirements of Contract Documents.
 - c. Tests and inspections shall be conducted in accordance with specified requirements and if not specified, in accordance with applicable standards of American Society of Testing and Materials and other recognized authorities as applicable.
 - 3. Promptly notify Architect and Contractor of observed irregularities or deficiencies of work or products.
 - 4. Promptly submit written reports of each test and inspection; at least one copy each to Architect, Owner, and Contractor.
 - 5. Perform any additional tests as required by the Architect or Owner.
- F. Limitations of Authority of Testing Laboratory.
 - 1. Laboratory is not authorized to:

- a. Release, revoke, alter or enlarge any requirements of Contract Documents.
- b. Approve or accept any portion of the Work.
- c. Perform any duties of the Contractor.

G. Contractor's Responsibilities

1. Cooperate with laboratory personnel, provide access to Work and to Manufacturer's operations.
2. Provide to the laboratory and to the Architect the preliminary design mix proposed to be used for concrete and other materials and mixes which require control by the testing laboratory.
3. Furnish copies of Products test reports as requested.
4. Furnish incidental labor and facilities:
 - a. To provide access to Work to be tested.
 - b. To obtain and handle samples at the Project Site or at the source of the product to be tested.
 - c. To facilitate inspections and tests.
 - d. For protection, storage and curing of test samples.
5. Costs of tests, samples and specified material, where the substitution is requested by the Contractor and the tests are necessary in the opinion of the Architect to establish equality qualified with specified items, shall be borne by the Contractor.
6. Notify laboratory and Owner's Representative sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
7. Employ and pay for the services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required:
 - a. For the Contractor's convenience.
 - b. When initial tests indicate Work does not comply with Contract Documents.
 - c. When required by laws, ordinances, rules, regulations, orders or approvals of public authorities.

END OF SECTION

GENERAL REQUIREMENTS

SECTION 1B - SUBMITTALS

- 1B-1 CONSTRUCTION SCHEDULE.** Before Work is started, Contractor shall submit to Architect for review a schedule of the proposed construction operations. The construction schedule shall indicate the sequence of the Work, the time of starting and completion of each part, and the installation date for each major item of equipment, and the time for making connections to existing facilities.

Owner may require Contractor to add to his plant, equipment, or construction forces, as well as increase the working hours, if operations fall behind schedule at any time during the construction period.

- 1B-2 PROGRESS REPORTS.** A progress report shall be furnished to Architect with each application for progress payment. If the Work falls behind schedule, Contractor shall submit additional progress reports at such intervals as Architect may request.

Each progress report shall include sufficient narrative to describe current and anticipated delaying factors, their effect on the construction schedule, and proposed corrective actions. Any Work reported complete, but which is not readily apparent to Architect, must be substantiated with satisfactory evidence.

Each progress report shall also include three prints of the accepted graphic schedule marked to indicate actual progress.

- 1B-3 SCHEDULE OF VALUES.** After review of the tentative schedule at the preconstruction conference, and before submission of the first application for payment, Contractor shall prepare and submit to Architect a schedule of values covering each lump sum item. The schedule of values, showing the value of each kind of work, shall be acceptable to Architect before any partial payment estimate is prepared. Such items as Bond premium, temporary construction facilities, and plant may be listed separately in the schedule of values, provided the amounts can be substantiated.

The sum of the items listed in the schedule of values shall equal the contract lump sum total Bid price. Overhead and profit shall not be listed as separate items.

An unbalanced schedule of values providing for overpayment of Contractor on items of Work which would be performed first will not be accepted. The schedule of values shall be revised and resubmitted until acceptable to Architect.

- 1B-4 SCHEDULE OF PAYMENTS.** Within 30 days after award of contract, Contractor shall furnish to Architect a schedule of estimated monthly payments. The schedule shall be revised and submitted each time an application for payment varies more than 10 percent from the estimated payment schedule.

- 1B-5 SURVEY DATA.** All field books, notes, and other data developed by Contractor in performing surveys required as part of the Work shall be available to Architect for examination throughout the construction period. All such data shall be submitted to Architect with the other documentation required for final acceptance of the work.

1B-6

SHOP DRAWINGS AND ARCHITECTING DATA. Architecting data covering all fabricated materials to be furnished under this contract shall be submitted to Architect for review. This data shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement and operation of component materials and devices; the external connections, anchorages, and supports required; performance characteristics; and dimensions needed for installation and correlation with other materials and equipment.

All submittals, regardless of origin, shall be stamped with the approval of Contractor and identified with the name and number of this contract, Contractor's name, and references to applicable specification paragraphs and Contract Drawings. Each submittal shall indicate the intended use of the item in the work. When catalog pages are submitted, applicable items shall be clearly identified. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data.

All deviations from the Contract Documents shall be identified on each submittal and shall be tabulated in Contractor's letter of transmittal. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by Contractor (including modifications to other facilities that may be a result of the deviation) and all required piping and wiring diagrams.

Contractor shall accept full responsibility for the completeness of each submission, and, in the case of a resubmission, shall verify that all exceptions previously noted by Architect have been taken into account. In the event that more than one resubmission is required because of failure of Contractor to account for exceptions previously noted, Contractor shall reimburse Owner for the charges of Architect for review of the additional resubmissions.

Any need for more than one resubmission, or any other delay in obtaining Architects' review of submittals, will not entitle Contractor to extension of the Contract time unless delay of the Work is directly caused by a change in the Work authorized by a Change Order or by failure of Architect to return any submittal within a reasonable amount of time after its receipt in Architect's office.

Architect's review of drawings and data submitted by Contractor will cover only general conformity to the drawings and specifications, external connections and dimensions which affect the layout. Architect's review does not indicate a thorough review of all dimensions, quantities, and details of the material, equipment, and device or item shown. Architect's review of submittals shall not relieve Contractor from responsibility for errors, omissions, deviations, or responsibility for compliance with the Contract Documents.

Six copies (or one reproducible copy) of each drawing and necessary data shall be submitted to Architect. Architect will not accept submittals from anyone but Contractor. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades. Resubmittals shall bear the number of the first submittal followed by a letter (A, B, etc.) to indicate the sequence of the resubmittal.

When the drawings and data are returned marked REJECTED or REVISE AND RESUBMIT, the corrections shall be made as noted thereon and as instructed by Architect and five corrected copies (or one corrected reproducible copy) resubmitted.

When corrected copies are resubmitted, Contractor shall in writing direct specific attention to all revisions and shall list separately any revisions made other than those called for by Architect on previous submissions.

When the drawings and data are returned marked REVIEWED AS NOTED or REVIEWED, no additional copies need to be furnished.

1B-7 TRAFFIC CONTROL AND DETOUR ROUTE PLAN. The Traffic Control and Detour Plan should be submitted to the Architect prior to the Pre-construction conference/meeting. This plan should show the proposed construction sequencing and numbered by phase. The plan should show which sections of work are being done, which roads are closed to traffic, which alternate/detour routes residents have available and the proper signage per MUTCD latest edition.

1B-8 LAYOUT DATA. Contractor shall keep neat and legible notes of measurements and calculations made by him in connection with the layout of the Work. Copies of such data shall be furnished to the Architect for use in checking Contractor's layout as provided under Lines and Grades (paragraph 1A-15 in the Project Requirements). All such data considered of value to Owner will be transmitted to Owner by Architect with other records upon completion of the Work.

1B-9 CUTTING AND PATCHING.

1B-9.1 GENERAL

- A. The Contractor shall submit a written request to the Owner's Representative well in advance of executing any cutting or alteration which may affect:
 - 1. The work of the Owner or any separate contractor.
 - 2. The structural value or integrity of any element of the Project.
 - 3. The integrity of effectiveness of weather-exposed or moisture-resistant elements or systems.
 - 4. The efficiency, operational life, maintenance, or safety of operational elements.
 - 5. The visual qualities of sight-exposed elements.

- B. The request shall include:
 - 1. Identification of the Project.
 - 2. Location and description of the affected work.
 - 3. The necessity for cutting, alteration or excavation.
 - 4. The effect on the work of the Owner or any separate contractor, or on the structural or weatherproof integrity of the Project.
 - 5. Description of the proposed work:
 - a. The scope of cutting, patching, alteration, or excavation.
 - b. The trades who will execute the work.
 - c. Products proposed to be used.

- d. The extent of refinishing to be done.
 - 6. Alternatives to cutting and patching.
 - 7. Cost proposal, when applicable.
 - 8. Written permission of any separate contractor whose work will be affected.
 - 9. Date and time work will be executed.
- C. Should conditions of the work or the schedule indicate a change of products from the original installation, Contractor shall submit a request substitution.

1B-9.2 MATERIALS

- A. Comply with specifications and standards for each specific product involved.

1B-9.3 INSPECTION

- A. The Contractor shall inspect existing conditions of the Project, including elements subject to damage or to movement during cutting and patching.
- B. After uncovering work, the Contractor shall inspect the conditions affecting the installation of products, or performance of the work. The commencement of any cutting or patching means acceptance of existing conditions.
- C. Report unsatisfactory or questionable conditions to the Owner's Representative in writing; do not proceed with the work until the Owner's Representative has provided further instructions.

1B-9.4 PREPARATION

- A. The Contractor shall provide adequate temporary support as necessary to assure the structural value or integrity of the affected portion of the Work.
- B. Provide devices and methods to protect other portions of the Project from damage.
- C. Provide protection from the elements for that portion of the Project which may be exposed by cutting and patching work and maintain excavations free from water.

1B-9.5 PERFORMANCE

- A. The Contractor shall execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs.
- B. Provide devices and methods to protect other portions of the Project from damage.
- C. Provide protection from the elements for that portion of the Project which may be exposed by cutting and patching work and maintain excavations free from water.
- D. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.

- E. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes.
- F. Restore work which has been cut or removed; install new products to provide completed Work in accordance with requirements of Contract Documents.
- G. Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- H. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
 - 1. For continuous surfaces, refinish to nearest intersection.
 - 2. For an assembly, refinish the entire unit.

1B-10 LIST OF SUBCONTRACTORS. Contractor shall submit a full detailed list of all subcontractors to the Architect.

1B-11 LIST OF MAJOR MATERIAL SUPPLIERS. Contractor shall submit a full detailed list of all major material suppliers to the Architect.

1B-12 EXCAVATION PLAN PROGRESS. Contractor shall submit his/her Excavation Plan to the Architect for approval, prior to the beginning of Work.

END OF SECTION

GENERAL REQUIREMENTS

SECTION 1C – MOBILIZATION AND DEMOBILIZATION

1C-1 DESCRIPTION OF WORK. The Work shall consist of the mobilization and demobilization of the Contractor's forces and equipment necessary for performing the Work required under the Agreement.

It shall include the purchase of contract bonds, transportation of personnel, equipment, and operating supplies to the site, establishment of offices, buildings, and other necessary facilities at the site; and other Work at the site.

It shall not include mobilization for any specific item of work for which payment for mobilization is provided elsewhere in the Agreement.

This specification covers mobilization for work required by the Agreement at the time of award. If additional mobilization costs are incurred during performance of the Agreement as a result of changed or added items of work for which the Contractor is entitled to an adjustment in contract price, compensation for such costs will be included in the price adjustment for the items of work changed or added.

- END OF SECTION -

GENERAL REQUIREMENTS

SECTION 1SP - SPECIAL PROVISIONS

1SP-1 DEFINITIONS2

1SP-2 TESTING LABORATORY2

1SP-3 LABOR PREFERENCE.....2

1SP-4 RESERVED2

1SP-5 CHANGE ORDERS.....2

1SP-6 MAINTENANCE OBLIGATION2

1SP-7 TIME OF COMPLETION AND LIQUIDATED DAMAGES.....2

1SP-8 PROJECT SIGN.....3

1SP-9 UTILITY RELOCATION.....3

1SP-10 PROTECTION OF TREES, PLANTS, AND SHRUBBERY3

1SP-11 PAYMENTS TO CONTRACTOR3

1SP-12 INSURANCE CERTIFICATES4

1SP-13 SAFETY AND HEALTH REGULATIONS4

1SP-14 SANITARY FACILITIES.....4

1SP-15 VISIT TO SITE.....4

1SP-16 PROTECTION OF INSTALLED UTILITIES.....4

1SP-17 AWARD OF CONTRACT.....4

1SP-18 DOCUMENTATION OF EXISTING CONDITIONS.....4

1SP-19 PROTECTION OF PROPERTY AND STRUCTURES6

1SP-20 PERFORMANCE AND PAYMENT BONDS.....6

1SP-21 UNDERGROUND INSTALLATIONS.....6

1SP-22 INSPECTION BY PUBLIC AGENCIES6

1SP-23 PROJECT CLEAN-UP6

1SP-24 INDEMNIFICATION.....7

1SP-25 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER.....7

1SP-26 CONSTRUCTION SEQUENCE8

1SP-27 CONSTRUCTION NOISE.....8

1SP-28 COOPERATION BETWEEN CONTRACTORS.....8

1SP-29. FIELD OFFICE8

1SP-30 PROXIMITY TO POWER LINES8

1SP-31. GROUND FAULT PROTECTION8

1SP-32 HAUL ROADS8

1SP-33 UTILITIES AND IMPROVEMENTS.....8

1SP-34 EXISTING FACILITIES.....9

1SP-35 DAMAGED STRUCTURES AND ROADWAYS10

GENERAL REQUIREMENTS

SECTION 1SP - SPECIAL PROVISIONS

1SP-1 DEFINITIONS. The City of Gretna is herein called the "Owner" and Burgdahl & Graves Architects is herein called the "Architect."

1SP-2 TESTING LABORATORY. An independent testing laboratory shall be employed at the Owner's option and paid by the Owner for the purpose of conducting tests where testing is called for in the Technical Specifications.

The selection of the testing laboratory by the Owner shall be understood as in no way relieving the Contractor of his responsibility for satisfactory performance of the work in full conformance with the requirements of the Contract. Excluding written protest by the Contractor in advance of processing or use of materials, services of the testing laboratory shall be understood as constituting full acceptance by and approval of the Contractor.

The Contractor shall cooperate with and make available to the testing laboratory such facilities and material samples as may be necessary for the performance of these services without charge.

1SP-3 LABOR PREFERENCE. To the extent that qualified mechanics and laborers are available, employment preference shall be given to bona-fide residents of Jefferson Parish.

1SP-4 RESERVED.

1SP-5 CHANGE ORDERS. All Change Orders must be approved in writing by the Owner prior to the execution of any work on same.

1SP-6 MAINTENANCE OBLIGATION. If at any time during the performance of this contract or for a period of twelve (12) months after final acceptance of the project, defects in construction and/or workmanship should develop, the contractor shall promptly repair and/or replace the defect even though such workmanship and/or material has already passed inspection. All such repair work is an obligation of the Contractor and the cost thereof must be included in the prices bid for the various items of work.

1SP-7 TIME OF COMPLETION AND LIQUIDATED DAMAGES. The Contractor will be issued a "Conditional Notice To Proceed" to acquire approvals of required drawings, brochures and other submittals, and to begin purchase and assembly of materials. The Contractor may only mobilize enough force to verify material requirements and quantities. The "Conditional Notice To Proceed" will expire 30 calendar days after the date of contract or as necessary to obtain material deliveries. The contractor shall request, in writing, an extension of the "Conditional Notice to Proceed" as may be required.

The Contractor on this project shall complete all work outlined in the total Bid within 60 calendar days from the date of the Full Notice to Proceed issued by the Owner or the Architect acting on behalf of the Owner.

The stated time of completion includes an assumed percentage of inclement weather days. No consideration shall be given to a request for a contract time extension due to inclement weather, except for extraordinary conditions such as hurricanes, floods, and the like.

Liquidated damages at the rate of Five Hundred Dollars (\$500.00) per day shall be assessed against the Contractor if the work is not completed within the above specified calendar days, in accordance with paragraph SC-8 of the Supplementary Conditions.

1SP-8 PROJECT SIGN. NOT USED

1SP-9 UTILITY RELOCATION. The Contractor shall notify the City of Gretna, Department of Public Works, prior to commencing any work involving removal, valving-off, or relocation of sewer lines or any utilities within the Wastewater Treatment Plant. The Contractor shall also notify the gas companies, the power company, Cable TV Company and the telephone company to coordinate relocation and construction operations.

1SP-10 PROTECTION OF TREES, PLANTS, AND SHRUBBERY. The Contractor shall be responsible for protecting all trees, plants, and ornamental shrubbery on the line of or adjacent to the proposed construction, whether these trees, plants, and shrubbery are within the servitude or not.

Contractor, after visiting the site, shall be aware of existing trees and shall not be allowed to cut or destroy any trees on private property or tree limbs overhanging project limits from private property without first obtaining written permission from the property owners. Trees within the servitude may be cut or destroyed only with the approval of the Architect.

1SP-11 PAYMENTS TO CONTRACTOR. The Owner agrees to make payment to its Contractor promptly sums due under this contract and to retain only such amounts as may be justified by specific circumstances specifically provided for in the construction contract, to the following schedule:

- a. Retention of up to ten (10) percent of payments for projects with contract prices of less than \$500,000.
- b. Retention of five (5) percent of payments for projects with contract prices of \$500,000 or more.

Wherever an item of work to be performed under this contract is specified in any of the bid documents as being paid at an item total price, the Contractor shall be paid the entire amount that appears in his bid proposal for that item.

Wherever the estimated quantities (i.e., cubic yards of sand, shell, etc.) of materials to be furnished under this contract are shown in any of the documents, including the Proposal, they are given for use in comparing bids and are not to be construed as exact quantities. The Owner reserves the right to increase or diminish these quantities as may be necessary to complete the work contemplated by this contract. The Contractor shall be paid for the actual quantity of items or material used, and payment will be at the respective unit price bid for these items or materials.

The sum of the products of approximate quantities multiplied by the unit price bid, constitute the total base bid price or total alternate bid price which sums shall be used in comparison of bids, and the awarding of the Contract.

It shall be understood that the total base bid or alternate bid price figure, wherever specified in the bid document, may not reflect the actual amount the Contractor will

receive upon completion of the work. This figure shall be adjusted in accordance with the actual quantity of unit price items used.

All payment requests or invoices must be sent first to the Architect for review and comment on the proper forms, which are then forwarded to the appropriate department. Contractors who fail to follow this procedure will not be paid on a timely basis due to the unnecessary delays in re-routing the payment requests.

"Final payment and release of retainage will be predicated on the Contractor submitting to the City a list of outstanding insurance claims which they have incurred by the residents and homeowners along with the disposition of such claims."

- 1SP-12 INSURANCE CERTIFICATES. The Contractor shall deliver the required insurance certificate for the project to the Architect within seven (7) calendar days of the execution of the Agreement. Failure to comply with this requirement will delay issuance of the Notice to Proceed.
- 1SP-13 SAFETY AND HEALTH REGULATIONS. All work and construction practices shall conform to "Federal Register - Volume 36 - Number 105 - Part II - Department of Labor - Bureau of Standards - Safety and Health Regulations for Construction", or the latest revision thereof.
- 1SP-14 SANITARY FACILITIES. The Contractor shall furnish his own adequate temporary facilities for his personnel. It shall be his responsibility to maintain and dispose of wastes.
- 1SP-15 VISIT TO SITE. The bidder shall visit the site of the proposed work in order that he may understand the facilities, difficulties and restrictions attending the execution of the contract. He will be allowed no additional compensation for failure to be so informed.
- 1SP-16 PROTECTION OF INSTALLED UTILITIES. Contractor is responsible for any and all materials required for protecting the Entergy distribution line located on the west side of this project as deemed necessary by his construction techniques
- 1SP-17 AWARD OF CONTRACT. The contract for the CITY OF GRETNA, WATERLINE REPLACEMENT AT WHITNEY AVENUE CANAL shall be awarded based on the lowest responsive and responsible bidder for the total bid price as determined by the Owner and in conformance with the Contract Specifications.
- 1SP-18 DOCUMENTATION OF EXISTING CONDITIONS. The Contractor, prior to mobilizing onto the jobsite, shall conduct a detailed survey on the jobsite, surrounding area and access routes.

This survey is intended to document existing conditions with respect to any conditions which may be noticed after construction begins. Post construction conditions shall also be compared to this data.

This documentation shall be provided by the Contractor and submitted to the Architect as preparation to resolve any damage claims which may arise due to the construction of this project. All costs associated with this survey shall be included in other bid items.

These records shall become property of the Owner upon delivery to the Architect or Owner's Representative.

The Owner shall have the authority to reject all or any portion of the photographic documentation not conforming to the Specifications. Those rejected portions shall be rephotographed at no additional cost to the Owner.

Photographs shall be taken of the exterior of all public and private buildings and structures along any pipeline work and immediately adjacent to any excavation or pile driving. The photos must be of sufficient extent to cover existing conditions which may be affected by the work.

The Contractor shall make every attempt to gain permission from property owners for access to private property for documenting preconstruction conditions. If a property owner refuses access after multiple attempts, the Contractor will notify the Architect and log all contacts with the property owner. The attempts shall include a formal letter and upon refusal, a registered or certified letter to supplement the log of verbal and/or telephone contacts.

Video tapes of the access routes shall be made to show existing street and right-of-way conditions. The camera shall be mounted on a tripod or platform upon a vehicle which places the camera approximately 10' above the path being traveled upon. The travel speed of the vehicle shall be no greater than 48 feet per minute. Photographs shall be taken to supplement the video tapes to give more detailed documentation of pre-existing conditions.

A carefully prepared log shall be maintained to show the name of the individual taking the photographs, the stationing as shown on the Plans, or as directed by the Architect, the name of the street, easement, or building being documented, the project name, and the direction of travel and viewing side.

All still photographs shall be taken on a speed graphic press type camera with 2-1/4" square film size.

Photographs shall be sharp clear, bright, well focused with accurate colors free from distortion or any other form of picture imperfection.

The date, time, and identification number of each photograph shall be displayed onto the negative and print.

The Architect and Owner shall be furnished with three (3) contact sheets containing each exposure positioned individually in plastic pages with full descriptions of each photograph (origin, location, etc.) attached to the back of the print. Negatives shall also be submitted positioned individually with descriptions matching those mentioned above in plastic pages. The prints and negatives shall be bound in sets in heavy duty 3 ring binders and delivered no later than on the date of mobilization upon the site or staging areas.

No photography shall be done during periods of significant precipitation, mist or fog.

The photography shall only be done when sufficient sunlight is present to properly illuminate the subjects of recording. Proper flash lighting shall be used inside the buildings and less lighted areas. No Direct Payment shall be made for video taping or photography, as well as associated labor, equipment, reproduction, etc. necessary to comply with the requirements above.

- 1SP-19 PROTECTION OF PROPERTY AND STRUCTURES. The Contractor shall, at his own expense, sustain in their places and protect from direct or indirect injury all pipes, poles, fencing, walls, utilities, and other structures or property in the vicinity of his work whether above or below the ground. He shall at all times have a sufficient quantity of timber and planks, chains, ropes, etc., on the ground and shall use them as necessary for sheathing any excavations and for sustaining or supporting any structures that are uncovered, undermined, endangered, threatened, or weakened. The Contractor shall assume all risks attending the presence or proximity of piles, poles, fencing, walls, buildings, and other structures and property of every kind and description in the vicinity of his work, whether above or below the surface of the ground, that are indicated on the Contract Drawings or may be discovered on the site by the use of reasonable investigation and caution; and he shall be responsible for all damage and assume all expense for direct or indirect injury caused by his work to any of them, or to any person or property by reason of injury to them. Contractor shall indemnify and hold harmless Owner and Architect and their agents and employees from and against all claims, damages, losses and expenses including, but not limited to attorney's fees, arising out of or resulting from the performance of the Work, when such claim, damage, loss, or expense is caused by work of the Contractor, any sub-contractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused by a party indemnified hereunder.
- 1SP-20 PERFORMANCE AND PAYMENT BONDS. All payment and performance bonds provided in connection with any contract let by or on behalf of the City of Gretna shall be provided by a company or companies having at least an "A" or better financial rating according to the latest A.M. Best Company ratings and shall be in an amount at least equal to the Contract Price.
- 1SP-21 UNDERGROUND INSTALLATIONS. Existing underground installations are indicated on the Contract Drawings only to the extent that such information was made available to or discovered by the Architect in preparing the Contract Drawings. There is no guarantee as to the accuracy or completeness of such information, and all responsibility for the accuracy and completeness thereof is expressly disclaimed.
- 1SP-22 INSPECTION BY PUBLIC AGENCIES. Authorized representatives of the City of Gretna, Department of Public Utilities, shall have access to the Work wherever it is in preparation or progress. Contractor shall provide proper facilities for such access and inspection.
- 1SP-23 PROJECT CLEAN-UP: During construction (daily) and before final acceptance the Contractor shall be responsible for and will clean up at his own expense any streets or roadways which have debris, mud, shells, etc., as a result of construction on this project.
- 1SP-24 INDEMNIFICATION: Contractor shall defend, indemnify, and hold harmless Owner and Architect and their agents, employees, related and companion corporations (collectively referred to as Owner and Architect) from and against any and all claims, demands, in any way arising out of or resulting from, directly or indirectly, errors, omissions, or negligence related to the work performed by the Contractor or any of his subcontractors, suppliers or agents, including all damages, losses, expenses, attorney's fees and costs.
- 1SP-25 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

- A. This provision specifies the procedure for determination of time extensions for unusually severe weather in accordance with the contract clause in the General Conditions, Paragraph 12.2. In order for the Architect to recommend and the Owner approve a time extension under this clause, the following conditions must be satisfied.
 - 1. The weather experienced at the project site during the contract period must be found to be unusually severe. That is, more severe than the adverse weather anticipated for the project location during any given month.
 - 2. The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.
- B. The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) New Orleans (Audubon) Weather Station located near the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all-weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER CALENDAR DELAY WORK
DAYS BASED ON (5) DAY WORK WEEK

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
(11)	(9)	(5)	(4)	(4)	(6)	(9)	(9)	(6)	(4)	(5)	(9)

- C. Upon acknowledgment of the Notice to Proceed (NTP) and continuing throughout the contract, the Architect/Owner will record on the daily report the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled workday.

The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph b. above, the contract time will be modified reflecting any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the contract clause entitled "Change in the Contract Time", Article 12 of the General Conditions.

- 1SP-26 CONSTRUCTION SEQUENCE. The Contractor shall be responsible for developing a construction sequence to facilitate the construction of this project. The sequence must be approved by the Architect and City prior to construction initiation. Construction sequencing shall be scheduled to minimize time of road closure and maximize parking in the downtown area.
- 1SP-27 CONSTRUCTION NOISE. The Contractor shall maintain and operate equipment in such manner as to minimize noise generation to the extent practicable. All engines used on the project shall be equipped with properly functioning mufflers.
- 1SP-28 COOPERATION BETWEEN CONTRACTORS. The Contractor shall be cognizant of the fact that other utilities may be under construction at the same time that this contract is active. There shall be complete cooperation with any other contractor in

the area, and any unavoidable conflicts shall be immediately brought to the Architect's attention.

1SP-29. FIELD OFFICE. NOT USED.

1SP-30 PROXIMITY TO POWER LINES. The Contractor shall take notice of the overhead power lines along the length of the project.

It shall be the Contractor's responsibility to determine the requirements of his work in the vicinity of the power lines and his ability to work safely under these conditions. Any relocation, de-energizing, etc. must be arranged with Entergy Services, Inc. by the Contractor, and it will be his responsibility for all costs associated with same.

The Contractor shall meet all applicable OSHA regulations and National Electric Safety Code requirements during the duration of this project. No equipment is to be utilized beneath transmission lines with a height greater than 15 feet.

1SP-31 GROUND FAULT PROTECTION. Electrical equipment used on this contract shall be equipped with ground fault circuit interrupters in accordance with EM 385-1-1, Section 11.C.05.

1SP-32 HAUL ROADS. NOT USED.

1SP-33 UTILITIES AND IMPROVEMENTS.

A. All known utilities within the limits of the work, such as pipes, communication lines, power lines, etc., that would interfere with construction work shall be removed, modified or relocated by the appropriate utility company at no cost to the Owner unless otherwise noted in the plans and/or specifications. The Contractor, however, shall cooperate with the authorities or company representatives and shall conduct his operations in such manner as to result in a minimum of inconveniences to the owners of said utilities. The Contractor shall notify each utility owner, (Entergy Electric, Atmos Energy, BellSouth Telecommunications, and Cox Communications) by certified mail 45 days, 15 days and by telephone 72 hours prior to the date utilities need to be moved and provide a copy of these notifications to the Architect. The contact persons and telephone numbers that should be utilized during the construction phase are listed on the drawings.

B. Notices to Owners and Authorities. The Contractor shall notify owners, Entergy Electric, BellSouth Telecommunications, Atmos Energy and Cox Communications of utilities when prosecution of the work may affect them. When it is necessary to temporarily disconnect utility services, the Contractor shall give notices sufficiently in advance to enable the affected persons to provide for their needs. Notices shall conform to any applicable local ordinance and, whether delivered orally or in writing, shall include appropriate information concerning the interruptions and instructions on how to limit their inconvenience. Utilities and other concerned agencies shall be contacted at least 48 hours (excluding Saturdays, Sundays and legal holidays) prior to cutting or closing streets or other traffic areas or excavating near underground utilities or pole lines.

C. Entergy Electric Transmission and Distribution Lines (Entergy). While constructing the project, the Contractor will be working near, and under the Entergy overhead power lines. The Contractor shall contact Entergy prior to start of construction to coordinate all construction work with Entergy in order to ensure safety.

1. All Entergy Electric relocation and de-energizing work must be coordinated with the Contractor for the project. This is necessary to prevent any loss of power to the adjacent storage businesses and other electrical fed equipment. Existing Entergy Electric facilities that have not been completely located at the time of construction shall be closely coordinated between Entergy Electric and the Contractor.
2. The Contractor shall maintain a minimum distance from all power lines as required by NEC and Entergy. Contractor shall be responsible for determining the maximum height and reach attainable by any part of any piece of equipment, and after coordinating with Entergy to determine the height and location of the power line, shall determine if the required clearance will be violated. The Contractor shall not work within the required clearance of the lines unless the lines are de-energized. If the clearance will be violated, prior to beginning any operations in the area, the Contractor shall coordinate with Entergy to de-energize the line. If the line is to be de-energized but is to remain in place, rather than being removed, the Contractor shall establish a procedure with Entergy to ensure that the Contractor shall have sufficient notice to allow removal of all equipment which may violate the required clearance from the area prior to the line being re-energized. These procedures and requirements shall also apply to any buried power lines.
3. It shall be the Contractor's sole duty and responsibility to provide for the safety of his men, equipment, subcontractors and the general public during operations in the vicinity of overhead and underground power lines; and to assure that all of his operations and those of his employees and subcontractors comply with OSHA, EM 385-1-1, the National Electric Safety Code, and all applicable Parish, State and Federal codes and regulations.

1SP-34 EXISTING FACILITIES.

- A. Protection and Relocation of Existing Structures and Utilities. The Contractor shall assume full responsibility for the protection of all structures and utilities, public or private, including poles, signs, services to building utilities, in the street, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables, whether or not they are shown on the drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's negligence shall be repaired by him at his expense.
- B. The Contractor shall bear full responsibility for locating all underground structures and utilities (including existing water services, drain lines, and sewers) as indicated on the plan drawings. Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor.
- C. Care and Protection of Property. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in another manner acceptable to the Architect.
- D. Other Features. Along the location of this work, all fences, walks, bushes, trees, shrubbery, and other physical features noted on the drawings to remain, shall be protected and restored in a thoroughly workmanlike manner.

E. The protection, removal, and replacement of existing physical features along the line of work shall be a part of the work under the contract, and all costs in connection therewith shall be included in the applicable contract unit and/or lump sum prices for which the work is incidental thereto.

1SP-35 DAMAGED STRUCTURES AND ROADWAYS. The Contractor shall at his own expense remove and replace any damaged structures and roadways caused by the negligence of his construction work as directed by the Architect.

The Contractor shall coordinate the work with the Architect. The existing buildings, bridge vehicular traffic bridge, fences, pavement and other structures which are located close to the project site. Damages to these structures may occur due to construction operations, construction vehicular traffic, vibrations, excavation, etc. To minimize the possibility of damages to these structures, the Contractor shall use the following procedures and or guidance:

A. Monitoring Vibrations. Vibrations, construction equipment and vehicular traffic may affect and damage existing structures. Vibrations shall be monitored by others and limited to 0.25 inch per second at all structures including buildings and pools. Exceeding 0.5 of an inch per second may induce structural damages. The Contractor shall be informed when the vibrations from his operations have exceeded 0.25 of an inch per second and the Contractor shall take immediate action to reduce the vibrations to the acceptable limits or terminate the operation until further notice. The Contractor shall coordinate monitoring of vibrations with the Architect.

END OF SECTION

SECTION 01010

PROJECT DESCRIPTION AND SCOPE OF WORK

A. GENERAL

1. The scope of work to be performed in an existing occupied building under this contract shall include, but not be limited to:
 - a. Installation of new mini-split system with new CU rooftop units prior to removing existing HVAC system/ductwork.
 - b. Replacing existing 4-pipe multi-zone air handling system with new HVAC system.
 - c. Removal of existing heating hot water system.
 - d. Associated demo and new work as indicated in Contract Documents.

B. PROPOSED ORDER OF WORK

1. Order of work shall be under means and methods of Contractor to perform scope of work of this contract subject to prior approval of Owner. Coordinate with Project Drawings and Project Manual for guidelines and work closely with Owner and Architect/ Engineer prior to proceeding.

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. The project shall be constructed complete as shown and indicated on the Contract Drawings and as described in the Contract Specifications.
- B. Payment shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labors, operations, and incidentals as necessary to complete the various items of work all in accordance with the requirements of the Contract Documents, including all costs of compliance with the regulations of public agencies having jurisdiction. The Contractor is hereby on notice that no separate payment will be made for any item not specifically called out, but that is required to properly complete the project.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

PART 4 - MEASUREMENT AND PAYMENT

4.1 SCOPE

- A. The Total Bid Price shall cover all work required by the Contract Documents. All costs in connection with the proper and successful completion of the work, including furnishing all materials, equipment, supplies, and appurtenances; providing all construction equipment, and tools; and performing all necessary labor and supervision to fully complete the work, shall be included in the unit and lump sum prices bid. All work not specifically set forth as a pay items in the Bid Form shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the prices bid.

4.2 ESTIMATED QUANTITIES

- A. All estimated quantities stipulated in the Bid Form or other Contract Documents are approximate and are to be used only (a) as a basis for estimating the probable cost of the work, and (b) for the purpose of comparing the bids submitted for the work. The actual amounts of work done and materials furnished under until price items may differ from the estimated quantities. The basis of payment for work and materials will be the actual amount of work done and materials furnished. No compensation will be given for any quantities not used.

4.3 MOBILIZATION AND DEMOBILIZATION (ITEM NO. 1)

- A. Measurement: Measurement for payment for mobilization and demobilization will be on a lump sum basis as specified herein.
- B. Payment: Payment for mobilization and demobilization shall cover all preparatory work, obtaining all permits, insurance and bonds, movement of personnel, equipment, supplies and incidentals to the project site, the establishment of temporary offices, project signs and other construction facilities necessary for work on this project. It shall include removal of all personnel, equipment, supplies, and incidentals from the project site, removal of temporary offices and other construction facilities necessary for work on this project, all as required for the proper performance and completion of the work.

1. Payment will be made at the contract lump sum price, subject to the following provisions:

2. Partial payments for mobilization and demobilization will be made in accordance with the following schedule up to a maximum of 5 percent of the total contract amount (including this item), and payment of any remaining amount will be made upon completion of all work under the contract.

<u>Percent of Total Contract Amount Earned</u>	<u>Allowable Percent of the Lump Sum Price for the Item</u>
1 st Partial Estimate	25%
10%	50%
25%	75%
50%	100%

3. No price adjustments will be made for this item due to changes in the work.

4.4 TRAFFIC CONTROL AND COORDINATION (ITEM NO. 2)

- A. Measurement: Measurement for payment for Traffic Control and Coordination will be made on a lump sum basis.
- B. Payment: Payment for this item will be made at the lump sum bid and will constitute full compensation for the traffic control. Payment will be made at 100% of the bid amount on the estimate after this work is accomplished.

4.5 SELECTIVE DEMOLITION (ITEM NO. 3)

- A. Measurement: Measurement for payment for Selective Demolition will be made on a negotiated basis for each unforeseen obstruction encountered that will need to be removed.
- B. Payment: Payment for this item will be negotiated on a case by case basis for each item deemed to be in conflict with the progress of the project. Money for removals will be drawn off of the "Not to Exceed" price on the bid sheet. No work for Removal of Structures and Obstructions will be made until a cost for the removal has been agreed to with the Project Architect/ Engineer

END OF SECTION

SECTION 01040

PROJECT COORDINATION/ CONTRACTOR'S USE OF PREMISES

PART 1 - GENERAL

1.1 SCOPE:

- A. The scope of this Section includes the General Contractor's responsibilities when performing work in and around occupied buildings. Areas of particular concern include the following:
 - 1. Protection of site occupants, staff, and visitors.
 - 2. Complying with all security requirements of the site and buildings as determined by the Owner.
 - 3. Protecting the buildings from damage, weather, and unauthorized entry.
 - 4. Restrictions for General Contractor's use of the premises.
 - 5. Phasing and Work Sequencing.
 - 6. Shoring & Bracing
 - 7. Cooperation with other contractors on site performing work.
- B. The General Contractor is responsible for project sequencing (pending Owner's prior review and approval), construction means, methods and techniques, etc., all to be in accordance with the provisions of these Specifications and applicable Code authorities.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. The requirements of this Section, in addition to the drawings and related Division 0 and Division 1 Sections, shall coordinate with and govern all aspects of the work shown in the Contract Documents. The General Contractor is responsible for supervising all aspects of the work, whether by their own forces or by subcontractors. He shall also make sure that the provisions of this Section are made a part of contract agreements with all suppliers, subcontractors, trades, etc. involved with the prosecution of the work.

1.3 QUALITY ASSURANCE:

- A. General: Unless conflicting and more restrictive requirements are indicated, comply with standards and recommendations of the following industry standards.
 - 1. Current edition of local Building Code and Zoning Ordinances.
 - 2. Uniform Plumbing Code, latest edition.
 - 3. Uniform Mechanical Code, latest edition.
 - 4. NFPA #70 National Electric Code, latest edition.
 - 5. State Fire Marshal's regulations, including NFPA 101 - Life Safety Code, latest edition.
 - 6. State Department of Labor and Industries regulations
 - 7. State General Safety & Health Standards.
 - 8. National Fire Protection Association Codes.
 - 9. Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines, latest edition.
 - 10. International Building Code, latest edition.
 - 11. Applicable FEMA requirements.

1.4 SUBMITTALS:

- A. Provide written work scheduling/ phasing information for the Owner's use and prior approval. Tentative schedule of upcoming work, and subsequent acceptance by the Owner, shall be updated on a weekly basis.

1.5 JOB CONDITIONS:

- A. The General Contractor shall be required to visit the site of the project, and shall assume full responsibility for all existing conditions which may affect (or be affected by) work included in his contract. Coordinate location of existing site structures, elements, utilities, and other built conditions scheduled to remain, and fully protect during course of construction. Repairs to, or replacement of, any existing conditions, construction, building contents, etc. damaged during course of work shall be the responsibility of the General Contractor, at no additional cost to the Owner. Match existing conditions, details, fit and finish, color, etc.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. General Contractor shall provide all materials and equipment necessary to protect site occupants, staff, visitors, and existing buildings from the weather and work related activity for the entire length of the Contract.
- B. Temporary Covers, Closures, Etc.:
 - 1. Use "Stud Grade" quality wood members to build partitions, protections, raised floor covered walkways, etc. All wood exposed to the weather shall be treated. Plywood shall be CDX Grade, in thicknesses appropriate for spanning conditions in accordance with APA recommendations. Maintain all standards of Section 06100 – Rough Carpentry (where applicable). Exterior partitions/ closures, temporary walkways, and roofs shall be protected with two (2) layers of 15 lb felt.
- C. Dust Screens:
 - 1. Provide sheet polyethylene (6 mil or greater) to create dust barriers protecting building interiors from construction related dust. All joints shall be continuously sealed with weather resistant tape.
- D. Rain/ Weather Protection:
 - 1. Provide and install all necessary materials, including, but not limited to, single ply roof membrane, flashing membranes, adhesives, mastics, bitumens, sealant, fasteners, etc., as required to maintain the buildings fully weather-tight against rain, wind, and cold during the entire life of the Contract. All new materials shall be compatible with existing materials.
- E. Temporary Fences, and Gates:
 - 1. See drawings for notes regarding fence/gate construction. Prior to erection coordinate with Owner and Architect for approval of proposed work.
- F. Miscellaneous Materials:

1. In addition to the materials listed herein, provide all other materials, components, systems, devices, equipment, etc. recognized in the industry as being effective for the particular task at hand.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS:

- A. It is intended that the General Contractor provide all materials, methods, means, equipment, etc. as necessary to provide necessary protection for site occupants, staff, visitors, and existing buildings (and contents) during the course of construction. The lists of materials and services referenced herein are not meant to be all inclusive; the General Contractor shall bear all costs associated with providing all necessary protective measures.
- B. Refer to Drawings and Division 2, and provide the protections specified therein as are applicable to the work of this Section. Coordinate as required.

3.2 PROTECTION OF SITE OCCUPANTS, STAFF, AND VISITORS:

- A. The safety of site occupants, staff, visitors, and the public in general during the performance of this Contract is of primary importance. Take all precautions to protect users of site and general public from construction procedures. Install barriers, fences, partitions, etc. as required to prevent entry of unauthorized persons into work areas. Where necessary, build protected walkways to transfer occupants and visitors safely from one area of the building and/ or site to the next.
 1. Build temporary protected walkways, comprised of side partitions, temporary lighting, and a roof designed to protect against construction related loading and abuse. In exterior locations, provide raised flooring (with slip resistant coating) and a two (2) plies 15 lb felt roofing. Use treated wood and CDX plywood in exterior locations.
- B. All on-site storage of equipment and materials shall be restricted to areas designated by the Owner, enclosed by a chain link fence with locking gate. Install locking barriers at perimeter of each work area sufficient to restrict access within to General Contractor's forces.

3.3 PROTECTING THE BUILDINGS FROM DAMAGE, WEATHER, AND UNAUTHORIZED ENTRY:

- A. The General Contractor is responsible for protecting all existing buildings, contents, and the site in general from both construction related damage and the weather (rain, wind, cold, etc.). Protections shall be maintained for the life of the Contract.
- B. Provide wood stud and plywood protection for existing site and building elements to protect them from construction related damage.
 1. Any damage to existing conditions caused by the execution of the work shall be repaired by the General Contractor at no additional cost to the Owner. Match existing materials, finishes, details, color schemes, etc.
 2. The site shall be returned to preconstruction condition, including complete cleanup, filling and replanting ruts and damaged grass areas, replacement of damaged landscaping, repairs to broken sidewalks and curbs, etc.
- C. Devise appropriate measures to weatherproof the buildings, using materials compatible

with existing construction.

1. Schedule demolition and removal work with methods for immediate closure in the event of inclement weather. Coordinate activities with reports from the National Weather Service to project appropriate work sequencing.
2. Buildings must be made fully weather-tight at the end of each work day, with measures appropriate to withstand heavy rains, wind driven rain, and high winds.

D. Secure the buildings against unauthorized entry at the end of each work day.

1. Temporary closures shall offer the same protection against building entry as existing construction.
2. Provide two (2) layers of 15 lb felt where closure is exposed to the weather.

3.4 PHASING & RESTRICTIONS FOR CONTRACTOR'S USE OF PREMISES:

A. Occupancy: The site and buildings will be occupied during the course of the construction contract. The General Contractor must coordinate all activities with City Hall personnel to assure as little disruption as possible to daily scheduled activities.

1. A weekly activity schedule designating work areas for the following week is to be coordinated with, and approved by, the Owner.

B. Hours during the week when work can take place are the regular building operating hours of 8:30 AM to 4:30 PM Monday through Friday (except declared holidays). Contractor shall pay City of Gretna \$35.00 per hour for City Hall personnel to be present during off-hours which are outside of regular building operating hours.

C. Construction phasing is the responsibility of the General Contractor, with the understanding that it is a necessity of the project. Only certain portions of the facility will be available for renovation at any given time. Phasing and sequencing of work must be approved in advance by Owner. All costs associated with constructing the project with the conditions and restrictions of working in an occupied site and buildings must be included in the Bid.

D. Access: The General Contractor shall be given access to specific site and/ or building areas in which to work. Work shall be confined to these spaces so as to minimize interruptions of building activities. In addition, certain work may be confined to "after hours" (as applicable).

1. General Contractor must coordinate all necessary trades to work within the designated space at the same time. All necessary materials shall be on hand before work starts. All work should be complete before moving to another section of the building(s) and/ or site.

E. The front entrance (by way of the existing ADA ramp) must be protected and remain open for use during regular building operating hours.

F. Schedule the work and conduct operations in such a manner as to avoid interference with the use of, or passage to and from, adjacent facilities. Do not block exit doors, fire lanes, and other means of egress.

G. Noise Control: Noisy construction practices which interfere with normal building activity in rooms adjacent to the designated work area must be restricted to times outside of regular building operating hours.

H. Dust Control: Erect dust barriers and provide other measures as necessary to prevent movement of airborne dust into other portions of building. General Contractor must clean up all building interiors and site areas affected by construction dust and debris.

This clean-up work shall be done on a daily basis prior to the business hours of operation.

3.5 WORK SEQUENCE:

- A. Coordinate construction schedule and operations with Owner.
- B. Required means of egress from existing buildings (doors, walks, landings, platforms, stairs, ramps, etc.) must be maintained in use and in accordance with the applicable Codes at all times during construction.
- C. Existing building interiors shall be positively protected from weather, dust and dirt at all times during the construction of new work. Noise shall be kept to a minimum. All construction shall be separated from other portions of the building by secure, dust-proof partitions. Temporary partitions exposed to weather shall be water-tight and insulated as necessary to properly protect the building interior.

3.6 SHORING AND BRACING:

- A. When working in and around existing buildings and structures, the design, installation, use, and removal of temporary shoring and bracing for existing and new walls, floors, structure, etc. shall be the sole responsibility of the General Contractor, who is also responsible for project sequencing, construction methods and techniques, etc.

3.7 WORK UNDER SEPARATE CONTRACTS OR BY OWNER'S FORCES:

- A. Owner reserves the right and may award or has awarded other contracts for work on site, and Contractor under this project shall fully cooperate with such contractors and carefully fit his own Work to that provided under other contracts as may be directed by the Owner. Contractor shall not commit or permit any act which will interfere with the performance of the Work by any other contractors.
- B. Contractor shall afford other contractors and Owner's forces reasonable opportunity for introduction and storage of their materials, equipment, and execution of their Work, and shall properly connect and coordinate his Work to their work.
- C. Wherever work being done by Owner's forces or by other contractors is contiguous to Work by this Contract, respective rights of various interests involved shall be established by Architect with approval of Owner.

END OF SECTION

SECTION 01400

TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 **SUMMARY:**

- A. Section Includes:
 - 1. Selection and payment
 - 2. Contractor's responsibility
 - 3. Contractor's cooperation
 - 4. Additional tests
 - 5. Rejection of materials
 - 6. Duties of the Testing Agency
 - 7. Submittals
 - 8. Quality Assurance
 - 9. Repair and Protection

1.2 **RELATED SECTIONS:**

- A. Individual Specification Sections: Inspections and tests required, and standards for testing.

1.3 **SELECTION AND PAYMENT:**

- A. Selection and Payment: The Owner will select and pay for an independent Testing Laboratory of recognized standing for all testing hereinafter specified and/ or required in the Contract Documents.
 - 1. The Contractor shall pay the Testing Laboratory costs for all tests that indicate nonconformance with the Contract Documents.

1.4 **SUBMITTALS:**

- A. The independent testing agency shall submit a certified written report of each inspection, test or similar service, to the Architect, in duplicate.
 - 1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
 - 2. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:
 - a. Date of issue
 - b. Project title and number
 - c. Name, address and telephone number of testing agency
 - d. Dates and locations of samples and tests or inspections
 - e. Names of individuals making the inspection or test
 - f. Designation of the Work and test method
 - g. Identification of product and Specification Section
 - h. Complete inspection or test data
 - i. Test results and an interpretation of test results
 - j. Ambient conditions at the time of sample-taking and testing

- k. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements
- l. Name and signature of laboratory inspector
- m. Recommendations on retesting

1.5 QUALITY ASSURANCE:

- A. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with ASTM E329 and accredited in the types of inspections and tests to be performed.
 - 1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

1.6 CONTRACTOR RESPONSIBILITY:

- A. General Contractor's Responsibility: Employment of the Laboratory does not relieve the General Contractor of responsibility to provide materials and construction in conformance with the Contract Documents. Processing or use of specified materials shall be understood as constituting full acceptance and approval by the General Contractor of materials as suitable for the intended purpose, unless previous written exception is taken by the General Contractor and approved by the Architect.

1.7 CONTRACTORS COOPERATION:

- A. General Contractor's Cooperation: The General Contractor shall cooperate with the Laboratory as follows:
 - 1. Make available, without cost, samples of all materials to be tested.
 - 2. Furnish nominal labor and sheltered working space as is necessary to obtain samples at the project.
 - 3. Inform the Laboratory of the material sources and instruct the suppliers to allow tests or inspections by the Laboratory.
 - 4. Notify the Laboratory sufficiently in advance of operations to allow for completion of initial tests and assignment of inspection personnel.

1.8 ADDITIONAL TESTS:

- A. Additional Tests: The Architect and Owner reserve the right to require additional tests to those specified or upon materials not already specified for testing. If such tests disclose noncompliance with the Contract Document requirements, the Architect and Owner reserve the right to require additional tests at the expense of the General Contractor.

1.9 REJECTION OF MATERIALS:

- A. Notification: The Laboratory shall notify the General Contractor, or his authorized representative, of any materials or works, which are not in full conformance with the Contract Documents and the Architect, shall be informed of such notification. Such nonconforming items shall not be incorporated in the finished work unless changed or corrected.

PART 2- PRODUCTS

(Not Applicable)

PART 3- EXECUTION

3.1 DUTIES OF THE TESTING AGENCY:

- A. The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Architect and General Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.
 - 1. The agency shall notify the Architect and General Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.
 - 3. The agency shall not perform any duties of the General Contractor.

- B. Coordination: The General Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition, the General Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
 - 1. The General Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

3.2 REPAIR AND PROTECTION:

- A. Upon completion of testing laboratory services, repair damaged construction and restore finishes to eliminate visual deficiencies.
- B. Protect construction exposed by testing laboratory services.
- C. Repair and protection is the General Contractor's responsibility.

END OF SECTION

SECTION 01410

QUALITY CONTROL

PART 1 - GENERAL

1.1 QUALITY CONTROL, GENERAL

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship on this project.
- B. Perform work only by persons qualified by equivalent applicable union standards to produce workmanship of the specified quality.
- C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.
- D. Comply with manufacturer's instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, notify and request clarification from Architect/ Engineer before proceeding.

1.2 SITE INVESTIGATION AND CONTROL

- A. The Contractor shall verify all dimensions in the field and shall check field conditions continuously during construction. The Contractor shall be solely responsible for any inaccuracies built into the Work due to his failure to comply with this requirement.
- B. The Contractor shall inspect related, adjacent, and appurtenant Work and shall report in writing to the Architect/ Engineer any conditions that will prevent proper completion of the Work. Failure to report any such conditions shall constitute acceptance of all site conditions, and any required removal, repair or replacement caused by unsuitable conditions shall be performed by the Contractor at their sole cost and expense.

1.3 INSPECTION OF THE WORK

- A. The Work shall be conducted under the general observation of the Architect/ Engineer and shall be subject to inspection by representatives of the Architect/ Engineer acting on behalf of the Owner to insure strict compliance with the requirements of the Contract Documents. Such inspection may include mill, plant, shop or field inspection, as required. The Architect/ Engineer shall be permitted access to all parts of the Work, including plants where materials or equipment are manufactured or fabricated.
- B. The presence of the Architect/ Engineer or any inspector(s), however, shall not relieve the Contractor of the responsibility for the proper execution of the work in accordance with all requirements of the Contract Documents. Compliance is a duty of the Contractor, and said duty shall not be avoided by any act or omission on the part of the Architect/ Engineer or any inspector(s).
- C. All materials and articles furnished by the Contractor shall be subject to rigid inspection, and no materials or articles shall be used in the Work until they have been inspected and accepted by the Owner or his representative. No Work shall be backfilled, buried, cast in concrete, hidden or otherwise covered until it has been inspected. Any Work so covered in the absence of inspector shall be subject to uncovering. Where uninspected work cannot be uncovered, such as in concrete cast over reinforcing steel, all such Work shall be subject to demolition, removal and reconstruction under proper inspection, and no additional payment will be allowed therefor.

1.4 TIME OF INSPECTIONS AND TESTS

- A. Samples and test specimens required under these Specifications shall be furnished and

prepared for testing in ample time for the completion of the necessary tests, analyses and reporting of results before said articles or materials are to be used. The Contractor shall furnish and prepare all required test specimens at its own expense. Except as otherwise provided in the Contract Documents, performance of the required tests will be by the Owner, and all costs thereof will be borne by the Owner at no extra cost to the Contractor; except, that the costs of any tests which show unsatisfactory results shall be borne by the Contractor.

- B. Whenever the Contractor is ready to backfill, bury, cast in concrete, hide or otherwise cover any Work under the Contract, the Architect/ Engineer shall be notified not less than 24 hours in advance to request inspection before beginning any such Work of covering. Failure of the Contractor to notify the Architect/ Engineer at least 24 hours in advance of any such inspections shall be reasonable cause for the Architect/ Engineer to order a sufficient delay in the Contractor's schedule to allow time for such inspections and any remedial or corrective Work required, and all costs of such delays, including its effect upon other portions of the Work, shall be borne by the Contractor. Payment for items that are built, uninspected, or unverified may be delayed by the Architect/ Engineer until satisfactory evidence of compliance is attained.

1.5 SAMPLING AND TESTING

- A. When not otherwise specified, all sampling and testing shall be in accordance with methods prescribed in the current standards of the ASTM or related standard entity, as applicable to the class and nature of the article or materials considered; however, the Owner reserves the right to use any generally-accepted system of inspection which, in the opinion of the Architect/ Engineer, will insure the Owner that the quality of the workmanship is in full accordance with the Contract Documents.
- B. Any waiver of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial Work, shall not be construed as a waiver of any technical or qualitative requirements of the Contract Documents.
- C. Notwithstanding the existence of such waiver, the Architect/ Engineer shall reserve the right to make independent investigations and tests as specified in the following paragraph and, upon failure of any portion of the Work to meet any of the quantitative requirements of the Contract Documents, shall be reasonable cause for the Architect/ Engineer to require the removal or correction and reconstruction of any such Work.
- D. In addition to any other inspection or quality assurance provisions that may be specified, the Architect/ Engineer shall have the right to independently select, test and analyze, at the expense of the Owner, additional test specimens of any or all of the materials to be used. Results of such tests and analyses shall be considered along with the tests and analyses made by the Contractor to determine compliance with the applicable specifications for materials so tested or analyzed; provided that wherever any portion of the Work is discovered, as a result of such independent inspection and investigation, and all costs of removal, correction and reconstruction, or repair of any such Work shall be borne by the Contractor.

1.6 RIGHT OF REJECTION

- A. The Architect/ Engineer, acting for the Owner, shall have the right, at all times and places, to reject any articles or materials to be furnished herein which, in any respect, fail to meet the requirements of the Contract Documents, regardless of whether the defects in such articles or materials are detected at the point of manufacture or after completion of the Work at the site. If the Architect/ Engineer or inspector, through an oversight or otherwise,

has accepted materials or Work which is defective or which is contrary to the Contract Documents, such material, no matter in what stage or condition of manufacture, delivery or erection, may be rejected by the Architect/ Engineer or the Owner.

- B. The Contractor shall promptly remove rejected articles or material from the site of the Work after notification of rejection.
- C. All costs of removal and replacement of rejected articles or materials from the site of the Work after notification of rejection shall be borne by the Contractor.

1.7 TESTING LABORATORY SERVICES

- A. The Owner will select and pay for the services of an independent testing laboratory to perform specified testing quality control and services.
 - 1. Contractor shall cooperate with the laboratory to facilitate the execution of its required services.
 - 2. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.
- B. Related Requirements
 - 1. Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities as mentioned in the Conditions of the Contract.
 - 2. Certification of Products indicated in respective Specification Sections.
- C. Testing laboratory inspecting, sampling, and testing is required for, but not limited to:
 - 1. Soils Compaction and Control.
 - 2. Cast-in-Place Concrete.
- D. Qualification of Laboratory
 - 1. Meet "Recommended Requirements of Independent Laboratory Qualification," latest edition, published by American Council of Independent Laboratories.
 - 2. Meet basic requirements of ASTM E 329, "Standard Recommended Practice for inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction".
 - 3. Authorized to operate in the State in which the Project is located.
- E. Laboratory Duties
 - 1. Cooperate with Architect/ Engineer and Contractor; provide qualified personnel after due notice.
 - 2. Perform specified inspections, sampling and testing and reporting of results of materials and methods of construction:
 - a. Comply with specified standards.
 - b. Ascertain compliance of materials with requirements of Contract Documents.
 - c. Tests and inspections shall be conducted in accordance with specified requirements and if not specified, in accordance with applicable standards of American Society of Testing and Materials and other recognized authorities as applicable.
 - 3. Promptly notify Architect/ Engineer and Contractor of observed irregularities or deficiencies of work or products.

4. Promptly submit written reports of each test and inspection; at least one copy each to Architect/ Engineer, Owner, and Contractor.
5. Perform any additional tests as required by the Architect/ Engineer or Owner.

F. Limitations of Authority of Testing Laboratory.

1. Laboratory is not authorized to:
 - a. Release, revoke, alter or enlarge any requirements of Contract Documents.
 - b. Approve or accept any portion of the Work.
 - c. Perform any duties of the Contractor.

G. Contractor's Responsibilities

1. Cooperate with laboratory personnel, provide access to Work and to Manufacturer's operations.
2. Provide to the laboratory and to the Architect/ Engineer the preliminary design mix proposed to be used for concrete and other materials and mixes which require control by the testing laboratory.
3. Furnish copies of Products test reports as requested.
4. Furnish incidental labor and facilities:
 - a. To provide access to Work to be tested.
 - b. To obtain and handle samples at the Project Site or at the source of the product to be tested.
 - c. To facilitate inspections and tests.
 - d. For protection, storage and curing of test samples.
5. Costs of tests, samples and specified material, where the substitution is requested by the Contractor and the tests are necessary in the opinion of the Architect/ Engineer to establish equality qualified with specified items, shall be borne by the Contractor.
6. Notify laboratory and Owner's Representative sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
7. Employ and pay for the services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required:
 - a. For the Contractor's convenience.
 - b. When initial tests indicate Work does not comply with Contract Documents.
 - c. When required by laws, ordinances, rules, regulations, orders or approvals of public authorities.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01420

REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.1 **SCOPE:**

A. Section Includes:

1. General definitions for Specifications and other Contract Documents including the Drawings.
2. Specification format and content explanation.
3. Explanation of Industry Standards.

1.2 **DEFINITIONS:**

- A. General: Basic Contract definitions are included in the Standard General Conditions of the Construction Contract.
- B. "Indicated": Shown, noted, scheduled and specified on the Drawings and/ or in Specifications.
- C. "Regulations": Laws, statutes, ordinances and lawful orders issued by authorities having jurisdiction.
- D. "Furnish": Supply and deliver to the project site.
- E. "Install": Unload, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean and perform similar operations at the project site.
- F. "Provide": Furnish and install, complete and ready for the intended use.
- G. "Installer": An installer is the General Contractor or another entity engaged by the General Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
 1. The term experienced, when used with the term Installer, means having a minimum of five (5) previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.
 2. Trades: Using terms such as carpentry does not imply certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as carpenter. It also does not imply that requirements specified apply exclusively to trades persons of the corresponding generic name.
 3. Assigning Specialists: Certain Sections of the Specifications require the specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the General Contractor has no option. However, the ultimate responsibility for fulfilling Contract requirements remains with the General Contractor.
 - a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.
- H. "Project Site": The site area available to the General Contractor for performing construction activities, either exclusively or in conjunction, with others performing other

work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built. The General Contractor's site area is restricted by the public right-of-way.

- I. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION:

- A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16 Division format.
- B. Specification Content: This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
 1. Abbreviated Language: Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
 2. Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the General Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the General Contractor, or by others when so noted.
 - a. The words "shall be" are implied wherever a colon (:) is used within a sentence or phrase.

1.4 INDUSTRY STANDARDS:

- A. Applicability of Standards: Except where Contract Documents include more stringent or specific requirements, industry standards, which are referenced in the Specifications are made a part of the Contract Documents and have the same force and effect as if bound or copied directly into Contract Documents.
 1. Where requirements are expressed in SI (metric) units, it is understood that corresponding metric versions of industry standards, if available (such as ASTM A36M for steel members or ANSI B18.22M for steel washers) will be the applicable standards.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.
- C. Publication Dates: Where a date of issue or edition is not specified, comply with standard in effect on the date of Contract Documents.
- D. Conflicting Requirements: Where compliance with 2 or more standards are specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different but apparently equal and uncertainties to the Architect for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.
- E. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, the General Contractor shall obtain copies directly from the publication source.
- F. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Generally recognized acronyms or abbreviations are used in the Contract Documents.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01530

BARRIERS AND ENCLOSURES

PART 1 - GENERAL

1.1 RELATED WORK

- A. Furnish, install and maintain suitable barriers as required to maintain security to prevent public entry and to protect the Work and existing facilities from construction operations. Remove the barriers when no longer needed, or at completion of Work.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

- A. Comply with federal, state and local codes and regulations.

1.3 BARRICADES AND LIGHTS

- A. All streets, roads, driveways and other thoroughfares which are closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning signs. Barricades shall be located at the nearest intersection on each side of the blocked section.
- B. All open trenches and other excavations shall have suitable barricades, signs and lights to provide adequate protection to the public. Obstructions such as material piles and equipment shall be provided with similar warning signs and lights.
- C. All barricades and obstructions shall be illuminated with warning lights from sunset to sunrise. Material storage and conduct of the Work on or alongside streets and driveways shall cause the minimum obstruction and inconvenience to the traveling public as possible.
- D. All barricades, lights and other protective devices shall be installed and maintained in conformity with the "Louisiana Manual on Uniform Traffic Control Devices", 1978 and latest revision.

1.4 FENCES

- A. All existing fences affected by the Work shall be maintained by Contractor until completion of the Work. Fences which interfere with construction operations shall not be relocated or dismantled until written permission is obtained from the owner of the fence, and the period the fence may be left relocated and dismantled has been agreed upon. Where fences must be maintained across the construction easement, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use. Fences or gates which have been disturbed or which have been opened must be closed when directed by the Owner or Architect/ Engineer within 12 hours of any such direction. If the Contractor fails to comply with any of this type of direction the Owner shall retain the right to remedy any fence removal with other forces and deduct monies spent from monies due the Contractor.
- B. Upon completion of the Work, Contractor shall restore all fences to their original or to a better condition and to their original location as needed.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Materials may be new or used (when prior approved) suitable for the intended purpose, but must not violate requirements of applicable codes and standards.

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01540

SECURITY

PART 1 - GENERAL

1.1 RELATED WORK

- A. None

1.2 PROTECTION OF WORK

- A. Contractor shall be responsible for protection of the site, and all work, materials, equipment and existing facilities thereon, against theft, vandals, and other unauthorized persons.
- B. No claim shall be made against Owner by reason of any act of an employee or trespasser, and Contractor shall make good all damage to Owner's property resulting from his failure to provide security measures as specified.
- C. Security measures shall be at least equal to those usually provided to protect the existing facilities during normal operation, but shall also include such additional security fencing, barricades, lighting, watchman services and other measures as required to protect the site.
- D. Maintain security of the limited access areas as required by the Owner.
- E. The work shall be under the charge and care of the Contractor until final acceptance. The Contractor shall take precautions against damages to the work by action of the elements or from other cause, and shall satisfactorily repair any damaged work at his expense. In case of suspension of work, the Contractor shall be responsible for all materials and shall properly store them if necessary, and shall erect temporary structures where necessary.

1.3 PROTECTION OF PUBLIC AND PRIVATE PROPERTY

- A. Contractor shall protect, shore, brace, support and maintain all above ground and underground pipes, conduits, drains and infrastructure items uncovered or otherwise affected by his construction operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences and other surface structures affected by construction operations, together with all sod and shrubs in yards and parkings, shall be restored to their original conditions, whether within or outside the easement.
- B. All replacements shall be made with new materials. No trees shall be removed outside of the permanent easement, except where authorized by Architect/ Engineer. Whenever practicable, Contractor shall tunnel beneath trees in yards and parking areas when on or near the line of trench. Hand excavation shall be employed as necessary to prevent injury to trees. Trees standing shall be adequately protected against damage by construction operations.
- C. Contractor shall be responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges and any other public or private property, regardless of location or character, which may be caused by transporting equipment, materials or men to or from the Work or any part of site thereof, whether by him or his Subcontractors. Contractor shall make satisfactory and acceptable arrangements with the owner of, or the agency or authority having jurisdiction over, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage.
- D. All fire hydrants, water control valves, and other facilities of public use shall be kept free from obstruction and available for use at all times. Fire hydrants to be removed and

relocated shall be done as quickly as possible.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 PERFORMANCE OF SECURITY MEASURES

- A. If the Contractor fails to comply with the provisions of this section, the Architect/ Engineer will immediately notify the Contractor, in writing, of such noncompliance. If the Contractor fails to remedy unsatisfactory maintenance within 48 hours after receipt of such notices, the Architect/ Engineer may immediately proceed to maintain the project, and the cost of this maintenance will be deducted from payments for the work.
- B. If the unsatisfactory maintenance results in a condition that is hazardous to life, health, or property, the Architect/ Engineer will immediately effect necessary repairs and deduct the cost of such repairs from payments for the work.

END OF SECTION

SECTION 01555

TRAFFIC CONTROL AND COORDINATION

PART 1 - GENERAL

1.1 SCOPE

- A. The work provided for in this section consists of providing and maintaining traffic control, coordination, maintenance and the preparation of a traffic control and truck haul route device plan as specified herein.

1.2 REFERENCES

- A. The current issues of the publications listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:
 - 1. Manual on Uniform Traffic Control Device (MUTCD) (latest edition)
 - 2. Louisiana Standard Specifications for Roadway and Bridges (2006 edition and amendment thereto)

1.3 MEASUREMENT AND PAYMENT

- A. No measurement will be made for the preparation of a traffic control device plan, nor the maintenance, control and coordination of traffic routing as specified herein. Payment will be made at the lump sum contract price for "Traffic Control and Coordination". Price and payment shall constitute full compensation for providing all plant, labor, materials and equipment to complete the work as specified herein and as shown on the drawings.

1.4 SUBMITTALS

- A. The Contractor shall prepare and submit the original and six (6) copies of the Traffic Control Device Plan as specified herein.

PART 2 - PRODUCTS

2.1 SIGNS AND BARRICADES

- A. In accordance with Section 713 of the Louisiana Standard Specifications for Roads and Bridges (LSSRB), 2006 Edition, the Contractor shall provide all necessary signs, barricades, temporary pavement markings, in accordance with the Louisiana Manual on Uniform Traffic Control Devices, Construction Section as well as all signs, barricades, blinking lights or other necessary traffic control devices required by the Parish of Jefferson or other governing specifications.

PART 3 - EXECUTION

3.1 TRAFFIC CONTROL DEVICE PLAN

- A. The Contractor shall develop and implement a site specific traffic control device plan (TCDP) and truck haul route plan, which shall provide for the safe and expeditious movement of traffic through construction zones. A construction zone is defined as the

immediate area of actual construction, which interferes with the driving or walking public. The TCDP shall comply with the requirements set forth in the Manual on Uniform Traffic Control Devices, as revised, and with the general requirements stipulated below.

- B. The TCDP for the site shall address the conditions for providing traffic flow within the zone during the influence of construction. The TCDP shall be schematically drawn on sheet(s) large enough to show adequate details and be easily readable and reproducible. If larger than eleven inches by seventeen inches (11" x 17"), the sheet(s) shall be submitted with a reproducible transparency so that the Architect/ Engineer and the City of Gretna can produce additional copies as needed.
- C. The TCDP shall be designed and stamped by a Professional Engineer registered in the State of Louisiana. The qualifications of the Engineer shall be submitted for review and approval of the Engineer, and where applicable Louisiana Department of Transportation and Development, Traffic Operations. Engineers for this project will be qualified by education and experience in Categories 1 and 2 as noted below. All categories require a minimum of four (4) years experience and education.
- D. Category 1 - Traffic Control through Construction Zones. Urban experience in MUTCD applications, plan preparations, studies in volume, speed, and pedestrians, and tort liability.
- E. Category 2 - Permanent Sign / Marking. Urban experience in MUTCD applications, studies in volume, speed, pedestrians, and accident analysis.
- F. The Contractor shall submit an original and six (6) copies of the TCDP to the Architect/ Engineer prior to any anticipated traffic control work for the review and approval. Adequate time (a minimum of 15 calendar days exclusive of mailing time) shall be allowed for review and approval. Such approval is required prior to start of any work, which might affect the traffic pattern in the area.

3.2 TRAFFIC CONTROL

- A. The necessary precautions shall include, but not be limited to, such items as proper construction warning signs, signals, lighting devices, battery operated flashers, markings, barricades, channelization, and hand signaling devices (flagging operations). The Contractor shall be responsible for the installation and maintenance of all devices and requirements for the duration of the construction period.
- B. All work shall be performed in accordance with the Louisiana Standard Specifications for Roads and Bridges (LSSRB), 2006 edition, except as noted. Traffic control devices shall be in accordance with the MUTCD.
- C. The Contractor shall consult with the Architect/ Engineer and the City of Gretna Department of Public Works immediately on any vehicular or pedestrian safety or efficiency problem incurred as a result of construction of the project. If warranted, the Contractor's Traffic Engineer shall make adjustments to the TCDP and the Contractor shall immediately implement the revised TCDP.
- D. The Contractor shall monitor traffic control devices on a daily basis and shall make appropriate changes to correspond to conditions.
- E. The qualified Traffic Engineer shall be provided by the Contractor to inspect the job site at the beginning of the project, after significant changes, and at 30-day intervals. A written report submitted to the Architect/ Engineer verifying compliance with the plan and adequacy of traffic control devices and operating conditions will be required for each inspection. All deficiencies noted by the report shall be immediately corrected by the Contractor.

3.3 PUBLIC CONVENIENCE AND SAFETY

- A. Road Closure. No road shall be closed by the Contractor to the public except by written permission of the Architect/ Engineer, and except while so closed, the Contractor shall

maintain traffic over, through, or around the work included in his Contract, with the maximum practical convenience, for the full twenty-four hours of each day of the Contract, whether or not work has ceased temporarily. The Contractor shall notify the Architect/ Engineer at the earliest possible date after the Contract has been executed, and in any case before the starting of any construction that might in any way inconvenience or endanger traffic, so that the necessary arrangements may be determined.

- B. Fire Protection. Fire hydrants shall be accessible at all times to the Fire Department. No material or other obstructions shall be placed closer to a fire hydrant than permitted by ordinances, rules, or regulations or within fifteen (15) feet of a fire hydrant, in the absence of such ordinances, rules, or regulations.

3.4 BARRICADES, DANGER, WARNING, AND DETOUR SIGNS

- A. General. The Contractor shall, at his own expense, provide, erect, paint, and maintain all construction barricades. The Contractor shall provide suitable and sufficient lights, torches, reflectors, or other danger signals and signs, provide a sufficient number of watchmen and flagmen, and take all necessary precautions for the protection of the work and safety of the public. The Contractor shall replace any permanent street signs or markers, which have to be moved to facilitate his construction with temporary signs as necessary.
- B. Warning Signs, Painting, Illumination. The Contractor shall erect warning signs beyond the limits of the project, sufficiently in advance of any place on the project where operations interfere with the use of the road by traffic, including all intermediate points where the new work crosses or coincides with the existing road. Barricades shall be kept well painted and suitable warning signs shall be placed thereon. All barricades and obstructions shall be illuminated at night and all lights or devices for this purpose shall be kept burning from sunset to sunrise.

3.5 EMERGENCY CONTRACTOR DESIGNATION

- A. The Contractor shall designate a person(s) who can be contacted and shall be available on a seven day week, 24 hour basis through the entire period that the contract is in force. Name(s) and telephone number(s) of the individual(s) designated shall be furnished to the Architect/ Engineer prior to starting work. The person contacted shall be able to respond to emergencies occurring along the length of the project during normal after work and holiday hours.

3.6 CONSULTATIONS

- A. The Contractor shall consult with the Architect/ Engineer and the City of Gretna Department of Public Works immediately on any vehicular or pedestrian safety or efficiency problems incurred as a result of construction of the project.

END OF SECTION

SECTION 01560

TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 RELATED WORK

- A. None

1.2 DUST CONTROL

- A. Contractor shall take reasonable measures to prevent or minimize unnecessary air-borne dust. Earth surfaces subject to dusting shall be kept moist with water or by application of a chemical dust suppressant. Dusty materials in piles or in transit shall be covered to prevent blowing.
- B. Buildings or operating facilities which may be affected adversely by dust shall be adequately protected from dust.

1.3 EROSION CONTROL

- A. Contractor shall prevent erosion of soil on the site and adjacent property resulting from his construction activities. Effective measures shall be initiated prior to the commencement of clearing, grading, excavation or other operations that will disturb the natural protection.
- B. Work shall be scheduled to expose areas subject to erosion for the shortest possible time, and natural vegetation preserved to the greatest extent practicable to minimize amount of bare soil exposed at one time. Temporary storage and construction buildings shall be located, and construction traffic routed, to minimize erosion. Temporary fast growing vegetation or other suitable ground cover shall be provided as necessary to control runoff.

1.4 NOISE CONTROL

- A. Contractor shall take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work.
- B. During construction activities on or adjacent to occupied buildings, and when appropriate, Contractor shall erect screens or barriers effective in reducing noise in the building; and shall conduct his operations to avoid unnecessary noise which might interfere with the activities of building occupants.

1.5 POLLUTION CONTROL

- A. Contractor shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris and other substances resulting from construction activities. No sanitary wastes will be permitted to enter any drain or watercourse other than sanitary sewers.
- B. No sediment, debris or other substance will be permitted to enter sanitary sewers and reasonable measures will be taken to prevent such materials from entering any drain or watercourse.

1.6 SURFACE WATER CONTROL

- A. The facilities to be constructed are located in an area that may be subject to heavy rainfall

and flooding. During the construction period, Contractor shall provide temporary protection as necessary to prevent flood damage to new and existing facilities and shall be responsible for any damage that may result from flooding. Additionally the Contractor shall provide adequate flow area to the existing stations as to not impede its pumping capacity.

- B. Contractor shall provide for the drainage of storm-water and such water as may be applied or discharged on the site in performance of the Work. Drainage facilities (and pumping operations as necessary) shall be adequate to prevent damage to the Work, the site and adjacent property. Drains shall not be blocked by any of the Contractor's activities as flooding may be caused by any impedance to existing storm water flow.
- C. Existing drainage channels and conduits shall be cleaned, enlarged or supplemented as necessary to carry all increased runoff attributable to Contractor's operations. Dikes shall be constructed as necessary to divert increased runoff from entering adjacent property (except in natural channels), to protect Owner's facilities and the Work, and to direct water to drainage channels or conduits. Ponding shall be provided as necessary to prevent downstream flooding. The Contractor must obtain permission from the Owner before beginning any of the above mentioned work.

1.7 DEBRIS CONTROL

- A. Remove debris, empty crates, waste, etc. from building and site at the end of each day's work and leave grounds clean and orderly. Keep driveways, entrances and walks clean and clear at all times.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01600

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 **SCOPE:**

- A. This Section includes:
 - 1. Definitions.
 - 2. Quality assurance; ADA/ ABA compliance.
 - 3. Product delivery, storage and handling.
 - 4. General product requirements.
 - 5. Product selection procedures.
 - 6. Hazardous materials.
 - 7. Installation of products.

1.2 **RELATED SECTIONS:**

- A. Section 01420 - Reference Standards and Definitions
- B. Section 01630 - Product Substitution Procedures

1.3 **DEFINITIONS:**

- A. Definitions: Terms used in the Drawings and Specifications such as “specialties”, “systems”, “structure”, “finishes” and “accessories”, which are self-explanatory and have well recognized meanings in the construction industry are not changed by this Section.
 - 1. Products: Items purchased for incorporation in the work, whether produced for the Project or taken from previously produced stock, including “materials”, “equipment”, “systems” and similar terms.
 - 2. Named Products: Items identified by manufacturer's product name, make or model designation.
 - 3. Materials: Products that are shaped, cut, worked, mixed, finished, fabricated, processed or assembled to form a part of the work.
 - 4. Equipment: Products with operational parts, whether motorized or manually operated, that usually, but not necessarily, requires service connections such as wiring or piping.

1.4 **QUALITY ASSURANCE:**

- A. Source Limitations: To the fullest extent possible, provide all products of the same kind from a single source.
- B. Compatibility of Options: When the General Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with other products.
- C. Labels and Nameplates: Unless required for evidence of compliance and to display essential operating data, labels and nameplates shall be concealed in the completed construction.
 - 1. Labels: Where required for observation after installation, locate product labels on an accessible surface that is not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on service-connected or

power-operated equipment. Locate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain essential operating data such as:

- a. Name of product and manufacturer
- b. Model and serial number
- c. Capacity
- d. Speed
- e. Ratings

D. ADA/ ABA Compliance: Provide products and installation of products to comply with American with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines and all ADA/ ABA requirements in compliance with the local jurisdiction. Notify the Architect of any observed conflicts or omissions between the requirements indicated for this project and the ADA/ ABA Guidelines.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. General: Deliver, store and handle products in accordance with the manufacturer's recommendations. Prevent damage, deterioration and loss, including theft.
- B. Delivery: Schedule delivery to avoid long-term storage at the site and to prevent overcrowding of construction and storage spaces.
 1. Deliver products to the site in the manufacturer's original packaging with labels and instructions for handling, storing, unpacking, protecting and installing.
- C. Inspection: Inspect products upon delivery to ensure that they comply with requirements, undamaged and properly protected.
- D. Storage: Store products at the site to facilitate inspection and quantity, as required.
 1. Store heavy products in a manner that will not endanger the supporting construction.
 2. Store products subject to damage by the elements above ground and under cover in a weather-tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions and as specified for conditioned space.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS:

- A. General Product Requirements: Provide products that comply with the Contract Documents, undamaged and previously unused, unless otherwise specified or permitted.
 1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details for complete installation, for the intended purpose and use.
 2. Where available, provide standard product types that have been used successfully in similar projects and situations as approved by the Architect.
 3. As specified in Section 01420 - Reference Standards and Definitions and as specified in the individual specification sections, quantity and quality indicated represent minimum acceptable levels.

2.2 PRODUCT SELECTION PROCEDURES:

- A. Proprietary Specification Requirements: Where two or more products/ manufacturers are named, provide one of the products/ manufacturers indicated or an Architect approved equal through the substitution procedure prior to receipt of Bid. No substitutions will be permitted after award of the Contract except as provided in Section 01630 - Product Substitution Procedures.
 - 1. Quality Standards: Proprietary specifications are used only to denote the quality standard of the products desired and do not restrict Bidders to the specific brand, make or manufacturer specified. Proprietary specifications are used only to set forth and convey to prospective Bidders the general style, type, character and quality of the products desired. Equivalent products will be acceptable, but only with written prior approval as described in the Substitution Procedures.
- B. Reference Standards Specification Requirements: Where products are specified in accordance with an established standard, select any product that meets or exceed those standards; when reference standards are used in the individual specification sections the equivalent products shall comply and test to the same standards.
- C. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a manufacturer's name, a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
- D. Performance Specification Requirements: Where Specifications require compliance with performance requirements, with or without use of a manufacturer's name, products that comply with these requirements and are recommended by the manufacturer for the application indicated. Appropriate overall performance of a product is implied as the product is specified for a specific application.
- E. Compliance with Standards, Codes and Regulations: Where the Specifications require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified. This applies when Owner's established standards are specified. Refer to Section 01420 - Reference Standards and Definitions for additional provisions.
- F. Visual Matching: Where Specifications require matching an established Sampler to match existing, the Architect's decision will be final on whether a proposed product matches satisfactorily.
- G. Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, the Architect will select the color, pattern and texture from the manufacturer's standard range.

2.3 HAZARDOUS MATERIALS:

- A. Hazardous Materials: No products containing asbestos shall be used in the construction.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS:

- A. General: Anchor each product securely in place, accurately located, aligned and coordinated with other Work. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
 - 1. Inspection of Conditions: The Installer shall be required to inspect each major component, including but not limited to the substrate, conditions and complete

- assembly of components under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.
2. Visual Effects: Provide uniform joint width and arrange joints to obtain the best visual effect at exposed Work. Refer choices and options to the Architect for the final decision.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations to comply with all warranties, contact the Architect when manufacturer's instructions conflict with requirements contained in Contract Documents. Obtain Architect's determination in writing in case of apparent conflicts.
- C. Preliminary Procedures: Inspect products immediately upon delivery and again prior to installation. Remove damaged and defective items from the Project site.
1. Verify measurements and dimensions, before conducting the pre-installation meeting and beginning each installation.
- D. Protection: Install each component during good weather conditions. Apply protective covering when required to ensure against damage and deterioration at Substantial Completion.
1. Protect products and adjacent construction during and after installation, until acceptance. Prevent components damage, soiling, deterioration, harmful exposure and incompatible materials.
 2. Coordinate the erection of temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for inspecting and testing purposes.
- E. Attachment: Where mounting heights are not indicated, install components at standard mounting heights complying with all applicable codes and regulations. Refer uncertain mounting height determinations to the Architect for decision.
1. Provide attachment, connection devices and methods necessary for securing work. Secure work true to line and level, allowing for thermal and building movement.
- F. Replacement and Repair: Promptly remove damaged, defective and non-conforming products from the Project site and promptly replace with conforming new products.
1. Subject to the Architect's approval, damaged and defective products may be repaired to the condition equivalent to acceptable new products. Products that cannot be satisfactorily repaired shall be removed and replaced without additional cost to the Owner.
 2. Replacement and repairs shall be made by the party responsible for the original installation.

END OF SECTION

SECTION 01630

PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SCOPE:

- A. Section Includes: Administrative and procedural requirements for handling product substitutions during bidding and after award of the Contract.

1.2 RELATED SECTIONS:

- A. Section 01631 - Substitution Request Form

1.3 LIMITATIONS ON SUBSTITUTIONS:

- A. Substitutions: Product substitutions will NOT be considered during bidding or after award of the Contract unless the "Substitution Request Form" is used. The form is included in this Project Manual as Section 01631 - Substitution Request Form.
 - 1. Substitutions will be acceptable only if the proposed substitute meets all specified requirements, including the manufacturer's specifications.
 - 2. Proposed substitutions must be approved by the Architect.
 - 3. Requests for substitutions may be accepted or rejected at the discretion of the Owner or Architect.
 - 4. By requesting a substitution, the Supplier or General Contractor warrants the following:
 - a. The proposed substitute is equal or superior in all respects, including but not limited to the following: warranties and guarantees, to the specified product or method.
 - b. No additional cost to the Owner or change in time will be involved unless stated in the request.
 - c. Necessary coordination with other work will be provided by the General Contractor.
- B. Exceptions: The following are not considered substitutions and are not subject to requirements specified in this section for substitutions:
 - 1. Revisions to Contract Documents requested by the Owner or Architect.
 - 2. Specified options on products and construction methods included in Contract Documents.

1.4 SUBMITTALS:

- A. Substitution Request Submittal: Requests for substitution will be considered only after compliance with the following:
- B. Submit one (1) copy (either electronically or hard copy) of each substitution request including form (form shall be completed and signed by submitter, either supplier or general contractor).
- C. Identify the product, the fabrication or installation method to be replaced, with references to Specification Section and Drawing numbers. Provide complete documentation for the proposed substitution including the following information, as appropriate:

1. Product Data, including manufacturer's printed recommendations for fabrication and installation.
2. Samples, as applicable or requested.
3. Provide comparison of the proposed substituted product, indicating significant qualities of the product originally specified. Significant qualities may include size, weight, durability, performance and visual effect.
4. Indicate changes or modifications to other parts of the Work necessary to accommodate the proposed substitution.
5. Effect on the Contractor's Construction Schedule and Contract Time.
6. Cost information in accordance with the procedures for Change Order proposals, if change in the Contract Sum is involved.
7. Shop Drawings (specific to project): Provide shop drawings with details to indicate project specific design of proposed system to match design intent and identify where proposed design will differ or alter Project Drawings and Project Manual.

1.5 SUBSTITUTIONS REQUESTED DURING BIDDING:

- A. No substitution will be considered prior to receipt of bids unless written request for approval has been received by the Architect at least 7 WORKING DAYS prior to the date for receipt of Bids. Such requests shall be submitted on the proper "Substitution Request Form" following this Section and described in as much detail as possible for review of request. The burden of proof of the merit of the proposed substitution is upon the proposer (either Supplier or General Contractor). The Architect's decision of approval or rejection of the proposed substitution shall be final.
 1. The request will be automatically rejected unless the following conditions are met:
 - a. The request is submitted on the required "Substitution Request Form" following this Specification. The form shall be completed and signed by either the supplier or General Contractor.
 - b. Extensive revisions to Contract Documents are not required.
 - c. Proposed changes are in keeping with the general intent of Contract Documents.
 - d. The request is timely, fully documented and properly submitted.
- B. If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

1.6 SUBSTITUTIONS REQUESTED AFTER CONTRACT AWARD:

- A. Conditions: The Architect's evaluation of the substitution requests made after Contract is awarded may include the following considerations:
 1. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
 2. A substantial advantage offered to the Owner, in terms of cost, time, energy conservation or other considerations of merit, offsetting additional responsibilities to the Owner, which may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate contractors, increased operating and maintenance costs, or similar considerations.
 3. The specified product or method of construction cannot be provided within the Contract Time. The request may not be considered if delay from use of the specified

product or method results from failure to pursue the Work promptly or coordinate activities properly.

4. The specified product or method of construction is not approved by a governing authority.
5. The specified product or method of construction is not compatible with other materials.
6. The specified product or method of construction cannot be coordinated with other materials.
7. The specified product or method of construction cannot provide a warranty required by the Contract Documents.

1.7 **RESPONSE:**

A. Architect's Action: Within two (2) weeks of receipt of the request for substitution, the Architect will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on a proposed substitution is not made within the allotted time, use the product or method specified. Acceptance during Construction Phase will be by Change Order if change in Contract Time or Contract Sum is involved. The request will be rejected unless the following conditions are met:

1. Extensive revisions to Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of Contract Documents.
3. The request is timely, fully documented and properly submitted.

1.8 **SUBMITTALS REQUIRED BY THE CONTRACT DOCUMENTS:**

- A. Non-Complying Submittals: Requests for substitution must be in accordance with requirements of this Section. The routine submittal of Shop Drawings, Product Data and Samples that represent construction not complying with the Contract Documents does not constitute a request for substitution.
- B. Required Submittals: Submittals specified in this Section do not take the place of submittals required in the specification Section under which the substitution is proposed, unless exemption from further submittals is stated in the approval.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

**END OF SECTION
FORM FOLLOWS**

H. List ways in which proposed substitution would be affected by applicable code requirements and agency approval: _____

I. List differences between proposed substitution and specified item: _____

J. Manufacturer's warranties of the proposed and specified items are: Same Different
Explain: _____

K. List information on availability of maintenance service and source of replacement materials:

L. Certification of, and Assumption of Liability for, Equivalent Performance:
The undersigned states that the function, appearance and quality of the proposed substitution is equivalent or superior to the specified item and **is in full compliance with the Contract Documents and applicable regulatory requirements.** FAILURE TO PROVIDE SIGNED SUBSTITUTION REQUEST WILL RESULT IN AUTOMATIC REJECTION OF PROPOSED SUBSTITUTION

If Submitted By Supplier

Signature

Telephone

Date

Email

Facsimile

If Submitted By General Contractor

Signature

Telephone

Date

Email

Facsimile

A/E's REVIEW AND ACTION (to be filled-in by Architect/Engineer)

Substitution Proposal Rejected because By: _____

- Not Complete Date: _____

Substitution Accepted Remarks: __

Substitution Accepted as Noted -

Substitution Rejected -

Substitution Rejected Because Request -

Received Too Late

-

-

END OF SECTION

SECTION 01770

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 **SCOPE:**

- A. Section Includes: Administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection and acceptance procedures.
 - 2. Project record document submittal.
 - 3. Closeout procedures.
 - 4. Final cleaning.
 - 5. The Requirements of this Section amplify and do not modify provisions of the General and Supplementary Conditions.

1.2 **RELATED SECTIONS:**

- A. Section 00700 - Standard General Conditions of the Construction Contract
- B. Section 00810 - Supplementary Conditions to the Standard Conditions of the Construction Contract
- C. Section 1A – Project Requirements
- D. Section 1B – Submittals
- E. Section 1SP – Special Provisions
- F. Section 01420 - Reference Standards and Definitions
- G. Divisions 2 through 16

1.3 **SUBSTANTIAL COMPLETION:**

- A. General: The project shall be completed for the intended use. All final “As-Built” Surveys shall be completed by the surveyor as specified in Division 0 and 1 Sections.
- B. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
 - 1. When the Contractor considers that the Work, or a portion thereof which the Owner agrees to with no separation, 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.
 - 2. Advise Owner of pending insurance change over requirements.
 - 3. Obtain and submit releases enabling the Owner use of the Work.
 - 4. Remove temporary facilities, construction equipment and temporary services. Restore disturbed items to original condition or better.
 - 5. Complete final clean up requirements.
 - 6. Submit an acceptable copy of the HVAC Test and Balance Report.
 - 7. Submit all Final Inspection Certificates along with a Use and Occupancy Certificate.
- C. Inspection Procedures: On receipt of a request for inspection, Architect will either proceed with inspection or advise the Contractor of unfilled requirements. Architect will prepare the Recommendation of Acceptance or advise the Contractor of construction that must be completed or corrected before the Recommendation will be issued.

1.4 PUNCH LIST:

- A. When Project nears completion, prepare a list of items to be completed or corrected. This list shall be submitted to the Architect for his review, verification and amendment. Incorporate all uncorrected items included on observation reports made by Architect's representative. Submit certificates of inspection from all responsible Regulatory Agencies concurrently with punch list.
- B. Punch list items shall be completed prior to release of retainage as indicated in the project requirements. Intermediate request of payment for satisfactorily completed punch list items shall be in accordance with the project requirements.

1.5 FINAL ACCEPTANCE:

- A. Preliminary Procedures: Before requesting final inspection of certification for final acceptance and final payment, complete the following.
 - 1. Provide inspection and acceptance reports from each agency department having jurisdiction.
 - 2. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 - 3. Submit an updated final statement, accounting for final changes to the Contract Sum.
 - 4. Submit properly executed Lien and Privilege Certificate.
 - 5. Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance and the list has been endorsed and dated by the Architect.
 - 6. Submit consent of surety to final payment on AIA Form G707.
 - 7. Submit a final liquidated damages settlement statement, if applicable.
 - 8. Submit evidence that taxes, fees and similar obligations have been paid.
 - 9. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 - 10. Submit an acceptable Roof Warranty.
- B. Re-inspection Procedure: The Architect will reinspect the Work upon receipt of notice that the Work, including items from earlier inspections, has been completed.
 - 1. Upon completion of reinspection, the Architect will prepare a certificate of final acceptance or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled, but are required for final acceptance.
- C. Additional Requirements: Refer to General Conditions of the Contract and additional Supplementary Conditions.

1.6 RECORD DOCUMENTS:

- A. Project Set: The Contractor shall maintain one set of record documents. Do not use record documents for construction purposes; protect from deterioration and loss; provide access to record documents for the Architect's reference during normal working hours.
- B. Record Drawings: Maintain a clean, undamaged set of black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most suitable for showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the

Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red colored erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
 2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
 3. Note related Change Order numbers where applicable.
 4. The Record Drawings shall show of all excavations, alignments, sizes and locations of improvements as constructed in the field.
 5. Organize record drawing sheets into manageable sets, bind with durable paper cover sheet, and print suitable titles, dates and other identification on the cover of each set. Sheets must be in same order and quantity as the contract documents. All sheets must be included in the set.
 6. Submit a reproducible record set of Contract Drawings and an electronic format set of Contract Drawings. The Electronic format must be in PDF format and each file shall be identified the same as the contract documents. (ie: A201, E305, etc.)
- C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in written form during construction.
1. Mark these documents to show substantial variations in actual Work performed.
 2. Give particular attention to substitutions, selection of options and similar information on elements that cannot be readily identified by direct observation.
 3. Note related Record Drawing information and Product Data.
 4. Upon completion of the Work, submit record Specifications to the Architect for the Owner's records.
- D. Record Product Data: Maintain one copy of each Product Data submittal, including items submitted for record purposes. Submit to Architect in the same numbered format and sequence as the contract documents.
1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted.
 2. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations.
 3. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation.
 4. Note related Change Orders, mark-up of record drawings and Specifications.
 5. Upon completion of the Work, submit record Product Data to the Architect for the Owner's records. Record Product data must be provided for all items requiring product data submittals by the specification, even if it was not submitted during the construction phase.
- E. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference.
- F. Maintenance Manuals: Unless otherwise specified in the Technical Sections, provide three (3) sets of maintenance manuals for the project, incorporating all maintenance, repair and operating procedures specified for the project. Organize maintenance data into suitable sets of manageable size. Bind properly indexed data in heavy-duty 3-ring

vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder.

1. Include the following types of information:

- a. Recommended "turn-around" cycles.
- b. Inspection procedures.
- c. Shop Drawings and Product Data.
- d. Maintenance and repair procedures.

G. Submittal: Upon completion of the work and prior to the awarding of substantial completion. The Contractor shall transmit all record documents and maintenance manuals to the Architect for the Owner's records. The records must be transferred with an inventory of items provided per each box, roll or container. A master inventory must be provided via electronic format (PDF).

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 FINAL CLEANING:

- A. General: General cleaning during construction is required by the General Conditions of the Contract and additional Supplementary Conditions and included in Section 01712 - Field Engineering. On completion of the work of this section and after removal of all debris, leave site and adjacent streets in clean condition satisfactory to the Architect.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface to the condition expected in a normal, commercial cleaning. Comply with manufacturer's instructions and requirements in individual Specifications Sections. Complete the following cleaning operations before requesting inspection for Substantial Completion.
 1. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, and other excess and foreign materials from exposed-to-view exterior surfaces, new and existing.
 2. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.
- C. Floor Finishing: Complete all waxing and polishing of resilient flooring per Division 9 requirements, in full accordance with flooring manufacturer's recommendations. Coordinate products with Owner prior to proceeding.
- D. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- E. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not abandon or bury debris or excess materials on the Owner's property or in the roadway. Do not discharge volatile, harmful and dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.
- F. Owner's Right to Clean Up: If the Contractor fails to perform final cleaning and removal of the protection as specified and fails to promptly and diligently commence and continue specified cleaning and removal after written notice by the Owner or Architect, the Owner

may execute such cleaning and removal and deduct by appropriate Change Order the cost of the cleaning and removal from the Contract Amount. This right of the Owner, if exercised, shall be exercised without prejudice to any other remedy the Owner may have under the Contract Documents or law.

- G. Materials for Owner's Use: Where extra materials of value remaining after completion of Work have become the Owner's property, and where extra stock of materials are required by the Contract Documents, arrange for disposition of these materials as directed.

3.2 CONTINUING INSPECTIONS:

- A. General: As required by special guaranteed warranties, agreements to maintain, workmanship bonds, and similar continuing commitments, comply with Owner's request to participate in inspections at the end of each time period of such continuing commitments. General Contractor and all major subcontractors shall participate in a general inspection of the work approximately one year after the date of Substantial Completion and prior to the one (1) year date to determine the general condition of the Work.

END OF SECTION

SECTION 01778

CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.1 SCOPE:

- A. Section Includes: General administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.
- B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work nor does it relieve suppliers, manufacturers, and subcontractors required to sign special project warranties.

1.2 RELATED SECTIONS:

- A. Section 1B - Submittals
- B. Section 01770 - Closeout Procedures
- C. Divisions 2 through 16
- D. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

1.3 DEFINITIONS:

- A. Standard Product Warranties are preprinted written warranties issued by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.4 WARRANTY REQUIREMENTS:

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged or accessed for construction to warranty Work.
- B. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected by replacement, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing defective Work regardless of whether the Owner has benefitted from use of the Work for a portion of its anticipated useful service life.
- D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - 1. Rejection of Warranties: Owner reserves the right to reject warranties and to limit selection of products with warranties not to conflict with requirements of the Contract Documents.
 - 2. Owner reserves the right to refuse Work where a special warranty, certification or similar commitment is required, until evidence is presented that entities required to sign such commitments are willing to do so.

1.5 SUBMITTALS:

- A. General: Submit written warranties to the Architect prior to the date of Substantial Completion. If the Substantial Completion date extends past the anticipated date, all warranties shall be updated with the proper Substantial Completion date and resubmitted to the Architect, prior to the actual Substantial Completion.

- B. Special Warranties: When the Contract Documents require the Contractor, subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Architect for approval prior to final execution.
 - 1. Refer to individual Sections of Divisions 2 through 16 for specific content requirements and particular requirements for submittal of special warranties.

- C. Form of Submittal: At Substantial Completion, submit three (3) copies of each required warranty properly executed by the Contractor, subcontractor, supplier or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy duty, durable 3-ring vinyl covered loose leaf binders, thickness as necessary to accommodate contents, sized to receive 8-1/2- by 11-inch paper.
 - 2. Provide heavy-duty paper dividers with plastic covered tabs for each separate warranty. Mark tabs to identify the product or installation. Provide a typed description of the product or installation, including the product name and manufacturer, and the name, address and telephone number of the installer.
 - 3. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS", the Project name and the name of the General Contractor.
 - 4. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual, as specified in Section 01770 - Closeout Procedures.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

D I V I S I O N

2

S I T E W O R K

SECTION 02110

DEMOLITION

PART 1 - GENERAL

1.1 SCOPE:

- A. The scope of this Section shall include all demolition and/ or removal work as necessary to prepare the site for new construction. This shall include all demolition/ removal shown on the drawings AND as necessary to accomplish the work under this contract (whether specifically indicated or not). See all drawings and all other related sections of the specifications for additional direction.
 - 1. Specifically note requirements as set forth in Division 0 and Division 1 documents as bound in the Project Manual.

1.2 SUMMARY:

- A. This Section includes, but is not limited to, the following:
 - 1. Demolition related to new work being performed.
 - 2. All other miscellaneous associated demolition and removal work and as otherwise required.

1.3 RELATED SECTIONS:

- A. Section 01040 – Project Coordination/ Contractor’s Use Of Premises
- B. Divisions 2 thru 16 – Specific technical demolition requirements.

1.4 DEFINITIONS:

- A. Demolish: Completely remove and legally dispose of off-site.
- B. Recycle: Recovery of demolition waste for subsequent processing in preparation for reuse.
- C. Salvage: Owner shall have salvage rights to all wanted items and materials. See Construction Drawings for addition salvage directions and requirements specific to this project.

1.5 MATERIALS OWNERSHIP:

- A. Unless otherwise indicated, demolition waste becomes the property of the General Contractor.

1.6 SUBMITTALS:

- A. Schedule of Demolition: Indicate the following:
 - 1. Detailed sequence of demolition work, with starting and ending dates for each activity.
 - 2. Temporary interruption of utilities and hvac services.

1.7 QUALITY ASSURANCE:

- A. Pre-demolition Conference: Conduct meeting at Project Site with Owner, Architect, General Contractor, and associated subcontractors present. Review methods and procedures related to demolition including, but not limited to, the following:
 - 1. Inspect and discuss conditions of construction to be demolished.
 - 2. Review and finalize demolition schedule.
 - 3. Review and finalize protection requirements.
 - 4. Review procedures for noise and dust control.
 - 5. Review procedures for building protection.
 - 6. Review items, if any, to be salvaged and returned to Owner.

1.8 PROJECT CONDITIONS:

- A. Building will be occupied during scope of demolition and construction. Conduct demolition so operations of occupied buildings will not be disrupted.
 - 1. Provide not less than 72 hours notice of activities that will affect operations of occupied buildings.
 - 2. Maintain access to existing walkways, exits, and other facilities of occupied buildings.
 - a. Do not close or obstruct walkways, exits or other facilities used by the occupants without written permission from authorities having jurisdiction.

1.9 SAFETY AND COORDINATION:

- A. The safety of site occupants, workmen and the public in general during any demolition procedure is of primary importance.
- B. The Contractor shall be required to visit the site of the project, and shall assume full responsibility for all existing conditions which may affect (or be affected by) work included in his contract.
 - 1. Coordinate location of existing streets, structures, elements, utilities (exposed and subsurface), and all other built conditions scheduled to remain, and fully protect during course of construction.
 - 2. Repairs to any existing conditions (on or off-site) and construction damaged during course of work under this contract shall be the responsibility of the Contractor, at no additional cost to the Owner. Match existing conditions, details, fit and finish.

PART 2 - PRODUCTS

2.1 REUSED MATERIALS:

- A. Existing removed materials and components may be reused only where specifically noted in Contract Documents.

2.2 SALVAGE MATERIALS:

- A. All demolition items shall remain the property of the Owner. These items shall be stored in a secure and protected area of the site. Any salvage items not claimed by the Owner's representative shall become the property of the Contractor, who shall remove same from site in a timely manner at no additional cost. Coordinate with Owner and Architect.
 - 1. To the greatest extent possible, the City requires that existing wood frame window components be salvaged and delivered to a to-be-determined architectural salvage center and/or the City of Gretna within a 20 mile radius of the project site.
 - 2. Contractor to submit list of salvageable demolition items to Owner, who will review and advise which items shall be stored for salvage.
- B. See Construction Drawings for additional salvage directions and requirements for this project. Coordinate with Owner for collection, storage, and turnover of salvage materials.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. The General Contractor and staff, subcontractors and staff, manufacturers, suppliers, and all those involved in the development of this project shall thoroughly review the plans and specifications and visit the job site to become totally familiar with existing conditions and the scope of work involved. Include all costs to perform the entirety of the scope of work within bid.

3.2 PROTECTION:

- A. Contractor shall provide for the proper protection of all persons, property, landscaping, building elements, utilities, etc., both onsite and offsite, in accordance with requirements of these specifications and all prevailing codes and ordinances.
- B. Take all precautions to protect users of site and general public from demolition procedures. Install barriers, fences, partitions, covered passageways, etc. as required to protect on and off site occupants and to prevent entry of unauthorized persons into work areas.
- C. Conduct operations in such a manner as to avoid interference with the use of, or passage to and from, adjacent facilities. Do not block fire lanes and other means of egress.
- D. All debris, excess fill, demolition and construction materials, etc., shall be hauled away from the site on a periodic basis at the Contractor's cost. Temporary storage of demolition trash shall be maintained in an approved on-site area, with location to be coordinated with the Owner in advance. Burning of waste material is not permitted.
- E. Contractor shall be responsible for protecting any existing utilities interfering with construction. Coordinate with Owner, Architect, and Utility Owner prior to proceeding.
- F. Existing Utilities:
 - 1. Do not interrupt existing utilities to occupied buildings without prior authorization by authorities having jurisdiction and giving at least 72 hours notice to occupants of occupied buildings if shutdown of service is required to perform work.
- G. Temporary Protection: Erect temporary protection, covers, enclosures, walkways, fences, railings, canopies, covered passageways, etc. as required.
 - 1. Protect buildings and facilities from damage due to demolition activities.
 - 2. Provide protection to ensure safe passage of people around demolition areas.
 - 3. Erect and maintain temporary enclosures to limit debris, noise, and dust migration to occupied buildings.

3.3 DEMOLITION:

- A. All demolition and removal work, as indicated on the drawings AND as necessary to accomplish the new work, shall be included in the Contract and shall be carried out in a neat and workmanlike manner.
 - 1. It is possible that not all required demolition and/ or removal work is specifically shown in the drawings, but it is the intent of these specifications that all demolition and/ or removal be performed where necessary to build a complete project as outlined in the Contract Documents, at no additional cost to Owner. Bidders shall inspect existing conditions prior to submitting bid, and include all costs in bid.

3.4 DUST CONTROL:

- A. Provide all measures as necessary to prevent movement of airborne dust into adjacent building spaces and properties. Full clean-up of spaces affected by demolition shall be done by Contractor's forces on a daily basis prior to the beginning of daily operations. Coordinate with Owner.
- B. When working in, and adjacent to, existing buildings, structures and occupied areas, Contractor shall utilize enclosed trash chutes to transfer demolition materials into dumpsters. Seal joints in chutes, cover dumpster tops, utilize water misting, and provide other measures as necessary to control and limit airborne dust.
- C. Building interiors and exterior concrete surfaces affected by dust generated by this project (sidewalks, drives, parking areas, etc.) shall be maintained in a broom clean condition.

3.5 REPAIRS:

- A. Promptly repair damage to buildings and site elements caused by demolition operations.

3.6 DISPOSAL OF MATERIALS:

- A. Remove demolition and construction debris from Project site and legally dispose of them.
 - 1. Do not allow debris to accumulate on site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and spaces

3.7 SHORING AND BRACING:

- A. When working in and around existing buildings, the design, installation, use, and removal of temporary shoring and bracing for existing and new walls, floors, structure, etc. shall be the sole responsibility of the Contractor, who is also responsible for project sequencing, construction methods and techniques, etc. Project sequencing shall be coordinated with the Owner.

3.8 CLEANING:

- A. On a daily basis, clean adjacent buildings, structures, and improvements of dust, dirt, and debris caused by demolition and construction operations. Return adjacent areas to conditions existing before construction began.

END OF SECTION

D I V I S I O N

6

WOOD AND PLASTICS

SECTION 06100

ROUGH CARPENTRY

PART 1 – GENERAL

1.1 SCOPE:

- A. The scope of rough carpentry work in this project shall be as shown on drawings and as specified herein. It shall include all labor, materials and equipment necessary for complete installation. Rough carpentry shall include, but not limited to, the following:
 - 1. Wood blocking, grounds, and nailers
 - 2. Wood furring
 - 3. Connectors, rough hardware, and all accessories and components
 - 4. Underlayment membrane

1.2 QUALITY ASSURANCE:

- A. Lumber to comply with PS 20 and National Grading Rules, except as otherwise indicated.
 - 1. Provide dressed lumber, S4S, with 19 percent maximum moisture content at time of dressing and shipment, for sizes 2" or less in nominal thickness.
- B. Factory mark each piece of lumber and plywood with grade stamp of inspection agency showing compliance with referenced standards.

1.3 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver wood products bundled or crated to provide adequate protection during transit and job storage, with required grade marks clearly identifiable. Inspect wood products for damage upon delivery. Remove and replace damaged materials.
- B. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks, and under temporary coverings.
 - 1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.
- C. Protect sheet materials during handling to prevent breaking comers and damage to surfaces.

1.4 JOB CONDITIONS:

- A. Installer must examine the substrates and supporting structure and the conditions under which the carpentry work is to be installed and notify the Contractor and Architect in writing of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. 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.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL:

- A. Lumber: Voluntary Product Standard PS 20, "American Softwood Lumber Standard", current

edition as published by U.S. Department of Commerce, and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with applicable rules of any rule writing agency certified by the American Lumber Standards Committee (ALSC) Board of Review. Lumber design values are to comply with ASTM D245 and ASTM D2555.

- B. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grade agency, grade, species, moisture content at time of surfacing, and mil.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamps and provide grade compliance certificates issued by inspection agency.
- C. Where nominal sizes are indicated, provide actual sizes required by PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dress sizes for dry lumber.
 - 1. Provide dressed lumber, S4S, unless otherwise indicated.
 - 2. Provide lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38 mm actual) thickness or less, unless otherwise indicated.
- D. Use board products where specifically indicated. When type not called out, use plywood (exterior grade in exterior wall and wet locations).

2.2 WOOD TREATMENT:

A. Wood Preservative Treated Wood Products:

- 1. Preservative Treatment: Comply with the applicable requirements of the American Wood Protection Association (AWPA). Mark each treated item to comply with the AWPA Standardized product mark requirements. This mark shall bear the AWPA Standard, AWPA Use Category, Preservative name and code, Preservative retention, Inspection Agency Logo, and Manufacturer name and location.
- 2. Pressure-treat above-ground items with waterborne preservatives complying with AWPA Standard UI. Treat indicated job specific items, including, but not limited to the following, in accordance with AWPA Use Category Designations:
 - a. Wood nailers, blocking, stripping and similar members in connection with roofing flashing, vapor barriers and waterproofing
 - b. Wood sills, blocking, furring, stripping and similar concealed members in contact with masonry, concrete and steel
 - c. Wood framing members set on concrete slab
 - d. Use treated lumber for wall furring strips
- 3. Fasteners: Provide stainless steel or appropriate coated fastener. Do **not** allow aluminum or steel to have contact with pressure preservative wood.
- 4. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Termite Wood Treatment Products:

- 1. Provide EPA registered termiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for maximum termiticide concentration allowed for each specific use, per product's EPA registered label.
 - a. Basis of Design: Bora-Care Commercial Termiticide, Insecticide, and Fungicide as manufactured Nisus Corporation. Termiticide shall contain the following ingredients:

- 1) Active Ingredients: 40 % Disodium Octaborate Tetrahydrate (DOT)
- 2) Penetrant: Patented glycol mixture

b. Prior Approved Equal

2.3 LUMBER:

- A. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for the moisture content specified for each use.
1. Provide dressed lumber, S4S, surfaced four sides
 2. Provide kiln-dried lumber 19 percent maximum moisture content at time of dressing (lumber 2" or less in nominal thickness)' and shall be stamped "S-DRY" "KD" or "MC15"
- B. Framing Lumber (2" through 4" thick): Provide No. 2KD or better of the following species:
1. Douglas Fir (WCLB or WWPA)
 2. Southern Yellow Pine (SPIB), with tight knots only
- C. Wood Grounds, Nailers and Blocking: Provide No. 2KD or better of Southern Yellow Pine (SPIB) or Douglas Fir (WCLB or WWPA). Refer to wood treatment specifications for conditions where pressure treated wood shall be utilized.

2.4 ACCESSORIES:

- A. Rough Hardware: Provide and install all rough hardware and metal fastenings as shown on drawings, specified herein, or required for proper installation of carpentry and millwork. Nails, spikes, screws, bolts, and similar items shall be of sizes and type to rigidly secure members in place. Applicable Federal Standards are as follows:
1. Nails: FS FF-N-105; SD, 13-1/2-gauge cement coated flat head nails, 1-5/8" long for drywall work
 2. Tacks: FS FF-N-103
 3. Wood Screws: FS FF-S-111
 4. Bolts: ASTM A307, Grade A (Hex head)
 5. Nuts: ASTM A563 (Hex nut)
 6. Washers: ASTM A563
 7. Lag Screws or Lag Bolts: FS FF-S-111
 8. Masonry Anchoring Devices: See Sections 04200 and 05500
 9. Toggle Bolts: FS FF-B-588
 10. Bar or Strap Anchors: ASTM A575 carbon steel bars
- B. Framing Connectors: Wood framing connectors shall be as recommended by Simpson Strong-Tie (or approved equal) for the specific framing conditions of this project, in full accordance with all codes having jurisdiction.
- C. Self-Adhering Underlayment Membrane: Self-adhering underlayment membrane composed of two waterproofing materials (an aggressive rubberized asphalt adhesive backed by a layer of high density cross laminated polyethylene). Rubberized asphalt surface shall be backed with a foldless release paper. Self-adhering membrane shall comply with the following standards: Underwriters Laboratories Class A fire classification per ASTM E108/UL 790, and U.S Department of Housing and Urban Development (HUD) Materials Release No. 1068g.
1. Approved Manufacturers:
 - a. Grace Ice and Water Shield by Grace Construction Products
 - b. Tamko TW Metal-and Tile Underlayment by Tamko Building Products
 - c. Prior Approved Equal

2. Membrane Properties:

- a. Thickness: 40 mils - 60 mils
- b. Weight: 30 lbs./ 100 sq.ft.
- c. Tensile Strength: 250 psi
- d. Elongation: 250%
- e. Permeance: 0.05 Perms max.

PART 3-EXECUTION

3.1 INSTALLATION - GENERAL:

- A. Fit carpentry work to other work. Scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds as necessary for proper attachment of related work.
- B. All wood framing shall be cut square, closely fitted, accurately set to levels, and permanently secured in place, employing nails, bolts, or spikes as large as suitable for the conditions.
- C. Discard units of material with defects which might impair the quality of the work and units which are too small to fabricate the work with minimum joints or the optimum joint arrangement.
- D. Set carpentry work accurately to required levels and lines, with members plumb and true and accurately cut and fitted.
- E. Securely attach carpentry work to substrates by anchoring and fastening as shown and as required by recognized standards. Countersink nail heads on exposed carpentry and fill holes. Use common wire nails, except as otherwise indicated. 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.
- F. Install metal connectors and accessories as required by code and wherever recommended by connector manufacturer (Simpson Strong-Tie) and good standard practice of the industry for a complete and structurally sound job.

3.2 WOOD GROUNDS, NAILERS AND BLOCKING:

- A. All rough wood members (grounds, nailers, blocking, etc.) used for this project shall be pressure treated members, shaped for fit into work, and to receive termite spray treatment prior to final installation.
 - 1. Termite spray application shall be performed outside.
 - 2. Safety precautions shall be taken to protect applicator, materials being treated, and surrounding property.
 - 3. Termite treatment shall be prepared in strict compliance with manufacturer's application rates for dilution.
 - 4. All wood members to receive termite spray treatment on all surfaces/ sides.
 - 5. All termite treated members to fully dry prior to incorporation into work.
- B. Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cuts required for true line and level of work to be attached. Coordinate location with other work involved.
- C. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown. Anchor into masonry with fasteners of suitable size and spacing to carry imposed loads.
- D. Provide adequate solid blocking (or furring) to support all surface mounted items, including, but not limited to, wall hung equipment, cabinets, grab bars, railings, toilet accessories, fixtures, trims, moldings, etc. Provide adequate framing, secured to structure, to support ceiling mounted fixtures.

3.3 SELF-ADHERING UNDERLAYMENT MEMBRANE:

- A. Inspection: Make sure all substrate joints are tight at all penetrations and other locations.
- B. Prepare substrate (plywood, wood composition, wood plank, metal, concrete, or gypsum sheathing) in accordance with Manufacturer's recommendations. Substrate shall be clean, dry,

free of dust and dirt, and primed where necessary for proper adhesion. Prime using self-adhered manufacturers recommendations for substrate construction.

- C. Install self-adhered underlayment membrane in strict compliance with manufacturer's written guidelines.
- D. Provide complete membrane coverage for a full, watertight seal. Lap sheets as recommended by membrane supplier.

3.4 MISC. ITEMS:

- A. Scaffolding: Scaffolding necessary for the proper construction of interior and exterior work shall be furnished and erected, constructed in a thoroughly substantial manner, and providing all requisite safeguards for the protection of life and limb. Meet all requirements as set forth in OSHA.

END OF SECTION

D I V I S I O N

7

THERMAL AND MOISTURE
PROTECTION

SECTION 07900

SEALANTS

PART 1 - GENERAL

1.1 SCOPE:

- A. The scope of sealant materials in this project shall be as shown on drawings and as specified herein. It shall include all materials, equipment and labor as necessary for complete installation. Provide the forms and types of sealant as required for project specific adjoining joint materials (interior and exterior) for watertightness and/ or airtightness.

1.2 RELATED SECTIONS:

- A. Division 9 – Finishes

1.3 SUBMITTALS:

- A. Product Data: Submit manufacturer's product specifications for each joint sealer product proposed, including instructions for joint preparation and sealer application.
- B. Samples: Submit color selection charts and samples of colors for selection by Architect from manufacturer's full color line.
- C. Test Reports: Coordinate with Sections 07811 - Cementitious Spray-Applied Fire Resistive Materials (where applicable) and 07840 - Firestopping (where applicable). For record purposes, for fire-resistive sealants (when used), provide test reports by an independent testing agency to confirm required fire resistance rating.
- D. Field Mock-Ups: Before starting permanent work, apply sealants to Architect selected joints for further verification of colors selected and to represent completed work for appearance, materials, and application.

1.4 SYSTEM DESCRIPTION:

- A. Design requirements:
 - 1. Design number of joints and joint widths for maximum of $\pm 25\%$ movement.
 - 2. Design depth of sealant to be 1/2 width of joint.
 - a. Maximum Depth: 1/2 inch
 - b. Minimum Depth: 1/4 inch
 - c. Maximum Recommended Width: 5/8 inches

1.5 QUALITY ASSURANCE:

- A. Installer Experience: Engage an Installer who has successfully completed within the last three (3) years at least three (3) joint sealer applications similar in type and size to that of this Project.
- B. Single Source Responsibility: Obtain joint sealer materials from a single manufacturer for each different product required.
- C. Performance: Provide joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.
- B. Store products in a location protected from freezing, damage, construction activity, precipitation, and direct sunlight per manufacturer's recommendations.
- C. Condition products to approximately 60°F to 70°F for use per manufacturer's recommendations.

D. Handle products with appropriate precautions and care as stated on Material Safety Data Sheets.

1.7 JOB CONDITIONS:

- A. The Installer must examine the joint surfaces and backing and their anchorage to the structure and the conditions under which the joint sealer work is to be performed and notify the General Contractor of conditions detrimental to the proper and timely completion of the work and performance of the sealers. Do not proceed with the sealant work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Weather Conditions: Do not proceed with installation of sealants under adverse weather conditions or when temperatures are below or above manufacturer's recommended limitations for installation. Proceed with the work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength. Wherever joint width is affected by ambient temperature variations, install elastomeric sealants only when temperatures are in the lower third of manufacturer's recommended installation temperature range.

1.8 WARRANTY:

- A. Provide manufacturer's five (5) year standard material warranty.
- B. Include coverage for replacement of sealant materials which fail to achieve water tight seal, exhibit loss of adhesion or cohesion, or do not cure, provided sealant has been installed per manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MATERIALS - GENERAL:

- A. Colors: For exposed materials, provide color as selected by Architect from manufacturer's full color lines. For concealed materials, provide the natural color which has the best overall performance characteristics.
- B. Compatibility: Before purchase of each required material, confirm its compatibility with each other adjoining material it will be exposed to in the joint system.
- C. Formulation: Where one-part, two-part and multi-part sealants are specified for the same sealant type, Installer has the option of selecting from the kinds specified.

2.2 MANUFACTURERS:

- A. Approved Manufacturers, pending specific product approval by Architect, are as follows:
 - 1. BASF The Chemical Co.
 - 2. Dow Corning Corporation
 - 3. Tremco Manufacturing Co.
 - 4. Sika Chemical Corporation
 - 5. Specified Technologies Inc. (STI)
 - 6. Hilti
 - 7. Prior Approved Equal

2.3 SEALANTS:

- A. Exterior Sealants:
 - 1. Hybrid Sealant: High performance, low modulus, high movement, non-sag, fast curing, ready to use hybrid sealant. Complying with ASTM C920, Type S, Grade NS, Class 50; TT- S-001543A, Type II, Class A, non-sag; TT-S-00230C, Type II, Class A; USDA compliant. Sealants may include the following:
 - a. MasterSeal NP 100 by BASF
 - b. Dymonic FC by Tremco
 - c. Prior Approved Equal

2. Silicone Sealant: Ultra low modulus, high performance, one component, moisture curing silicone sealant. Complying with ASTM C920, Type S, Grade NS, Class 100/ 50; TT-S-001543A, Class A; TT-S-00230C, Class A, Type II. Sealants may include the following:
 - a. Spectrum 1 by Tremco
 - b. 795 Silicone Building Sealant by Dow Corning
 - c. Prior Approved Equal

B. Interior Sealants:

1. Polyurethane Sealant: One component, high performance, non-priming, gun grade, elastomeric polyurethane sealant. Complying with ASTM C920, Type S, Grade NS, Class 35; TT-S-00230C, Type II, Class A; USDA compliant; and UL classified. Sealants may include the following:
 - a. MasterSeal NP 1 by BASF
 - b. Dymonic by Tremco
 - c. Prior Approved Equal
2. Silicone Sealant: Ultra low modulus, high performance, one component, moisture curing silicone sealant. Complying with ASTM C920, Type S, Grade NS, Class 100/ 50; TT-S-001543A, Class A; TT-S-00230C, Class A, Type II. Sealants may include the following:
 - a. Spectrum 1 by Tremco
 - b. 795 Silicone Building Sealant by Dow Corning
 - c. Prior Approved Equal

2.4 MISCELLANEOUS MATERIALS:

- A. Joint Cleaner: Provide the type of joint cleaning compound recommended by the sealant or caulking compound manufacturer for the joint surfaces to be cleaned.
- B. Joint Primer/ Sealer: Provide the type of joint primer/ sealer recommended by the sealant manufacturer for the joint surfaces to be primed or sealed as required.
- C. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by the sealant manufacturer to be applied to sealant-contact surfaces where bond to the substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape wherever applicable.
- D. Sealant Backer Rod: Compressible closed cell rod stock of polyethylene; "Closed-Cell Backer Rod and Soft-Baker Rod" (Sonneborn Building Products), "Ethaform" (Dow Corning Corp.), "Minicel" (Haveq Industries) or prior approved equal; or open cell polyurethane (Denver Foam) or prior approved equal as recommended by the sealant manufacturer in published data.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS:

- A. Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified and except where manufacturer's technical representative directs otherwise.

3.2 JOINT PREPARATION:

- A. Examination: Examine joints indicated to receive joint sealers for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.
 1. Clean joint surfaces immediately before installation of sealant or caulking compound. Remove dirt, insecure coatings, moisture and other substances which would interfere with

- bond of sealant or caulking compound.
2. Prime or seal the joint surfaces wherever shown or recommended by the sealant manufacturer. Do not allow primer/ sealer to spill or migrate onto adjoining surfaces.
 3. Concrete, Stone, and Other Masonry:
 - a. Clean by grinding, sandblasting, or wire brushing to expose sound surface free of contamination and laitance.
 4. Wood:
 - a. Clean new and weathered wood. Scrape away loose paint to bare wood. If coatings cannot be removed, test coverage to verify adhesion of sealant and consult with manufacturer for appropriate primer.
 5. Metal:
 - a. Remove scale, rust, and coatings from metal to expose bright white surface. Remove protective coatings as well as chemical residue or film.
 - b. Aluminum Frames: Remove clear lacquer before application of joint sealants. If coatings cannot be removed, test coverage to verify adhesion of sealant and consult with manufacturer for appropriate primer.
 - c. Prime the following surfaces with primer recommended by joint sealant manufacturer:
 - 1) Copper
 - 2) Stainless Steel
 - 3) Galvanized Steel
 - 4) Fluorocarbon (Kynar) Coatings
 - d. Remove other protective coatings or finishes that could interfere with adhesion.
- B. Priming:
1. Where circumstances or substrates require primer, comply with the following requirements:
 - a. Apply primer full strength with brush or clean, lint free cloth. Apply primer to a light, uniform coating. Porous surfaces require more primer. Do not over apply. Do not apply primer onto surfaces of substrate.
 - b. Allow primer to dry before applying joint sealants. Depending on temperature and humidity, primer will be tack free in 15 to 120 minutes.
 - c. Prime and seal on same workday.

3.3 INSTALLATION:

- A. General: Comply with joint sealant manufacturers' written installation instructions applicable to products and applications indicated, except where more restrictive requirements are specified.
- B. Preparation: Application surfaces shall be sound, clean and dry at time sealants are applied.
 1. Prime surfaces, if recommended by sealant manufacturer, using recommended material.
- C. Installation Standards: Comply with recommendations of ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- D. Backer Rods: Install sealant backer rod for sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for the application shown. Backer rod shall be accurately positioned with the joint to establish and control the uniform designated thickness of the sealant.
 1. Exercise care in the installation of the joint backing to see that the backing is not set too far below the surface, thereby increasing the depth of the sealant.
 2. All joint backing shall be used 25-30%, as recommended by the sealant manufacturer, 30%

under compression and care shall be taken that the backing is not stretched so that it will, at a later time, recover and damage the sealant applied over it.

- E. Bond Breaker Tape: Install bond breaker tape wherever required by manufacturer's recommendations to ensure that elastomeric sealants will perform properly and when backer rod cannot be implemented.
- F. Sealants: Install sealants to depths as shown, as recommended by the sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead:
 - 1. For normal moving joints sealed with sealants, fill joints to a depth equal to 50% of joint width, but neither more than 1/2" deep nor less than 1/4" deep.
- G. Apply sealant with sufficient pressure to completely fill the void space and to assure complete wetting of contact area to obtain uniform adhesion. During the application, keep the tip of nozzle at the bottom of joint, forcing sealant to fill from bottom to top. Move tip along joint at a rate as to completely fill the joint. Tool all caulking smooth and flush with adjacent surfaces unless detailed to be finished below the surface.
- H. Spillage: Do not allow sealants or compounds to overflow or spill onto adjoining surfaces or to migrate into the voids of adjoining surfaces. Clean the adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.

3.4 EXTERIOR SEALANT – SHALL INCLUDE, BUT NOT LIMITED TO, THE FOLLOWING:

- A. Exterior Openings and Penetrations: Caulk perimeter joints of all exterior openings, such as doors, windows, louvers, storefront, wall penetrations, connections, etc.
- B. Exterior Joints: Joints and gaps formed by the intersection of dissimilar materials.
- C. Expansion, Control, and Construction Joints: Caulk all expansion, control, and construction joints in exterior wall and sheet metal construction.

3.5 INTERIOR CAULKING – SHALL INCLUDE, BUT NOT LIMITED TO, THE FOLLOWING:

- A. Windows: Caulk at perimeter of windows, storefront, etc. set in exterior and interior walls.
- B. Interior Joints: Joints and gaps formed by the intersection of dissimilar finishes and materials.

3.6 CURE, PROTECTION AND CLEANING:

- A. Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations to obtain high early bond strength, internal cohesive strength and surface durability.
 - 1. Advise the General Contractor of procedures required for the cure and protection of sealants during the construction period so that they will be without deterioration or damage (other than normal wear and weathering) at the time of Owner's acceptance.
- B. Remove excess sealants and sealant smears as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.
 - 1. Remove and replace other materials which cannot be satisfactorily cleaned.
- C. Repair, remove or replace, other work damaged by joint sealer work and cleaning.

3.7 QUALITY CONTROL:

- A. Standard Field Adhesion Test:
 - 1. The field adhesion test is a simple screening procedure that may help detect application problems such as improper cleaning, use of improper primer, poor primer application or improper joint configuration. As a check for adhesion, a simple hand pull test is required at the job site after the sealant is fully cured (usually within 7 to 21 days). Field adhesion testing

should be documented using the field Adhesion Testing Log. It is suggested that 5 tests for the first 300 meters (1000 feet) and one test per 300 meters (1000 ft) thereafter be submitted or one test per floor per elevation. The hand pull test procedure is as follows:

- a. Make a knife cut horizontally from one side of the joint to the other.
 - b. Make two vertical cuts (from the horizontal cut) approximately 75 mm (3 in.) long, at both sides of the joint.
 - c. Place a 25 mm (1 in.) mark on the sealant tab.
 - d. Grasp 50 mm (2 in.) piece of sealant firmly just beyond the 25 mm (1 in.) mark and pull at a 90 degree angle.
 - e. If dissimilar substrates are being sealed, check the adhesion of sealant to each substrate separately. This is accomplished by extending the vertical cut along one side of the joint, checking adhesion to the opposite side, and then repeating for the other surface.
 - f. Pass/ fail criteria for each sealant are shown in Table below. If the sealant does not pass according to the guidelines provided, consult the manufacturer's representative.
 - g. Inspect the joint for complete fill. The joint should not have voids, and joint dimensions should match those shown in the weathersealing details. The manufacturer's representative can assist in determining when corrective action is required.
 - h. Record the test results in a field adhesion test log. This log will need to be retained as a part of the manufacturer's warranty procedure. Some building officials may also require it.
2. NOTE: When a sealant is used to weatherseal between two dissimilar substrates, it is recommended that the sealant adhesion to each side of the joint be individually tested. (See step e).
- B. Field Adhesion Hand Pull Test Criteria:
1. Contractor shall perform field adhesion hand pull test in conformance with the sealant manufacturer's criteria requirements. Contractor shall have Architect present for approval of field adhesion hand pull test.
- C. Sealant Repair in Adhesion Test Area:
1. Repair the sealant pulled from the test area by applying new sealant to the test area. Assuming good adhesion was obtained, use the same application procedure to repair the areas as was used to originally seal it. Care should be taken to ensure that the original sealant surfaces are clean and that the new sealant is in contact with the original sealant.

END OF SECTION

D I V I S I O N

9

FINISHES

SECTION 09230

PLASTER

PART 1 - GENERAL

1.1 SCOPE:

- A. The extent of plaster work is shown on the drawings and as specified herein. The work of this project consists of repair and/ or remediation to existing plaster and replacement of plaster as indicated on drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. Section 02110 – Demolition
- B. Section 07900 - Sealants
- C. Section 09260 - Metal Stud & Gypsum Board Systems
- D. Section 09900 - Painting

1.3 SUBMITTALS:

- A. Product Data: Submit manufacturer's specifications and installation instructions for each material with materials clearly identified by product name.
- B. Shop Drawings: Submit Shop Drawings of unusual conditions in connection with plaster construction, including expansion joints, reveals, substrate attachments, etc.
- C. Sample Panels: Submit sample panels of each specified finish, on movable frames not less than 2 foot square for review of texture, finish and workmanship.

1.4 PERFORMANCE REQUIREMENTS:

- A. Fire Resistance Ratings: Where fire resistance classifications are indicated, provide materials and application procedures identical to those listed by UL or tested in accordance with ASTM E119 for type of construction indicated.

1.5 QUALITY ASSURANCE:

- A. Installer Qualifications: Minimum 5 years documented, successful experience with work comparable to Work of this Project.

1.6 PRE-INSTALLATION CONFERENCE:

- A. Prior to commencing Work, at Contractor's direction, meet with Architect at site to review materials, installation procedures, details and coordination with other Work.

1.7 DELIVERY AND STORAGE OF MATERIALS:

- A. All materials shall be delivered in their original unopened packages and stored in an enclosed shelter providing protection from damage and exposure to the elements.

1.8 PROJECT CONDITIONS:

- A. Environmental Requirements:
 - 1. Maintain temperature at a minimum 55°F (13°C) during plastering, and until plastering is dry. Distribute heat throughout construction area, with deflection or protective screens used to prevent concentrated or irregular heat on curing/drying surfaces.
 - 2. Keep ventilation and air circulation to a minimum level during plastering until the plaster has set. After plaster has properly set, provide adequate ventilation to carry off excess moisture and permit proper drying.
- B. Protection: Provide proper protection of adjacent work, such as finished door and window frames and other items which do not receive a plaster finish, during plastering.

PART 2 - PRODUCTS

2.1 MANUFACTURER:

- A. Plaster System: The products listed below establish a standard of quality and are as manufactured by United States Gypsum Company (USG). Other acceptable manufacturers include Parex, Inc. or prior approved equal.
- B. Metal Lath Materials: Fabricate from cold-rolled steel, complying with ASTM C847.
 - 1. Finish: Factory applied rust-inhibitive paint.
 - 2. Expanded Metal Lath: Self-furring diamond mesh, weight as required to comply with referenced standards for type and spacing of supports used in Work; minimum 3.4 lbs./sq. yd.
 - 3. Lath Attachment Devices: Appropriate anchors (or other metal supports) as recommended by manufacturer, of type and size to suit application, to rigidly secure lathing materials in place.
- C. Metal Trim / Plaster Stop:
 - 1. Material: Galvanized steel, 26 gauge minimum.
 - 2. Corner Beads: Equivalent to USG No. 4-A flexible corner bead for archways and curved design.
 - 3. Casing beads: 3/4" casing beads with metal lath, made from corrosive-resistant galvanized steel. #66 Square Edge with 3-1/8" long expanded flange: 1/4"
- D. Three-Coat Plaster Materials:
 - 1. Comply with ASTM C28.
 - 2. Minimum compressive strengths for neat plasters: 2800 psi base coats; 5000 psi finish coat.
 - 3. Base and brown coats: Equivalent to Structo-Base Gypsum Plaster by USG.
 - 4. Finish coat: Equivalent to Imperial Finish, by USG.
- E. Sand: Fine, clean graded silica sand, equivalent to #1 Q-Rok Unground Silica (Bagged) by US Silica, Berkeley Springs, WV.
- F. Water: Suitable for domestic consumption, free of harmful soluble salts, acids, alkalis and other deleterious matter which would impair the Work.
- G. Gypsum Plaster Mixes:
 - 1. Scratch Coat: 100 pounds high-strength gypsum neat base coat plaster, 2 cubic feet sand.
 - 2. Brown Coat: 100 pounds high-strength gypsum neat base coat plaster, 3 cubic feet sand.
 - 3. Finish Coat: 50 pounds high-strength gypsum gauging plaster, 100 pounds lime. Finish texture to match existing building surfaces. Provide sample for Architect's approval prior to proceeding.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates to receive plaster and see that sheathing, lath supports, casing beads, plaster stops, metal lath, etc. are secured in place to structure. See that grounds are set to receive the specified thickness of plaster. Inspect metal accessories, casing beads, plaster stops, metal lath, etc. for rusting or other conditions that will stain the finish plaster. Correct such conditions by touching up with aluminum paint. Do not proceed with work until unsatisfactory conditions are corrected

3.2 INSTALLATION:

- A. Metal Lath:
 - 1. Follow Manufacturer's written recommendations for all aspects of installation, specific to the conditions of this project.
 - 2. Apply lath in proper manner to form true surfaces, straight or to uniform curvature, without

- sags or buckles.
3. Install with long dimension of lath at right angles to direction of supports.
 4. Lap at sides not less than 1/2 inch and at ends not less than 1 inch.
 5. Stagger end laps at adjoining sheets.
 6. Secure lath into each support, using corrosion resistant anchors as recommended by manufacturer, at intervals not exceeding 6 inches on center.
 7. Continuously reinforce internal corners with corner mesh, except where metal lath returns 3 inches from corner to form angle reinforcement; fasten at perimeter edges only.

B. Metal Trim:

1. Install in lengths as long as practicable, accurately aligned with flush hairline joints at abutting edges.
2. Install plumb, true and level.
3. Secure in accordance with manufacturer's instructions.
4. Protect factory finish from marring or damage.

C. Accessories:

1. Corner Bead: Attach to all vertical and horizontal exterior corners with masonry anchors, screws, or staples spaced 12 inches on center along both flanges along the entire length of board.
 - a) Casing Beads and Metal Trim:
 - (1) Apply to with manufacturer's recommended masonry anchors 12 inches on center.
 - (2) Cut and miter ends accurately and install where partitions terminate against masonry or dissimilar material, and where indicated.
 - b) Expansion Joints and Misc. Moldings:
 - (1) Install where recommended by system manufacturer.
 - (2) Apply USG Acoustical Sealant behind control joint.
 - (a) Remove protective tape after plastering.

D. 3-Coat Gypsum Plaster:

1. Apply plaster in accordance with ASTM C842, except for more stringent requirements of manufacturer or these specifications.
2. At areas where existing plaster is being removed and replaced, apply new 3-coat system, of uniform total thickness to match existing adjacent areas.
3. Do not exceed more than 1/8 inch in 10'-0" variation from true plumb or level plane in any exposed line of surface, as measured by 10'-0" straightedge placed on any location on surface.
4. Unless otherwise indicated, make interior angles square and external corners square.
5. Apply each plaster coat to an entire surface plane without interruption, to avoid abrupt changes in uniform appearance of succeeding coat.
6. Join wet plaster to set plaster at naturally occurring interruptions in plane of plaster, such as corners or openings in plaster Work. Stoppage of plaster within a panel is not permitted.

E. Mixing:

1. Use mechanical mixers for mixing plaster. Small batches may be hand mixed.
2. Do not use frozen, caked or lumped material.

F. Base Coats:

1. Scratch Coat:
 - a) Apply first coat with sufficient material and pressure to form full keys through, and to embed into, metal lath.
 - b) Provide sufficient depth of material over metal lath to allow for scratching of surface.
 - c) As soon as first coat has become firm, scratch entire surface in one direction only, to

- provide mechanical bond with second coat.
- d) On vertical surfaces, scratch horizontally.

2. Brown coat:

- a) Apply second coat with sufficient material and pressure to ensure tight contact with scratch coat.
- b) Bring surface to true even plane by rodding; fill surface defects and scratches.
- c) Float surface and leave uniformly rough to provide bond for finish coat.

G. Finish Coat:

- 1. Apply finish coat with sufficient pressure and material to ensure tight contact with, and complete coverage of, brown coat.
- 2. Bring to total required thickness, with thickness of finish coat between 1/32 inch and 1/16 inch.
- 3. Finish surface to flat, smooth, hard trowel marks, free of trowel marks. Provide sample for Architects approval prior to proceeding. At repairs/rebuilds, match adjacent existing finish.

3.3 PATCHING AND REPAIR:

- A. Patching of defective Work is permitted only with approval of Architect.
- B. Perform cutting, patching, repairing and pointing-up operations neatly and thoroughly.
- C. Repair minor imperfections with either plaster or joint compound. Repair larger imperfections with bonding compound and plaster.
- D. Repair cracks and indented surfaces by moistening plaster and filling with new material, troweled or tamped flush with adjoining surfaces.

3.4 CLEANING:

- A. Remove plaster spillage promptly from adjoining Work.
- B. Remove protective coverings used to protect other Work. Repair or replace surfaces which have been damaged by plastering Work.

END OF SECTION

SECTION 09260

METAL STUD & GYPSUM WALLBOARD SYSTEMS

PART 1 - GENERAL

1.1 SCOPE:

A. The scope of non-load-bearing metal stud framing work and gypsum board systems in this project shall be as shown on drawings and as specified herein. It shall include all labor, materials, and equipment necessary for complete installation. This section includes, but not limited to, the following:

1. Non-load-bearing steel framing, furring, backing plates, trims, reveals, bridging and deflection tracks. Gypsum (and other composition) board assemblies attached to framing and furring.

1.2 RELATED SECTIONS:

- A. Section 02110 – Demolition
- B. Section 07900 – Sealants
- C. Section 09230 – Plaster
- D. Section 09900 – Painting

1.3 QUALITY ASSURANCE:

A. Industry Standard:

1. Gypsum Association (GA):
 - a. GA-214 Recommended Levels of Gypsum Board Finish
 - b. GA-216 Application and Finishing of Gypsum Board Finish
 - c. GA-226 Application of Gypsum Board to Form Curved Surfaces
 - d. GA-232 Painting New Gypsum Board
 - e. GA-234 Control Joints for Fire-Resistant Rated Systems
 - f. GA-801 Handling and Storage of Gypsum Panel Products: A Guide for Distributors, Retailers, and Contractors
2. Fire-Resistance Ratings:
 - a. Where indicated, provide materials and construction identical to assemblies tested for fire resistance per ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - b. Provide indicated fire-resistance rated assemblies identified in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.
3. Allowable Tolerances: 1/8" offsets between planes of board faces, and 1/4" in 8'-0" for plumb, level, warp and bow.
4. Manufacturer: Provide gypsum/ composition board produced by one of the following:
 - a. National Gypsum Co.
 - b. USG Corp.
 - c. Georgia-Pacific Gypsum, LLC.
 - d. Or Prior Approved Equal
5. Manufacturer: Provide metal stud framing for gypsum/ composition wall board work and other metal framing as detailed by one of the following:
 - a. AllSteel & Gypsum Products, Inc.
 - b. ClarkWestern Building Systems/ Dietrich Metal Framing
 - c. Bostwick Steel Lath Co.
 - d. Or Prior Approved Equal
6. Manufacturer: Provide gypsum board reveal trims and shapes produced by one of the following:
 - a. Fry Reglet Architectural Metals
 - b. Gordon Interior Specialties
 - c. Trim-Tex Drywall Products

- d. Gypsum/ Composition Board Manufacturer listed above
 - e. Metal Stud Framing Manufacturer listed above
 - f. Or Prior Approved Equal
7. Manufacturer: Provide recessed/ flush non-rated access panels produced by one of the following:
- a. JL Industries
 - b. Larsen's Manufacturing
 - c. Or Prior Approved Equal

PART 2 - PRODUCTS

2.1 **METAL FRAMING:**

- A. General: Provide steel framing members complying with the following requirements:
1. Component Sizes and Spacings: As indicated but not less than that required to comply with ASTM C 754 for maximum deflection of L/360 at 5 lbs. per sq. ft. lateral loading.
 2. Protective Coating: ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized.
- B. Studs and Runners: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch-wide minimum lip (return) and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:
1. Nominal 20 gauge minimum unless otherwise indicated on Drawings.
 2. Nominal 20 gauge minimum at walls receiving ceramic tile and dimensional stone tile finish.
 3. Nominal 16 gauge minimum at door jambs (two studs at each jamb)
 4. Depth: As indicated on drawings.
- C. Wall Braces: Match studs, and space at 4'-0" on center from top track of wall to structure above (and elsewhere as required) to insure wall rigidity.
- D. Lateral Bracing/Bridging of Stud Walls:
1. Provide cold rolled channels and clips spaced 4'-0" on center vertically from slab to top of wall.
 2. Provide straps (both sides of stud) at runner track solid blocking (10'-0" on center) spaced 4'-0" on center vertically from slab to top of wall.
- E. Deflection Tracks at All Floor Decks and Roof Decks: Contractor's option of Slip Track or Telescoping Slip Track
1. Slip Track: Provide deep leg runner track with no attachment to metal studs. At each stud location attach runner track to structure above. Provide lateral bracing within 12" of slip track, typical. Allow 1" gap between runner track and top of stud for vertical deflection.
 2. Telescoping Slip Track: Provide two deep leg runner tracks with no attachment from inside track to outside track. At each stud location attach outside runner track to structure above. At each stud location attach inside runner track to each stud flange. Allow 1" gap between outside runner track and inside track for vertical deflection.
- F. Stud System Accessories: Provide stud manufacturer's standard clips, shoes, ties, reinforcement, fasteners and other accessories as needed for a complete stud system.
- G. Furring members: No. 20 MSG galv. steel resilient channels (unless noted otherwise), secured to structure at 16" o.c. with Type S, 1-1/4" long steel screws. See drawings for shapes and size.
- H. Fasteners: Type and size recommended by manufacturer for the substrate and application indicated.

2.2 **STRUCTURAL METAL FRAMING:**

- A. Heavy gauge (i.e.- 14 ga. to 18 ga.) metal stud framing shall be used where shown and in all load-bearing conditions where light gauge framing is not adequate to carry imposed loads. Also, see Section 05400 – Cold-Formed Metal Framing for guidelines.

2.3 BOARD PRODUCTS:

A. Gypsum Board:

1. Thickness, 5/8" thick; Sheet Size: 4'-0" wide x maximum length available which will minimize number of end joints in work. All gypsum board shall be Type "X" gypsum core, with additives to enhance fire resistance as required. Complying with ASTM C1396 and Federal Specifications SS-L-30D Type III Grade X for exposed gypsum board, hereby defined to include work indicated for painted finish and similar forms of decoration as well as unfinished work.
 - a. Gold Bond Brand Fire-Shield Gypsum Board by National Gypsum Company
 - b. Sheetrock Brand Gypsum Panels Firecode Core by USG Corporation
 - c. Or Prior Approved Equal

2.4 ACCESSORY PRODUCTS (GYPSUM BOARD):

- A. Trim Accessories: Provide manufacturer's standard trim accessories of types necessary for complete and detailed drywall work (for conditions not specifically indicated below and as indicated on drawings), formed of galvanized steel with either knurled and perforated or expanded flanges for screwing and beaded for concealment of flanges in joint compound with hemmed edges where exposed. Provide beads (corner, casing, etc.), trims ("J", "U", "L", etc.) one-piece control joint, etc.
- B. Fasteners: Screws complying with GA-216 and with gypsum board manufacturer's recommendations. Comply with UL Assembly fastener requirements in fire rated walls and ceilings.
- C. Joint Treatment Materials:
 1. Joint Tapes: Perforated; Comply with ASTM C475.
 2. Joint Compound: Adhesive with or without fillers complying with ASTM C475. Provide pre-mixed ready for application and as follows: Single Compound Treatment - Provide manufacturer's single component compound for both bedding and finishing joints.

PART 3 - EXECUTION

3.1 UL RATED ASSEMBLIES:

- A. Contractor shall be responsible for complying with all installation requirements of applicable UL Assemblies for rated walls and/ or ceilings as shown in drawings to be provided. This shall include layout and spacing of studs and/ or furring members, type and spacing of fasteners, and application and fastening of gypsum board. UL Assembly (with installation standards) for each rated wall and/ or ceiling may be obtained from Architect prior to bidding.

3.2 INSTALLATION OF METAL SUPPORT SYSTEMS:

A. General:

1. For framing/ partitions, comply with ASTM C754 and C840 as applicable to the type of substrate and drywall support system indicated and comply with the Gypsum Association GA-216 for installation of furring members.
 - a. Supplemental Framing: Install supplementary framing, blocking, and bracing at terminations in gypsum/ composition board assemblies and to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Coordinate with all trades, suppliers, etc.
 - b. Comply with details indicated and with recommendations of board manufacturer or if none available, with "Gypsum Construction Handbook" published by USG Corp.
2. Level main runners to a tolerance of 1/4" in 12'-0", measured both lengthwise on each runner and transversely between parallel runners.
3. Space furring members at 16" on center (unless noted otherwise).

B. Wall/ Partition Support Systems:

1. Install runner tracks at floors, ceilings and structural walls and columns where stud system abuts other work, except as otherwise indicated.
2. Secure jamb studs to frames of openings and install runner track sections (for jack studs) above and below openings, secured to jamb studs.

- a. Space jack studs same as partition studs and screw to runner tracks above and below.
 - b. Install two (2) 16 gauge studs at each jamb of each opening.
3. When framing heads and jambs at door/ window openings to receive aluminum frames (Section 08150), orient framing members as required to coordinate with frame manufacturer's standard details. Verify prior to proceeding.
 4. Space studs at 16" o.c., unless otherwise shown. Space furring members 16" on center
 5. Install extra furring members and angle runners at terminations of wall work and at openings and where required for support of other work occurring in the drywall work.
 6. For walls in which studs are not continuous to floor or roof deck above, brace from top track to structure above with angled studs at 4'-0" on center, and in other locations as required for wall stability and rigidity.
- C. Tracks and Braces:
1. Deflection Tracks shall be used at all stud walls to be secured to floor and/or roof decks (or structure) above.
 2. Provide and install lateral bracing/bridging at 4'-0" on center vertically in all walls.

3.3 INSTALLATION OF GYPSUM BOARD:

- A. Standards: Comply with ASTM C840 and "Recommended Specifications for the Application and Finishing of Gypsum Board," (GA-216, by the Gypsum Association), except where more detailed or more stringent requirements are indicated here or by the manufacturer's instructions and recommendations.
- B. Locate exposed end-butt joints as far from center of walls and ceilings as possible and stagger not less than 1'-0" in alternate courses of board.
- C. Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends without more than 1/16" open space between boards. Do not force into place.
- D. Locate either edge or end joints over supports, except in horizontal applications or where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so that both tapered edge joints abut and mill-cut or field-cut end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.
- E. Gypsum board shall be held off structural floor slab 1/4" maximum (3/16" minimum; no slab contact allowed in any length).
- F. Attach gypsum board to framing and blocking as required for additional support at openings and cut-outs.
- G. Cutting: After scoring face paper and breaking core, cut back paper; do not tear or snap.

3.4 INSTALLATION OF DRYWALL TRIM ACCESSORIES:

- A. General: Coordinate and integrate the installation of trim accessories with the installation of gypsum board. Use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Install all trims, components and accessories in compliance with GA-216 Gypsum Association Guidelines.
- B. Install manufacturer's standard beads (corner, casing, etc.) at corners of drywall work (where specialty trims not indicated). Paint to match gypsum work.
- C. Install manufacturer's standard trims ("J", "U", "L", etc.) wherever edge of gypsum board would otherwise be exposed or semi-exposed (where specialty trims not indicated). Paint to match gypsum work.
- D. Install specialty trims (type and locations as indicated) in compliance with manufacturer's written recommendations for a complete, neatly detailed and finished condition. Use pre-formed corners, intersections, etc. when available.
- E. Install manufacturer's standard one-piece control joints in rated and non-rated walls at locations indicated below. Placement of control joints shall be in accordance with GA-216 Gypsum Association Guidelines (where not specifically located on drawings).
 1. Control joints shall be installed where a wall or partition runs in an uninterrupted straight plane exceeding 30 linear feet. Control joints shall be located at door jambs, extending

from door head to ceiling, whenever possible (left side). When this is not possible in maintaining 30 foot maximum spacing, contact Architect for specific direction.

2. Where a control joint occurs in an acoustical or fire-rated system, blocking shall be provided behind the control joint by using a backing material such as 5/8 inch type X gypsum panel products, mineral fiber or other tested equivalent.
3. Control joints shall be installed in ceilings to limit dimensions in either direction to 50 feet. Coordinate locations with Architect.
4. Control joints or intermediate blocking shall be installed when ceiling framing or furring members change direction.

3.5 DRYWALL FINISHING:

- A. Finish exposed drywall surfaces with joints, corners and exposed edges reinforced or trimmed as specified and with all joints, fastener heads, trim accessory flanges and surface defects filled with joint compound in accordance with manufacturer's recommendations for a smooth, flush surface. Form true, level or plumb lines, without joints, fastener heads, flanges of trim accessories or defects visible after application of field-applied decoration.
- B. Use joint tape to reinforce joints formed by tapered edges or butt ends of drywall units and at interior corners and angles. Set tape in joint compound then apply skim coat over tape in one application.
 1. Where open spaces of more than 1/16" width occur between abutting drywall units (except at control joints), pre-fill joints with joint compound and allow pre-fill to dry before application of joint tape.
- C. Application of Joint Compounds: After mixing, do not use joint compounds if recommended pot-life time has expired. Allow drying time between applications of joint compound in accordance with manufacturer's recommendations for the relative humidity and temperature levels at the time of application. In no case, allow less than 24 hours drying time between applications of joint compound. Apply not less than three (3) separate coats of joint compound over joints, fastener heads and metal flanges.
- D. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214 from Gypsum Association.
 1. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistive-rated assemblies.
 2. Level 4 for gypsum board surfaces indicated to receive wallcoverings.
 3. Level 4 for gypsum board surfaces indicated to receive paint, and high performance coatings.

3.6 CLEANING AND PROTECTION:

- A. Cleaning: Promptly remove any residual joint compound from adjacent surfaces.
- B. Protection: Provide final protection and maintain conditions that ensure gypsum board assemblies remain without damage or deterioration at the time of Substantial Completion.

END OF SECTION

SECTION 09900

PAINTING

PART 1 - GENERAL

1.1 SCOPE:

- A. The scope of painting work in this project shall be as shown on drawings and specified herein. It shall include all labor, materials, and equipment necessary for a complete finished installation.
- B. If the schedule herein requires two or more types of painting on the same substrate, the type will be distinguished by the term "paint" meaning an opaque finish (flat, satin, semi-gloss, gloss sheens) and "transparent" meaning a non-opaque, transparent finish (varnishes, stains).

1.2 RELATED SECTIONS:

- A. Section 07900 – Sealants
- B. Section 09260 – Metal Stud & Gypsum Wallboard Systems
- C. Section 09230 - Plaster

1.1 DEFINITIONS:

- A. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, coatings, stains, sealers and fillers.
- B. "Exposed surfaces" include portions of the completed construction which are visible when permanent and built-in fixtures and equipment are in place.
- C. "Exterior" includes portions of the completed construction which are subject to outdoor ambient temperature and humidity conditions, including covered but unenclosed areas.
- D. Surfaces to be Painted: Complete coverage of all exposed surfaces is intended, unless indicated "no paint" on drawings. Without restricting the extent of the work to be performed, the work shall include, but is not limited to, the following:
 - 1. Wood: Painting of all exposed woodwork and finish carpentry, interior and exterior, doors and of all architectural woodwork and finish carpentry, except that specified to be pre- finished.
 - 2. Structural Steel: Touch-up after erection (concealed work only), and complete painting for all exposed work.
 - 3. CMU, Masonry, and Plaster: All exposed surfaces.
 - 4. Ferrous Metal: All exposed surfaces of all ferrous metal work, including galvanized, both exterior and interior of building which is not finished painted under other sections, to include steel frames, steel doors, access panels, guards, lintels, gutters, gravel guards, metal flashings, railings (unless otherwise indicated), roof accessories, steel supports, sprinkler riser, roof hatch and grates, bollards, etc.
 - 5. Concrete Slab: Concrete sealer for slabs scheduled to remain a concrete surface.
 - 6. Gypsum Drywall: All exposed surfaces.
 - 7. Concrete: Sidewalk curbs, handicapped ramps, site light bases, parking striping, directional arrows, etc. (when indicated on drawings).
 - 8. All Previously Painted Surfaces.
- E. Surfaces Not to be Painted: The following areas or items will not require painting under this Section, unless otherwise noted:
 - 1. Concealed duct shafts, concealed spaces, concealed pipes and ducts.
 - 2. Acoustical tile and suspension system.
 - 3. Pre-finished panels.
 - 4. Structural steel work concealed by interior building finish.
 - 5. Gypsum drywall surfaces to receive other finish materials.

1.2 QUALITY ASSURANCE:

- A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.
- B. Compatibility: Review other Sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information on finish materials to be used, to enable use of compatible prime coats. Notify the Architect of anticipated problems using the specified materials.
- C. Industry Standards: Comply with the recommendations of the Painting and Decorating Contractors of America, as contained in "PDCA Architectural Specification Manual", except where conflicting and more stringent requirements are specified in this Section.
- D. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.
- E. Cooperation with Other Trades: This work shall be scheduled and coordinated with other trades and shall not proceed until other work and/ or project conditions are as required to achieve satisfactory results. General Contractor shall examine the Specifications for the various other trades and materials and shall thoroughly familiarize himself with all their provisions regarding painting.

1.3 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical information including paint label analysis with handling, storage and application instructions for each material proposed for use. Identify purpose (primer, intermediate or finish coat) and substrate for each paint material.
- B. Samples: Prior to beginning work submit samples for review of color and texture only. Provide a listing of material for each coat of each finish sample.
 - 1. On 12" x 12" gypsum board and CMU, provide one sample of each color and material. Resubmit samples as requested by Architect until acceptable sheen, color, and texture is achieved.
 - 2. On 12" x 12" section of plaster, provide one sample of each color and material. Resubmit samples as requested by Architect until acceptable sheen, color, and texture is achieved.
- C. Provide one sample of natural and stained wood finish. Use wood samples approved for Sections 06100, 06200, and 08210 (where applicable). Label and identify each as to location and application.
- D. On completed wall surfaces and other building components, where directed by the Architect, duplicate painted finishes of approved samples. Provide full-coat finish samples on at least 100 sq. ft. of surface, until required sheen, color and texture is obtained; simulate finished lighting conditions for review of in-place work.
 - 1. Final acceptance of colors will be from samples applied on the job.
 - 2. Approved on-site samples will be the standard for acceptance of the permanent work, which shall match approved samples in color, sheen, texture, hiding powers, application workmanship, and other appearance characteristics. Identify, preserve and protect on-site samples.

1.4 DELIVERY, STORAGE, AND HANDLING:

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent based materials, and materials used with solvent based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Storage of Materials:
 - 1. Store all materials in a single place designated by the General Contractor. The storage place shall be kept neat and clean and all damage shall be made good. Remove soiled or used rags, waste and trash from the building every night and take every precaution to avoid the danger of fire.
 - 2. Emulsion paints shall be protected from exposure to cold weather by storing in shelters so as

to prevent freezing of the paint.

D. Disposal:

1. Never pour leftover coatings down any sink or drain. Use up material on the job or seal can and store safely for future use.
2. Do not incinerate closed containers.
3. For specific disposal contact the local waste management agency.

1.5 ENVIRONMENTAL CONDITIONS:

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limitations recommended by manufacturer for optimum results.
- B. Maintain temperature in building at a constant 65 °F or above during drying of plaster and masonry and provide adequate ventilation for escape of moisture from building in order to prevent mildew, damage to other work and improper drying of paint. Once painting has commenced, provide a constant temperature of 65 °F or above and prevent wide variations in temperature which might result in condensation on freshly painted surfaces.
- C. Exterior painting shall not be performed when the temperature is below 50 °F, while the surface is damp, during cold, rain or frosty weather, or when temperature is likely to drop to freezing within 24 hours. Avoid painting surfaces while they are exposed to hot sun.
- D. Cleaning Area: Before painting is started in any area, it shall be broom-cleaned and dust shall be removed from all areas to be painted. After painting operations begin in a given area, broom cleaning will not be allowed. Cleaning shall then be done only with commercial vacuum cleaning equipment.

1.6 PROTECTION:

- A. Drop Cloths: Protect adjacent areas and installation by the use of drop cloths or other approved precautionary measures.
- B. Hardware and Fixtures: Remove and protect hardware, accessories, device plates, lighting fixtures, factory finished work and similar items or provide ample in-place protection. Upon completion of each space, carefully replace all removed items. This work shall be done only by skilled mechanics, using adequate tools commensurate with the work to be done.

1.7 WARRANTY:

- A. Inspection of all surfaces to be coated must be done by the manufacturer's representative to insure proper preparation prior to application (General Contractor to coordinate). All thinners, fillers, primers, and finish coatings shall be from the same manufacturer to support a product warranty. Products other than those submitted shall be accompanied by a letter stating its fitness for use and compatibility.
- B. At project closeout, provide to the Owner executed copies of the Manufacturer's standard form outlining the terms and conditions of any exclusions to their Limited Warranty against Manufacturing Defect.

1.8 EXTRA MATERIALS:

- A. Deliver extra materials to Owner. Furnish extra materials that match products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
- B. Paint, Primers, Accessories, Etc.: Provide minimum of 1 gallon of each paint type and color used for touch-up purposes. Cans shall be clearly marked with color name, number, and type of paint.
- C. At project closeout, provide the color mixture name and code to the Owner for accurate future color matching.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Basis of Design: For purposes of designating type and quality for the work under this Section, drawings and specifications are based on products manufactured or furnished by Benjamin Moore & Company (BMC), except as noted specifically otherwise.
- B. Acceptable Manufacturers: The following manufacturers may have products meeting the herein specified quality that will be acceptable as approved, upon specific product review by the Architect:
 - 1. PPG Industries, Pittsburgh Paints
 - 2. Tnemec
 - 3. Prior Approved Equal

2.2 PAINT MATERIALS:

- A. Except where specifically noted in this section, all paint shall arrive on job ready mixed and pre-tinted. Agitate all paint prior to and during application to ensure uniform color, gloss, and consistency.
- B. Thinner addition shall not exceed manufacturer's printed recommendations. Do not use kerosene or other organic solvents to thin water based paints.
- C. Where paint is to be sprayed, thin according to manufacturer's current written guidelines.
- D. Compatibility: Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

2.3 APPLICATION EQUIPMENT:

- A. Equipment shall be adequate and commensurate for the work and workmanship required herein.

2.4 ACCESSORY MATERIALS:

- A. This shall include all required ladders, scaffolding, drop cloths, masking, scrapers, tools, sandpaper, dusters, cleaning solvents and other items required to perform the work and achieve the results herein specified.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. The General Contractor and Installer shall review the product manufacturer's special instructions for surface preparation, application, temperature, re-coat times, and product limitations.
- B. The General Contractor and Installer shall review product health and safety precautions listed by the manufacturer.
- C. The General Contractor and Installer shall be responsible for enforcing on site health and safety requirements associated with the Work.
- D. Do not begin installation until substrates have been properly prepared.
- E. Ensure that surfaces to receive paint are dry immediately prior to application.
- F. Ensure that moisture retaining substrates to receive paint have moisture content within tolerances allowed by coating manufacturer. Where exceeding the following values, promptly notify Architect and obtain direction before beginning work.
 - 1. Concrete and Masonry: 3-5 percent. Allow new concrete to cure a minimum of 28 days.
 - 2. Exterior Wood: 17 percent.
 - 3. Interior Wood: 15 percent.
 - 4. Interior Finish Detail Woodwork, Including Trim, and Casework: 10 percent.
 - 5. Plaster and Gypsum: 15 percent.
 - 6. Concrete Slab-On-Grade: Perform calcium chloride test over 24 hour period or other acceptable test to manufacturer. Verify acceptable moisture transmission and pH levels.
- G. Examine surfaces to receive coatings for surface imperfections and contaminants that could

impair performance or appearance of coatings, including but not limited to, loose primer, unsound previous coating, rust, scale, oil, grease, mildew, algae, or fungus, stains or marks, cracks, indentations, or abrasions.

- H. Correct conditions that could impair performance or appearance of coatings in accordance with specified surface preparation procedures before proceeding with coating application.

3.2 PREPARATION – GENERAL:

- A. Clean surfaces thoroughly prior to coating application.
- B. Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance.
- C. Stains and Marks: Remove completely, if possible, using materials and methods recommended by coating manufacturer; cover stains and marks which cannot be completely removed with isolating primer or sealer recommended by coating manufacturer to prevent bleed-through.
- D. Remove Mildew, Algae, and Fungus using materials and methods recommended by coating manufacturer.
- E. Remove dust and loose particulate matter from surfaces to receive coatings immediately prior to coating application.
- F. Remove or protect adjacent hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items not indicated to receive coatings.
- G. Move or protect equipment and fixtures adjacent to surfaces indicated to receive coatings to allow application of coatings.
- H. Protect adjacent surfaces not indicated to receive coatings.
- I. Prepare surfaces in accordance with manufacturer's instructions for specified coatings and indicated materials, using only methods and materials recommended by coating manufacturer.

3.3 SURFACE PREPARATION:

- A. Concrete and Concrete Masonry: Clean surfaces free of loose particles, sand, efflorescence, laitance, form oil, curing compounds, and other substances which could impair coating performance or appearance.
- B. Concrete Floors: Remove contaminants which could impair coating performance or appearance. Verify moisture transmission and alkaline-acid balance recommended by coating manufacturer; mechanically abrade surface to achieve 80-100 grit medium-sandpaper texture.
- C. Existing Coatings:
 - 1. Remove surface irregularities by scraping or sanding to produce uniform substrate for coating application.
 - 2. Maintenance painting will frequently not permit or require complete removal of all old coatings prior to repainting. However, all surface contamination such as oil, grease, loose paint, mill scale, dirt, foreign matter, rust, mold, mildew, mortar, efflorescence, and sealers must be removed to assure sound bonding to the tightly adhering old paint. Surfaces of old paint films must be clean and dull before repainting (dull surface by sanding). After preparation, coat entire surface with primer (including well adhered previous coatings). **Check for compatibility (and bond of previous coatings) by applying a test patch of the recommended coating system, covering at least 2 to 3 square feet. Allow to dry one week before testing adhesion per ASTM D3359. If the coating system is incompatible, or the bond of previous coating to substrate beneath is inadequate, complete removal of existing coatings is required. Provide test results for Architect's review showing compliance prior to ordering materials.**
- D. Gypsum Board: Repair cracks, holes and other surface defects with joint compound to produce surface flush with adjacent surfaces.
- E. Masonry Surfaces - Restored: Remove loose particles, sand, efflorescence, laitance, cleaning compounds and other substances that could impair coating performance or appearance.
- F. Metals - Aluminum, Mill-Finish: Clean and etch surfaces with a phosphoric acid-water solution or water based industrial cleaner. Flush with clean water and allow to dry, before applying primer coat.
- G. Metals - Copper: Clean surfaces with pressurized steam, pressurized water, or solvent washing.

- H. Metals - Ferrous, Unprimed: Remove rust or scale, if present, by wire brush cleaning, power tool cleaning, or sandblast cleaning; remove grease, oil, and other contaminants which could impair coating performance or appearance by solvent cleaning, with phosphoric-acid solution cleaning of welds, bolts and nuts; spot-prime repaired welds with specified primer.
- I. Metals - Ferrous, Shop-Primed: Remove loose primer and rust, if present, by scraping and sanding, feathering edges of cleaned areas to produce uniform flat surface; solvent-clean surfaces and spot-prime bare metal with specified primer, feathering edges to produce uniform flat surface.
- J. Metals - Galvanized Steel (not passivated): Clean with a water-based industrial strength cleaner, apply an adhesion promoter followed by a clean water rinse. Alternately, wipe down surfaces using clean, lint-free cloths saturated with xylene or lacquer thinner; followed by wiping the surface dry using clean, lint-free cloths.
- K. Metals - Galvanized Steel, Passivated: Clean with water-based industrial strength cleaner. After the surface has been prepared, apply recommended primer to a small area. Allow primer to cure for 7 days, and test adhesion using the "cross-hatch adhesion tape test" method in accordance with ASTM D3359. If the adhesion of the primer is positive, proceed with a recommended coating system for galvanized metal.
- L. Metals - Stainless Steel: Clean surfaces with pressurized steam, pressurized water, or water-based industrial cleaner.
- M. Plaster: Repair cracks, holes and other surface defects as required to maintain proper surface adhesion. Apply patching plaster or Joint compound and sand to produce surface flush with adjacent undamaged surface. Allow a full cure prior to coating application as recommended by the patching compound manufacturer's recommendations.
- N. Polyvinyl Chloride (PVC) Pipe: Remove contaminants and markings with denatured alcohol scuff sand and wipe with solvent for maximum adhesion. Test adhesion before starting the job.
- O. Fiberglass Doors: Remove contaminants with cleaning solvent (alcohol) scuff sand and wipe. Test adhesion of primer before starting job.
- P. Textiles - Insulated Coverings, Canvas or Cotton: Clean using high-pressure air and solvent of type recommended for material.
- Q. Wood:
 - 1. Seal knots, pitch streaks, and sap areas with sealer recommended by coating manufacturer; fill nail recesses and cracks with filler recommended by coating manufacturer; sand surfaces smooth.
 - 2. Remove mill marks and ink stamped grade marks.
 - 3. Apply primer coat to back of wood trim and paneling.
- R. Wood Doors: Seal door tops and bottoms prior to finishing.
- S. Wood Doors - Field-Glazed Frames and Sash: Prime or seal glazing channels prior to glazing.

3.4 MIXING:

- A. Quality: At time of application, paint shall show no signs of hard settling, excessive skinning, livering or other deterioration.
- B. Consistency: Paint shall be thoroughly stirred, strained and kept at a uniform consistency during application.
- C. Prohibited Mixing: Paint of different manufacturers shall not be mixed together.
- D. Thinning: Where necessary to suit conditions of surface, temperature, weather and method of application, packaged paint may be thinned immediately prior to application in accordance with the manufacturer's directions. The use of thinner for any reasons shall not relieve the Installer from obtaining complete hiding coverage.
- E. Colorant: Primer may be tinted with a colorant recommended by the manufacturer.

3.5 APPLICATION – GENERAL:

- A. Application of primers, paints, stains or coatings, by the Installer, will serve as acceptance that surfaces were properly prepared in accordance with the manufacturer's recommendation.
- B. Method of Application: Paint shall be applied in accordance with manufacturer's

recommendations. On masonry surfaces, filler coat and other first coats shall be applied by brush. Subsequent coats shall be applied by brush (or roller, on smooth faced units). On all other surfaces, prime and finish coats may be applied by brush or roller.

C. General Requirements for Workmanship:

1. Coverage and hide shall be complete. When color, stain, dirt or undercoats show through final coat of paint, the surface shall be covered by additional coats until the paint film is of uniform finish, color, appearance, thickness and coverage, at no additional cost to the Owner.
2. Rate of application shall not exceed average rate of coverage recommended by manufacturer for the type of surface involved less ten percent (10%) allowance for losses, unless manufacturer's printed recommended specifications state that the recommended rate included normal expected losses.
3. Minimum dry film thickness per coat shall not be less than thickness recommended by the manufacturer, and in NO case less than as specified herein.
4. The finished surfaces shall be free from runs, drops, ridges, waves, laps, brush marks and free of variations in color, texture and finish.
5. All interior wood trim shall be back-primed before installation with enamel undercoat or penetrating sealer, as required.
6. Sand enamel or varnish finish applied to wood or metal with fine sandpaper and then clean between coats to produce an even, smooth finish.
7. Remove electrical panel box covers and doors before painting wall. Paint separately and reinstall after all paint is dry.

D. Apply each coat to uniform coating thickness in accordance with manufacturer's instructions, not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted.

E. Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.

F. Sequence of Coats: Sufficient time shall elapse between successive coats to permit proper drying. This period shall be modified as necessary to suit adverse weather conditions.

G. Inspect each coat before applying next coat; touch-up surface imperfections with coating material, feathering, and sanding if required; touch-up areas to achieve flat, uniform surface without surface defects visible from 5 feet.

H. Remove dust and other foreign materials from substrate immediately prior to applying each coat.

I. Where paint application abuts other materials or other coating color, terminate coating with a clean sharp termination line without coating overlap.

J. Where color changes occur between adjoining spaces, through framed openings that are of same color as adjoining surfaces, change color at outside stop corner nearest to face of closed door.

K. Re-prepare and re-coat unsatisfactory finishes; refinish entire area to corners or other natural terminations.

3.6 CLEANING:

A. Clean excess coating materials, and coating materials deposited on surfaces not indicated to receive coatings, as construction activities of this section progress; do not allow to dry.

B. Re-install hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items that have been removed to protect from contact with coatings.

C. Reconnect equipment adjacent to surfaces indicated to receive coatings.

D. Relocate to original position equipment and fixtures that have been moved to allow application of coatings.

E. Remove protective materials.

3.7 PROTECTION AND REPAIR:

A. Protect completed coating applications from damage by subsequent construction activities.

B. Repair to Architect's acceptance coatings damaged by subsequent construction activities. Where repairs cannot be made to Architect's acceptance, re-apply finish coating to nearest adjacent

change of surface plane, in both horizontal and vertical directions.

- C. A minimal amount of touch-up work to newly painted surfaces will be allowed (one touch-up per every 10 square feet of wall area), but only if the repair is not visible upon close inspection. Contractor must refinish a whole wall rather than spot-finish where there are numerous repairs to be made, or where remedial work is unsatisfactory.

3.8 PAINTING SCHEDULE - EXPLANATION:

- A. Except as specified under the "Surfaces Not to be Painted" paragraph, the surfaces listed in the painting schedule shall receive the surface treatment, paints and number of coats indicated. Piping and ductwork shall not be painted until the piping and ductwork have been tested and approved.

3.9 PAINTING SCHEDULE:

- A. Exterior and Interior Steel and Ferrous Metals (Including Piping, Etc.):
 - a. Surface Cleaner: As necessary, Corotech Citrus Cleaner V610 Series at manufacturer's recommended rates
 - b. First Coat: Fabricator's shop coat or Corotech Acrylic Metal Primer V110 Series at 3.0 – 4.0 mils dry per coat on tight rust surfaces or at 1.6 - 2.0 mils dry per coat on clean metal surfaces.
 - c. Second and Third Coats: Ultra Spec HP D.T.M. Acrylic Semi-Gloss HP29 Series, Semi-Gloss Sheen at 2.3 mils dry per coat.
- B. Exterior and Interior Galvanized Metal (Including Sheet Metal, Decking, Piping, Conduits, Etc.):
 - a. Surface Cleaner: As necessary, Corotech Citrus Cleaner V610 Series at manufacturer's recommended rates
 - b. First Coat: Fabricator's shop coat or Corotech Acrylic Metal Primer V110 Series at 3.0 – 4.0 mils dry per coat on tight rust surfaces or at 1.6 - 2.0 mils dry per coat on clean metal surfaces.
 - c. Second and Third Coats: Ultra Spec HP D.T.M. Acrylic Semi-Gloss HP29 Series, Semi-Gloss Sheen at 2.3 mils dry per coat.
- C. Interior Gypsum Board (Ceilings):
 - a. First Coat: Super Hide Zero VOC Interior Latex Primer 354 Series, Flat Sheen at 1.3 mils dry per coat.
 - b. Second and Third Coats: Super Hide Zero VOC Interior Flat 355 Series, Flat Sheen at 1.1 mils dry per coat.
- D. Interior Gypsum Board (Walls and all Furr Outs):
 - a. First Coat: Regal Select Waterborne Interior Paint Pearl Finish 550 Series, Pearl Sheen at 1.5 mils dry per coat
 - b. Second and Third Coats: Regal Select Waterborne Interior Paint Finish 550 Series, Pearl Sheen at 1.5 mils dry per coat
- E. Interior Wood (Painted):
 - a. First Coat: Regal Select Waterborne Interior Paint Pearl Finish 550 Series, Pearl Sheen at 1.5 mils dry per coat
 - b. Second and Third Coats: Regal Select Waterborne Interior Paint Finish 550 Series, Pearl Sheen at 1.5 mils dry per coat

END OF SECTION

D I V I S I O N

15

MECHANICAL

SECTION 15010 - MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract apply to the work specified in DIVISION 15 - MECHANICAL.

B. Separation of Division 15 into Sections is for convenience only and is not intended to establish limits of work. Sections are as follows:

1. 15010 - MECHANICAL GENERAL PROVISIONS
2. 15400 - PLUMBING SYSTEMS
3. 15500 - FIRE PROTECTION SYSTEMS
4. 15600 - HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS
5. 15650 - HEATING, VENTILATING AND AIR CONDITIONING CONTROL SYSTEMS

1.2 SCOPE

A. Provide labor, materials and equipment for complete and operating systems.

1.3 CUTTING AND PATCHING

A. Cutting and patching for the work of this Division shall be in accordance with the requirements of the General Conditions. Work of this Division shall include providing information for any required openings to those responsible for concrete slabs and other concrete members. Openings associated with work of this Division not indicated or specified in other Divisions, shall be work of this Division. Field cut openings shall be located to avoid the reinforcing. Locations of field cut openings in slabs and structural members shall not proceed without the written approval of the Architect/Engineer.

1.4 DRAWINGS

The drawings are diagrammatic and are intended to show the general arrangement and approximate physical sizes of equipment, piping and ductwork. Every nut, bolt, brace, hanger, piping or duct rise, drop, offset, etc., is not indicated or specified. Each item (required, necessary or incidental, for the proper and dependable operation of each system) shall be provided under this Division whether specifically referred to or not. Refer to architectural drawings for necessary dimensions and to shop drawings and submittals for physical size of equipment.

1.5 CODES AND PUBLICATIONS

A. Work shall be executed in accordance with the presently enforced Codes and Publications which shall include but shall not be limited to the following:

1. Jefferson Parish Building Code
2. Jefferson Parish Mechanical Code
3. Jefferson Parish Plumbing Code
4. International Building Code
5. Louisiana State Plumbing Code
6. ASPE Data Book
7. ASHRAE Publications
8. Louisiana State Fire Marshal Act
9. SMACNA, Sheet Metal and Air Conditioning Contractors National Association
10. NFPA 13 - Sprinkler Systems
11. NFPA 70 - National Electrical Code
12. NFPA 72 - National Fire Alarm Code
13. NFPA 90A - Installation of Air Conditioning & Ventilating Systems
14. NFPA 101 - Life Safety Code

B. Where the above are at variance with the Contract Documents, the more stringent requirements shall be applicable.

1.6 REVIEWS, PERMITS AND INSPECTIONS

A. Apply for and pay for governmental and regulatory agency reviews, permits and inspections. Provide plumbing riser diagrams, sketches, etc. as required by regulatory agencies for permit issuance. No work shall be concealed until approved by the governmental or regulatory agency inspectors and the Architect/Engineer. Local regulations shall be adhered to. Upon completion, a Certificate of Approval from the appropriate regulatory agencies shall be provided the Architect/Engineer.

1.7 FEES AND DEPOSITS

A. Arrange for and pay regulatory inspection and service connection fees (sewer, drainage, and water) including the cost of any main extensions. Pay meter deposits for utility services. After substantial completion of the project, the meter registration shall be transferred to the Owner .

1.8 VISITING SITE

A. The Bidder shall visit the site of proposed work so that he may understand the facilities, difficulties, and restrictions attending the execution of the Contract. No additional compensation will be allowed for failure to be so informed.

1.9 WORK IN OTHER DIVISIONS

A. Prior to bidding, the Contractor shall coordinate items of work referred to as **"work of other Divisions"** to insure items are not omitted or duplicated.

1. Utility connections - sewer, storm drainage, and water.

2. Electrical work (wiring, raceways and disconnect switches), fire alarm work (wiring, raceways, equipment and devices) associated with work of this division and not specified as work of Division 16 - Electrical, shall be work of this division.

3. Supports for work of this Division, except supports specifically indicated to be provided under other Divisions, shall be provided as work of this Division. Supports provided under other Divisions shall be checked and coordinated under this Division to ensure that they suit the work to be installed.

4. Painting, including painting of exposed insulation, exposed piping, and exposed ductwork not specified as work of DIVISION 9 - FINISHES, shall be work of this Division. Damaged surfaces of factory finished items shall be repaired to the satisfaction of the Architect/Engineer as the work of this Division. Nameplates shall be protected until painting has been accomplished. Protection shall be removed and nameplates cleaned prior to acceptance of equipment.

1.10 MANUFACTURER'S RECOMMENDATIONS

A. Equipment and materials provided under this Division of the specifications shall be installed according to manufacturer's recommendations. Each manufacturer's application and installation instructions shall be reviewed prior to ordering equipment or commencing with the work. If the drawings or specifications show or describe any deviations from the manufacturer's recommendations the Contractor shall request clarification, from the Architect/Engineer and provide as directed at no additional cost to the Owner .

1.11 GUARANTEE AND SERVICE

A. The equipment, materials and workmanship shall be guaranteed for one year after beneficial use of a particular system, beneficial occupancy of the building or final acceptance of entire project. Where specifically indicated extended warranties shall be provided. Beginning date of guarantee will be established only after written request is received by the Architect/Engineer from the Contractor, and agreed upon by the Architect/Engineer stating the date the systems were turned over to the Owner for beneficial use or occupancy.

B. During the one year period of guarantee, any defects in equipment, materials, or workmanship shall be promptly corrected without cost to the Owner. Mechanical and associated electrical equipment shall be serviced and adjusted without cost during the guarantee period. Servicing and adjusting shall include labor, material, parts, etc., required during the first year. It includes but is not limited to: oiling motors, adjusting belts, adding refrigerant, adjusting and calibrating controls, and repairing leaks.

1.12 SPECIAL CONDITIONS

A. No piping, ducts or other mechanical equipment foreign to electrical equipment shall pass through or above spaces dedicated to electrical panelboards, electrical distribution panels, electrical switchboards, and motor control centers. Work shall conform with NFPA 70. Working clearances and dedicated spaces at electrical equipment shall be maintained per NFPA 70. Coordinate with each trade.

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP

A. Equipment and materials shall be new and shall be listed by Underwriters' Laboratories, Inc. (UL) or Factory Mutual (FM) in categories for which standards have been set by that agency. Methods of installation shall be in full accord with the latest and current engineering practices. Pressure vessels, as called for by respective codes, shall be ASME and National Board Commission stamped.

2.2 SUBSTITUTIONS

A. Names of manufacturers and catalog numbers indicated in the Contract Documents are to establish a standard as to design and quality. Other products similar in design and of equal quality may be used if submitted to the Architect/Engineer and found acceptable. Refer to General Conditions for additional information. When the Contractor elects to use an acceptable alternate manufacturers' equipment, the Contractor shall be responsible to coordinate the change with the trades affected. The Contractor shall also pay for any additional work required under this Division as well as any other Division if the alternate equipment is used. If required by Architect/Engineer because of substitutions, submit for review 1/4" scale working drawings of equipment areas with plan and section views.

2.3 SUBMITTALS

A. Within 30 days after award of the Contract, and before executing any work, submit for review six copies of descriptive equipment literature or shop drawings **in one complete indexed and bound submittal** for the following items:

Access Doors	Refrigerant Specialties
Magnetic Starters	Flexible Duct and Fittings
Backflow Devices	Air Flow Monitors
Mechanical Insulation	Vibration Isolators
Drains	Air Handling Units
Fire Protection Shop Drawings	HVAC Pumps
Fire Protection Equipment	Filters
HVAC Valves	Electric Duct Heaters
HVAC Water Specialties	Electric Wall Heaters

B. The same equipment manufacturer shall be provided for multiple items of similar equipment, regardless of capacities, on this project, unless prior written deviation is given by the Architect/Engineer. Submittals shall be identified with project name, equipment name and number as indicated on the drawings, and specification paragraph reference. Submittals shall be properly marked to show proposed model number and accessories being provided and shall have the Contractor's stamp certifying that he has reviewed the submittal and found it to be in accordance with the specifications and drawings. Where applicable, submissions shall include installation drawings and brochures showing locations, methods of anchoring, connections to work of others, wall conditions at each particular installation and special floor mounting conditions. Submittals which do not comply with the above will be returned without review, for resubmittal.

2.4 ACCESS DOORS

A. Doors in gypsum board or masonry construction shall be Karp type DSC-214M or Milcor style M-Standard, 16-gauge steel frame and 14-gauge steel door construction, continuous piano hinge and a zinc chromate prime coat. Doors in glazed or ceramic tile construction shall be same type as above except stainless steel construction. Doors in inaccessible acoustical tile ceilings, or walls with wall covering shall have 16-gauge steel frame and 18-gauge steel panel construction, recessed door for acoustical tile or gypsum board insert covered with matching wall covering, concealed hinge with a zinc chromate prime coat, and exposed edges painted white when installed in acoustical tile ceiling. Doors in fire rated partitions or ceilings (up to 1½ hour rating) shall carry the Underwriters' Laboratories "B" label. Doors required in types of construction not hereinbefore specified shall suit the type and style of material in which installed. Unless otherwise indicated doors shall have screw driver operated locks.

2.5 ENCLOSURES

A. Control equipment enclosures provided by the Contractor or provided as part of a packaged piece of equipment shall meet the following minimum standards unless specifically indicated otherwise. Where indicated on the drawings or in the specifications, flush mounted enclosures shall be provided.

B. Control equipment enclosures provided within the building shall be equivalent to or greater than NEMA 1 type construction. Control equipment enclosures provided outside of the building, a non-enclosed area of the building or in an accessible crawl space under a building shall be equivalent to or greater than NEMA 3R type construction with drain and breather. Control equipment enclosures provided within hazardous areas, controlling explosion-proof equipment shall be NEMA 7 or 9 type construction. Control equipment enclosures provided for cooling towers and associated equipment within 20'-0" of towers shall be NEMA 4X noncorrosive type construction.

2.6 FUSES

A. Provide fuses for all fused equipment provided under this Division. Fuses shall be size and type required by the equipment manufacturer.

2.7 MAGNETIC STARTERS

A. Provide combination type magnetic starters for three phase motors. Provide magnetic starters or contactors for single phase motors which start and stop as part of an automatic control sequence. Unless noted otherwise magnetic starters shall be across-the-line type rated per NEMA standards. Starters shall have under voltage protection when used with momentary-contact push button stations and shall have undervoltage release when used with maintained contact push button stations. Enclosures for starters shall be as hereinbefore specified. Starters in motor control centers shall be fully compatible with the motor control center. Provide two-speed starters for two-speed motors. Two-speed starters shall have timing relay for time delay between speed changes.

B. Starters shall be non-reversing type complete with integrally fused 120 volt control transformer, start-stop push button and pilot light or hand-off-auto switch and pilot light, where indicated, or as required for control. Two speed starters shall have hand-off-high-low selector switches and pilot lights. Starters for motors interlocked to run with other motors or which have automatic start-stop controls (exclusive of safety controls such as firestats, freezestats, etc.) shall have hand-off-auto switch. Starter shall be wired so as not to by-pass safety controls when in the "hand" position.

C. Starter contacts shall be of silver alloy, and shall be of the double break type. The movable magnet and contact assembly, an arc hood in which the fixed contacts are mounted, solenoid cell, and thermal overload relays (one in each phase) shall be assembled and mounted on a heavy steel back plate. The only moving part shall be the magnet and contact assembly which shall move up and down. Each pole shall be enclosed in an individual arc chamber.

D. Starters for 5 horsepower and larger 3-phase motors shall include under voltage/phase-reversal/phase-loss protection relay wired into the control circuit. Overload protective devices shall be selected in accordance with the motor nameplate, and shall be of the thermal inverse time limit type and shall include a manual reset type push button on the outside of the cover. Overloads shall operate on the melting alloy principle. Starters shall have normally open and/or closed external electrical interlocks as required to suit equipment controlled. Magnetic starters shall include a disconnect switch with visible blades and Class R fuse rejection features. Acceptable manufacturers: Furnas Class 14, Square D Class 8536, GE Series 300 or approved equal.

2.8 MAGNETIC CONTACTORS

A. Magnetic contactors shall be Square D Series 8903-SMG70-V02 or equal, 30A, 3 pole, mechanically held, with 120 volt coil and non-fused disconnect.

2.9 MOTORS

A. Unless otherwise indicated, motors shall be NEMA Design B, constant speed, variable torque construction. Motors shall conform to the Energy Policy Act of 1992 and shall be of the premium efficiency type suitable for use with variable speed (variable frequency or voltage) motor drives. Electrical characteristics shall conform with the electrical supply as indicated on the electrical drawings.

B. Single-phase motors shall be split-phase or capacitor start type with built-in thermal overload. Three-phase motors shall be squirrel cage type.

C. Motors shall be guaranteed to operate continuously at full load with a 10% voltage variation above or below the specified voltage. Motors shall be rated for an ambient temperature of 40 degrees C and a temperature rise not to exceed 40 degrees C with a 1.15 service factor. Motors shall have either sleeve or pre-lubricated ball bearings as required for the particular application.

D. Motors shall be copper wound. Open drip-proof (ODP) motors shall have Class B insulation. Totally enclosed (TE) or totally enclosed fan cooled (TEFC) motors shall have Class F insulation. Motors shall be T-frame conforming to NEMA MG13 and tested in accordance with NEMA MG1 Part 12 and IEEE Test Procedure 112, Method B. Nameplate information shall include the manufacturer's nominal and guaranteed efficiency values.

E. Unless noted otherwise on the drawings or in the specifications, housings for motors in indoor locations shall be open drip proof (ODP) or explosion proof (XP) type. Motors in outdoor locations or subject to excessive moisture shall be totally enclosed (TE) or totally enclosed fan cooled (TEFC) type. Belt drive motors shall have bases with provisions for adjustment in field.

F. Motors provided on equipment not as an integral part of the equipment but propelling the equipment by the use of belts, sheaves, couplings, etc., shall be as manufactured by Emerson, General Electric, Marathon, U.S. Electric, or approved equal. Alternate manufacturers requesting approval shall submit evidence of a factory authorized service facility within a reasonable distance of the project to service or replace motors under warranty. Motors manufactured by or specifically for equipment manufacturers and provided as an integral part of the equipment package need not comply with the requirements of this paragraph.

2.10 SAFETY PANS

A. Safety pans shall be fabricated from 18-gauge (min.) galvanized sheet steel. Sides of pans shall be a minimum of 2" high with top edges hemmed. Sides longer than 6'-0" shall have additional flat bar or angle top edge bracing to prevent sagging. Joints and seams shall be watertight. Pans shall extend at least 6" beyond the sides of the

equipment it is serving. Provide a 1" steel female pipe coupling in side of pan near the bottom for overflow piping connection.

2.11 PREPARED OPENINGS

A. Piping and tubing installed through masonry or concrete walls, floor/ceiling assemblies, and floors above grade shall be installed through pipe sleeves.

B. Ducts installed through masonry or concrete walls and non-rated concrete floors above grade shall pass through 20-gauge galvanized sheet metal sleeves. Duct sleeve shall have a 1/2" maximum annular clearance around duct. Allowance shall be made for external duct wrap (if specified). Ducts, tubing and piping installed through floors of mechanical rooms shall have a 4" high concrete curb on each side to prevent water from leaking through openings. Exposed piping installed through walls shall be fitted with chromium plated escutcheons on each side of the wall. Exposed ductwork passing through non-rated masonry or concrete walls shall be fitted with a 2" wide sheet metal flange around each side of duct on each side of the wall.

C. Ducts installed through partitions, walls or floors which are smoke rated or have a fire rating of one hour or greater shall be installed in accordance with SMACNA standards. Piping and tubing installed through partitions, walls, or floors which are smoke rated or have a fire rating of one hour or greater shall be installed through pipe sleeves.

2.12 ROOF MOUNTED EQUIPMENT, DUCTS AND PIPING

A. Roof mounted equipment shall be installed on equipment supports or curbs as detailed on the drawings or as specified. Tops of curbs shall be level. Ducts penetrating the roof shall be installed within a waterproof curbed area as detailed on the drawings. Piping penetrating the roof shall be installed through a pitch pocket or piping curb as noted or detailed on the drawings. Any penetrations of the roof shall be watertight.

2.13 PIPE SLEEVES

A. Sleeves for tubing and piping installed through masonry or concrete walls shall be Schedule 40, galvanized steel pipe. Sleeves for tubing and piping installed through fire or smoke rated dry wall partitions, floors, and floor/ceiling assemblies above grade shall be a minimum of Schedule 10, galvanized steel pipe. Sleeves for tubing and piping installed through basement walls, and floors, and slabs below water level shall have a water stop flange welded to sleeve.

2.14 FIRE BARRIER MATERIAL

A. Fire barrier material shall be provided in annular spaces between sleeves and piping or tubing where piping or tubing penetrates floors or partitions that have a fire rating of one hour or greater. Material shall be UL classified as a through penetration fill, void or cavity material and shall be capable of passing a 4 hour fire test per ASTM E 814. Material shall be installed in strict accordance with the manufacturers instructions. Acceptable

manufacturers: 3M Fire Barrier, Metacaulk, Nelson Fire Stop, PTI Fire Seal, Thomas & Betts Fire Safe, or approved equal.

2.15 SAFING MATERIAL

A. Safing material shall be installed in annular spaces between sleeve and pipe or tubing where sleeve and pipe or tubing penetrate partitions that are designated as smoke separations. Material shall be mineral wool designed for hand packing. Material shall have an ASTM E 84 rating of flame spread –10, fuel contributed –0, smoke developed –0 and shall be rated non-combustible per ASTM E 136. Acceptable manufacturers: Carborundum, U.S. Gypsum, or approved equal.

2.16 CURBS AND SUPPORTS

A. Prefabricated metal curbs and equipment support rails for equipment provided on built-up roofs, unless otherwise noted on the drawings, shall be provided under SECTION 15600 - HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS. Curbs and equipment supports for equipment installed on metal roofs shall be a product of the metal roof manufacturer. Poured in place concrete curbs and supports shall be in accordance with DIVISION 3 - CONCRETE. Interior and exterior supports such as, but not limited to pipe stands, elbow supports, strut channels, trapeze supports, structural steel supports and hanger rods shall be hot-dipped galvanized after fabrication.

2.17 SUPPORTS

A. Supports shall adequately support the weight of the pipe and material contained within. Supports shall be manufactured in accordance with MSS SP-58, ANSI B31.1 and UL 203. Acceptable manufacturers: Elcen Mfg. Co., Michigan Hanger Co., Anvil, Persing & Co., or approved equal. Supports for piping above grade shall be as follows:

B. Cast iron or steel piping:

1. Interior:

a. Anvil Figure 260 adjustable clevis hanger and rod, carbon steel construction, zinc plated finish.

b. Strut channels, supporting steel, and trapeze hangers, carbon steel with zinc plated finish.

2. Exterior (Crawl spaces and unenclosed areas):

a. Anvil Figure 260 adjustable clevis hanger and rod, carbon steel construction, hot dipped galvanized finish.

b. Strut channels, supporting steel, and trapeze hangers, carbon steel with hot dipped galvanized finish.

3. Copper tubing - Anvil Figure CT-69 adjustable tubing ring and rod, carbon steel ring with copper finish and malleable iron adjusting nut.

4. Riser clamps:
 - a. Clamps, bolts and nuts for cast iron or steel piping shall be Anvil Figure 261, carbon steel construction, hot dipped galvanized finish.
 - b. Clamps for copper tubing, glass or plastic piping shall be Anvil Figure 261c, black carbon steel construction, copper plated for copper tubing or with formed section plastic coated for glass or plastic piping.

C. Hangers for piping under concrete slabs on grade or fill - Waste and vent, storm drainage, fire protection and domestic water piping shall be type 316 stainless steel rod. Hangers for any other piping shall be type 316 stainless steel clevis type hanger and rod with rod lapped over the slab reinforcing steel. See drawings for details.

2.18 UNIONS AND FLANGES

A. Unions:

1. Steel piping 2½" and smaller - Unions shall be ANSI B16.39 malleable iron, WOG, female pattern, threaded ends, brass seat, with ground joint.
2. Copper tubing 2½" and smaller - Cast copper unions shall have solder ends, with ground joint.

B. Flanges:

1. Steel piping 3" and larger - Welding neck or slip-on type, flat or raised face, forged steel, ASTM A 181, Grade I, ANSI B16.5, Class 150 or 300 as required. Bolts shall be ASTM A 307, Grade B8. Nuts shall be ASTM A 307, Grade 8. Exterior bolts and nuts shall be stainless steel.
2. Copper tubing 3" and larger - Flanges shall be ANSI Standard B16.24, Class 150, with solder joint ends. Bolts shall be ASTM A 307, Grade B8. Nuts shall be ASTM A 307, Grade 8. Exterior bolts and nuts shall be stainless steel.
3. Gaskets shall be 1/16" thick, similar to Garlock or Cranite, factory cut, one piece. Provide full-face gaskets for flat-face flanged joints, and ring gaskets for raised-face flanged joints.

2.19 DISSIMILAR METALS

A. 2" and smaller - Dielectrically isolated unions, couplings or nipples. 2 1/2" and larger dielectrically isolated and gasketed flanges.

2.20 PIPE IDENTIFICATION

A. Identification of piping shall be by the use of colored, waterproofed, all-temperature, self-adhering pipe markers and directional arrows. Acceptable manufacturers: Ready Mode, Seton Style RPM, MAPA Label Tabs, or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION OF VALVES

A. Valves shall be provided where indicated on the drawings or as hereinafter described. Valves shall be installed so that the handle is accessible and operable. Where required due to space limitations, special short style handles may be provided on ball valves. Gate, globe and other style valves having packing glands shall have valve handles installed in the horizontal or vertical (down) position or any angle between to keep packing glands moist.

B. Valves located in walls, chases and above suspended, inaccessible ceilings shall be provided with access doors. Valves located above accessible acoustical tile ceilings shall have the location of each valve marked with a pressure sensitive colored dot applied to the T-bar. Color to be selected by the Architect/Engineer. Valves located above ceilings indicated to be used for drains, or for future use shall have a pipe plug or nipple and cap closure. Valves in equipment spaces indicated to be used for drains, blowdowns, etc., shall have hose threads for extensions to floor drains. Hose bibbs shall not be used.

3.2 RECORD DRAWINGS

A. At the completion of the work, unless noted otherwise in the general conditions, mark-up one reproducible set with colored pencils in a neat and understandable manner to show significant changes made during construction. Provide an electronic copy of the drawings in .pdf format on a disc to be included in the closeout documents. Underground piping, valves and cleanouts outside of the building shall be dimensioned on the record drawings. Dimensions shall indicate the location of exterior mains with reference to the exterior building walls and/or corners. Contractor shall pay for reproduction costs.

3.3 OPERATING INSTRUCTIONS

A. Prior to the time scheduled for occupancy, the Contractor shall provide the services of a competent mechanic to instruct the Owner in the care and operation of equipment. Before final acceptance, the Contractor shall prepare and deliver to the Architect/Engineer three bound copies of operating instructions, which shall be contained in hard back loose leaf type binders, divided into a suitable number of volumes so as to permit easy reference, and shall include:

1. Description of major components of systems, including the function of major items.

2. Detailed operating instructions and instructions for making routine minor adjustments.
3. Routine maintenance operations.
4. Manufacturer's catalog data, service instructions wiring diagrams, fabrication drawings and parts list for each piece of operating equipment.
5. Copies of equipment submittals and shop drawings, including review sheet, reviewed by and acceptable to the Architect/Engineer.
6. Guarantee and Warranty Information.
7. Names and telephone numbers of subcontractors and suppliers.

3.4 ELECTRICAL WORK

A. Refer to schedules and electrical drawings for motor voltages. Motors for mechanical equipment shall be provided under this Division. The work of this Division shall include setting and aligning integral drive motors in operating position. Unless noted otherwise, combination magnetic starters and, magnetic motor starters for mechanical equipment shall be provided under this Division and installed and electrically connected under DIVISION 16 - ELECTRICAL.

B. Electrical work in connection with DIVISION 15 - MECHANICAL required but not indicated as work of DIVISION 16 - ELECTRICAL shall be work of this Division. Control disconnects, monitoring, level, electrical interlock and signaling wiring and raceways shall be work of this Division. Safety, signaling, and control devices such as thermostats, firestats, damper motors, valve operators, push buttons, pilot lights, control and/or monitoring panels, crank-case heaters, etc., shall be provided and wired under this Division in strict accordance with an approved wiring diagram. Wiring and raceways installed under this Division shall comply with the requirements of DIVISION 16 - ELECTRICAL and shall be installed by a licensed electrician.

3.5 CONCRETE

A. Formed and poured in place concrete work including equipment housekeeping pads, concrete equipment bases that are installed on vibration isolators, and piping supports not provided as work of other Divisions shall be provided as work of this Division and shall be standard weight concrete in accordance with the American Concrete Institute's Standard Specifications, and shall test at 3000 psi in 28 days.

B. Provide required templates and dimensioned drawings for housekeeping pads, supports, and anchor bolts. A 4" high (min.) reinforced concrete housekeeping pad shall be provided under each piece of exterior and interior floor supported mechanical equipment. Pads shall extend a minimum of 6" beyond edges of equipment. Edges of pads shall be chamfered.

3.6 EQUIPMENT SUPPORTS

A. Unless otherwise specified, supports necessary for properly supporting the work and the equipment of this Division shall be provided under this Division. Additionally, provide isolation materials to prevent transmission of vibration to the building structure. Isolation of equipment as shown on drawings or specified is the minimum required, and any additional isolation required to prevent transmission of vibrations shall be provided under this Division, in accordance with the equipment manufacturer's recommendations. Foundations for supports shall be provided under DIVISION 3 - CONCRETE or DIVISION 5 - METALS.

3.7 SAFETY PANS

A. Provide safety pans under water heaters, hot water storage tanks, fan coil units, air handling units, boilers, etc. Pipe safety pan outlet to floor drain, trapped waste, or to outside of building.

3.8 OPENINGS, GROUNDS AND CHASES

A. Openings, grounds, chases and lintels may be provided under other Divisions, as directed by this Division, to accommodate the piping, ductwork and equipment. Sleeves and prepared openings shall be accurately located in slabs or walls before pouring of concrete. It shall be the responsibility of this Division to verify that openings and chases are properly located. Openings associated with work of this Division not indicated or specified in other Divisions, shall be work of this Division. Coordinate location of grease ducts through roof and arrange for roof framing to be relocated to avoid offsetting of ducts.

B. Holes through existing concrete shall be either core drilled or saw cut. Drilled or cut holes required shall have the approval of the Architect/Engineer prior to cutting or drilling. Sleeves set in openings cut in existing masonry or concrete walls or concrete slabs shall be one pipe size smaller in outside diameter than the cored hole. The sleeve shall be grouted in place with non-shrinking waterproof grout. Where piping is installed through smoke and/or fire separations, fill annular space between sleeve and piping with safing or fire barrier material.

3.9 ACCESS DOORS

A. Equipment which may require constant or periodic operation or adjustment such as but not limited to valves, water hammer arresters, cleanouts, automatic smoke and fire dampers, damper operators, mixing boxes, variable volume equipment, steam traps, plumbing traps, plumbing fixture connections, etc., located in or above inaccessible ceilings, walls, or chases shall have hinged metal access doors as required by type of construction.

B. Minimum door size shall be 8" x 8". Doors shall be of sufficient size to adequately service, repair, replace or inspect the equipment. Locations of access doors in ceilings shall be coordinated to avoid conflict with ceiling mounted devices (lighting fixtures, fire alarm devices, ceiling diffusers, sprinkler heads, etc.). Locations shall be approved by the Architect/Engineer.

3.10 PIPE SLEEVES

A. Piping and tubing installed through masonry or concrete walls, concrete floors above grade, exterior metal wall panels, and smoke or fire rated partitions shall be installed through pipe sleeves as hereinbefore specified.

B. Where piping or tubing is installed through fire or fire/smoke rated separations, the annular space between the piping or tubing and sleeve shall be filled with UL Classified fire barrier material. Where piping or tubing is installed through smoke rated separations, the annular space between the piping or tubing and sleeve shall be packed solid with safing material. Annular space between pipe or tubing and sleeve installed through exterior walls shall be made waterproof by filling with a silicone type caulking compound on the exterior side only. Annular space between pipe and sleeve installed through basement walls, floors and slabs on grade or fill and slabs below water level shall be made waterproof by using a mechanically expandable seal, or an approved equal means.

3.11 SUPPORTS

A. Hangers, guides, brackets and braces shall be adequately fastened to the structure by means of concrete inserts, drilled expansion shields, drilled wedge type devices, bolts or beam clamps. Powder driven fasteners shall not be used. Inserts in slabs and beams for fastening work shall be cast in place in new slabs. Inserts required in existing concrete shall be drilled type. Drilling shall not penetrate the post-tensioning tendons.

B. Where building construction consists of a metal roof supported by metal purlins, provide additional steel members to span between roof supports to provide supports for hanger rods.

3.12 GENERAL PIPING INSTRUCTIONS

A. Exposed and concealed horizontal lines of pipe and tube shall be carried on hangers and supports hereinbefore specified and properly spaced to maintain alignment. Install pipe and tubing true to line and grade. Piping shall be concealed except where noted. Piping shall be installed above suspended ceilings and in furred partitions. Exposed piping shall be installed parallel to or at right angles with building walls, except where otherwise shown on drawings. Changes in elevation, to suit varying ceiling heights, shall be made so that piping will stay exposed. Exposed pipe through walls, floors and ceilings shall be fitted with chromium plated escutcheons securely held in position with allowance for expansion. Escutcheons shall be large enough to fit the pipe, tubing or

insulation and to cover openings around the sleeves through walls. Minimum bury for exterior piping shall be 18" below finish grade, unless noted otherwise on drawings or in specifications. PVC water mains shall have 30" minimum cover.

B. Wherever changes in sizes of piping occur, changes shall be made with reducing fittings. The use of reducing couplings in rolled or cut groove joint piping or bushings in other piping systems will not be permitted.

C. Cutting and boring through structural members shall be done only when approved by and under supervision of the Architect/Engineer. Offsets in piping above slab shall be made with fittings. Bending of pipe shall not be permitted. Automatic valves or traps shall be provided with unions and shut-off valves so that they can be removed for servicing. Valving shall also be arranged so as to eliminate the necessity of draining major parts or entire system while service or repairs are made. Drains where required by manufacturer and at each low point or trapped area of each system shall be provided.

3.13 CONNECTION OF COPPER TUBING

A. Copper tubing shall be cut with square ends, and burrs and fins removed. Tubing shall be handled and protected carefully and tubing cut, dented, or otherwise damaged shall be replaced. Ends of tubing and fittings shall be cleaned using sand or emery cloth.

B. Copper Water Tube: Apply a thin coat of flux to end of tube and solder cup. Insert tube into fitting full depth and apply heat. Apply solder until bead appears at end of fitting. Clean excess solder and flux from completed joint.

C. Copper Refrigerant Tube: Refrigerant piping shall be installed so proper oil drainage and entrainment are maintained. Materials used in the construction and installation of refrigerant piping system shall be suitable for the refrigerant used and no material shall be used that will deteriorate due to the chemical action of the refrigerant or the oil or the combination of both. Equipment and piping openings shall be plugged or capped to prevent air, dirt, or moisture from entering the system. Piping must be thoroughly cleaned before the system is charged with refrigerant. Suction lines shall be pitched no less than 1/2" per 10' toward the compressor. During the brazing process dry nitrogen shall be bled continuously through the piping.

3.14 CONNECTION OF SCREW JOINTED PIPING

A. Piping shall be square cut and free from fins, burrs, die marks, etc. Threads shall be full cut to depth of die. Apply approved lubricant or thread sealing tape on male threads only. Screw fitting and pipe together using pipe wrenches so that not more than three threads remain exposed on pipe. Clean excess joint material from completed joint. Joints in galvanized piping systems shall be cleaned and sprayed with two coats of zinc rich rust inhibiting paint.

3.15 CONNECTION OF WELDED JOINT PIPING

A. Welded joints shall conform to the requirements of ANSI B31.1. Welders shall be qualified using shielded metal arc welding process or other approved process in accordance with the applicable provisions of the ASME Boiler and Pressure Vessel Code, Section IX. Prior to erection, each length of pipe shall be held in an inclined position and repeatedly tapped to loosen any scale or foreign matter within the pipe. Each length of pipe shall be thoroughly swabbed prior to erection.

3.16 CONNECTION OF GROOVE JOINTED PIPING

A. Piping shall be inspected and verified free from indentations, projections, grooves, weld seams or roll marks on the exterior pipe surface over the entire gasket seating area to insure a leak-tight gasket seating. Pipe ends shall be square cut. Cut and roll grooves shall meet the manufacturer's criteria. Gasket, pipe ends and coupling housing shall be properly lubricated per manufacturer's recommendations prior to seating and aligning.

3.17 SUPPORTS AND CLAMPS

A. Vertical support and bracing for risers shall be by use of riser clamps at every floor but not less than 15'-0" o.c. Horizontal **piping above grade** and within buildings shall have supports and rods adequate for size, material and service, and be supported at not more than the following intervals on straight runs of piping:

MAXIMUM SUPPORT SPACING - CAST IRON PIPING

<u>PIPE DIAMETER</u>	<u>SUPPORT SPACING</u>	<u>MIN. HANGER ROD-DIAMETER</u>
2"	5'-0" and at each Joint	3/8"
3"	5'-0" and at each Joint	1/2"
4"-5"	5'-0" and at each Joint	5/8"
6"-8"	5'-0" and at each Joint	3/4"

MAXIMUM SUPPORT SPACING -STEEL AND COPPER PIPING

<u>PIPE DIAMETER</u>	<u>SCREWED, SOLDERED & WELDED JOINTS</u>	<u>GROOVED JOINTS</u>	<u>MIN. HANGER ROD DIAMETER</u>
1/2" to 1 1/4"	6'-6"	6'-6"	3/8"
1 1/2" to 2"	10'-0"	7'-6"	3/8"
2 1/2" to 3"	10'-0"	10'-0"	1/2"
4" to 6"	10'-0"	10'-0"	5/8"-3/4"
8" to 12"	14'-0"	12'-0"	3/4"-7/8"

B. Unless otherwise detailed on the drawings, **underground piping** shall have hanger rod sizes as listed below to support the piping at not more than the following intervals on straight runs of piping:

PIPE DIAMETER	MAX. SUPPORT SPACING	MIN. SUPPORT ROD DIAMETER
1/2" to 6"	4'-0"	1/4" *
8" to 10"	4'-0"	3/8" *

** If allthread rod is used in lieu of smooth rod, allthread rod shall be one size larger.*

C. When interior support rods for pressurized piping are over 12" in length, provide lateral bracing every fourth hanger or as required to prevent swaying. Offsets or bends in hanger rods or pipe hanging from pipe are not acceptable. Piping shall be racked and handled in a manner to prevent entrance of dirt and foreign matter. Open pipe ends shall be plugged or capped during erection. Horizontal pipe shall be supported not over 1' from the fitting at each change in horizontal direction or vertical elevation of the piping. Pipes must be installed so that they may contract or expand freely without damage to other work or injury to themselves.

D. In securing rods and hangers to wood or metal, angle clips, beam clips or C-clamps shall be used. Angle clips must be attached to structure by means of screws or bolts. Securing rods to concrete shall be as hereinbefore specified. Trapeze supports with U-bolts, pipe straps or clamps may be used where two or more pipes run parallel at the same elevation. Perforated type strap hangers shall not be used. Exterior pipe supports shall be hot dipped galvanized after fabrication.

E. Vibrations or movement developing in piping shall be eliminated or isolated by re-spacing of supports, anchoring or installation of spring supports as directed. Refrigerant liquid piping shall be isolated by providing a 6" long piece of 3/4" thick elastomeric type insulation between pipe and hanger. Insulated piping with a normal operating range of 55 degrees or less, provide a 20-gauge sheet metal saddle approximately 12" long and having 180-degrees of contact with insulation between the hanger or support and the insulation for each pipe. Insulated piping with a normal operating range of 56 degrees or greater may have the hanger installed between the pipe and the insulation. Where individual pipe supports are installed outside of the insulation jacket or trapeze supports are used to support insulated pipes, a galvanized sheet metal saddle, as described above, shall be installed between the support and the insulation

3.18 UNIONS OR FLANGES

A. Unions or flanges shall be provided at items of equipment to facilitate their easy maintenance, including tube bundle or coil removal, and/or cleaning. It shall not be necessary to remove any valve, strainer, or device to do the required maintenance. Piping connections at equipment shall be in accordance with the current engineering and installation practices. The requirements of this paragraph will be strictly enforced and if in

the opinion of the Architect/Engineer it is not adhered to, the Contractor will be required to re-pipe the equipment as directed.

3.19 WORK RELATED TO EQUIPMENT NOT FURNISHED AS WORK OF THIS DIVISION

A. Unless specifically indicated otherwise, any required mechanical services for and required mechanical connections to items indicated on the drawings or in the specifications or items provided by the Owner shall be mechanically connected as work of this Division. The Contractor shall provide piping, valves, traps, etc., as required for complete operation of each piece of equipment.

3.20 DISSIMILAR METALS

A. Inert NSF/FDA lined dielectric nipples shall be provided between copper, bronze or brass piping material or valves and steel piping material or steel tanks. Dielectric nipples and brass or copper unions or flanges shall be provided at cast iron valves and equipment where hereinbefore specified for equipment maintenance. Dissimilar metals shall be isolated from surface contact with each other by the use of a non-conductive material, tape, etc.

3.21 PROTECTION OF WORK

A. The Contractor shall protect equipment, fixtures, and work from damage. Damaged work will be rejected and replaced at the expense of the Contractor. Where possible, rooms containing new plumbing fixtures shall be kept locked until the building is turned over to the Owner. Immediately after installation of each plumbing fixture, it shall be covered with a fixture protector.

B. Mechanical equipment shall be protected from damage and from the weather. Provide adequate and proper storage facilities for items during the progress of the work.

3.22 CLEANING OF EQUIPMENT AND MATERIAL

A. Prior to acceptance, the Contractor shall clean equipment and remove grease, dirt and foreign matter. Pressure regulating assemblies, traps, strainers, flush valves and similar items shall be thoroughly cleaned. Air, oil and natural gas piping shall be blown out with clean compressed air. When connections are made to existing systems, the Contractor shall do cleaning and purging of the existing systems required to restore them to the condition existing prior to the start of work.

3.23 FRICTION LOSSES, ELECTRICAL RATINGS AND SPACE REQUIREMENTS

A. The values of air and water friction losses, electrical current ratings and space requirements for various pieces of equipment, as contained in these specifications or as scheduled, are estimated values and sizes and have been used in obtaining specifications for equipment and for sizing ducts, pipe, electric wiring and motor controls.

Any necessary changes in any of these items resulting from values other than the estimated ones shown shall be the responsibility of the Contractor and shall be subject to the approval of the Architect/Engineer. The Contractor shall pay any costs for additional labor and material required including costs of any other Contractor involved. Should substitute equipment require different requirements from that shown on the drawings, the Contractor shall be responsible for the cost of the changes. Any such changes must be approved by the Architect/Engineer.

3.24 MARKING OF EQUIPMENT

A. Each piece of mechanical equipment shall be suitably identified by means of ¼" high letters cut in white laminated phenolic strip to show black letters. Mechanical equipment, such as but not limited to, boilers, air handling units, exhaust fans, starters, etc., shall be labeled. Strip shall be secured to interior equipment using self-adhesive backing and to exterior equipment by means of two brass bolts and nuts or screws.

3.25 IDENTIFICATION OF PIPING

A. Piping, whether insulated or not shall be identified. Identification may be omitted from piping in inaccessible chases and furring and where use is obvious, due to its connection to fixtures or equipment and where the appearance would be objectionable, as in finished rooms.

B. Identification shall be placed as follows - near each valve and branch connection, above accessible ceilings wherever piping emerges or disappears from view when viewed from the floor of the room in which it is installed, labels shall not be more than 10' apart.

3.26 CHANGES TO PIPING OR DUCTS

A. Should the Contractor desire to make changes in the routing or arrangement of piping or ducts, whether for his own convenience, to avoid conflict with the work of other trades, or to conform to local codes, such changes shall not be made without the prior approval of the Architect/Engineer.

3.27 STARTING AND TESTING

A. A competent and experienced service and installation mechanic shall be employed by the Contractor to start test and adjust the equipment. The Architect/Engineer reserves the right to require the test of any item of equipment or machinery. Such tests shall be conducted by the Contractor in the presence of the Architect/Engineer.

3.28 PROJECT CLOSEOUT DOCUMENTS

A. Prior to the final acceptance of the project the Contractor shall deliver to the Architect/Engineer for review, the following in two three-ring binders:

1. Certificates of approval from local regulatory agencies.
2. Extended equipment warranties.
3. Operating instruction manuals which shall include copies of reviewed submittals and shop drawings including review sheet.
4. Performance tests of backflow preventer.
5. NFPA 13, acceptance certificates for the sprinkler system, standpipe system, and fire suppression systems.
6. HVAC test and balance reports.
7. Record drawings.

B. Final payment will be withheld until each applicable item has been provided to and is found satisfactory by the Architect/Engineer.

- END OF SECTION -

SECTION 15400 - PLUMBING SYSTEMS

PART 1 - GENERAL

1.1 SCOPE

A. Work under this Section shall include providing a complete and functioning plumbing system for the project and any appurtenances indicated or necessary. Terminate each system 10 feet beyond the edge of structural pile supported slabs, unless indicated otherwise on the drawings, for extension under other Divisions of the specifications.

B. Items specified or required shall be provided for a complete and operating system as described in SECTION 15010 - MECHANICAL GENERAL PROVISIONS.

1.2 SPECIAL REQUIREMENTS

A. PVC piping shall not be installed in any above ceiling plenum space or any mechanical equipment room used as a return air plenum.

1.3 ELECTRICAL WORK

A. Electrical work in connection with work of this Section not indicated as work of DIVISION 16 - ELECTRICAL, including disconnect switches for control wiring, shall be work of this Section.

PART 2 - PRODUCTS

2.1 VALVES (Plumbing)

A. Valves shall be as listed below unless otherwise noted on the drawings. All valves for use in potable water system shall be lead free model of the valves listed below:

1. Water shut-off valves above grade:

a. 4" and smaller - Nibco Series S-FP-600N or Watts Series B, full port ball valve; 600 psi ASTM B-283 bronze body, ASTM B-16 chrome plated brass ball and stem; PTFE seats, packing, and gaskets; solder ends; two piece construction with lever handle. Acceptable manufacturers: Conbraco, Hammond, Red-White, Milwaukee, Nibco, Watts, or approved equal.

2.2 PIPE, FITTINGS, AND JOINTS

A. Soil, Waste, and Vent:

1. Above grade pipe and fittings:

a. Service weight, centrifugally spun cast iron pipe and drainage type fittings with plain or beaded ends, ASTM A 888 and CISPI 301; pipe and fittings shall be coated per ASTM A-74. Cast iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and listed by NSF International. Joints shall be neoprene elastomer sleeve with stainless steel shield and clamp assembly; sleeve shall bear the ASTM C 564 marking, clamp shall bear the CISPI 310 NO-HUB marking. Horizontal waste arms between stacks and plumbing fixtures shall be hard drawn, copper drainage tube, type DWV, ASTM B 306, or seamless copper water tube, type L, ASTM B 88; fittings shall be wrought copper drainage type, ASME B16.29 or cast copper drainage fittings, ASME B16.23; joints shall be solder type using 95-5 type tin-antimony solder, ASTM B 32, Alloy grade 95A..

B. Domestic Water:

1. Pipe and fittings above grade:

a. Piping 2½" and smaller - Seamless copper water tube, type L, hard drawn, ASTM B 88; fittings shall be wrought copper pressure type, ASME B16.22 or cast copper pressure type, ASME B16.18; joints shall be solder type using 95-5 type tin-antimony solder, ASTM B 32, alloy grade 95A.

2.3 HOSE BIBBS

A. Hose bibbs shall be ¾" nickel plated brass, female flange to wall, vacuum breaker installed as an integral part of hose bibb and lock shield with loose key. Acceptable manufacturers: Woodford Model 24P, Prier Brass Model C135 nickel-plated finish or approved equal.

2.4 BACKFLOW PREVENTERS

A. Reduced Pressure Backflow Preventer (Potable Water Service):

1. The reduced pressure device shall consist of two independently operating, spring loaded, center guided, "Y" pattern check valves, and one hydraulically dependent differential relief valve. The device shall automatically reduce the pressure in the "zone" between the check valves at least 5 psi lower than the water inlet pressure. Should the differential between the upstream and the zone of the unit drop to 2 psi, the relief valve shall open and discharge to the drain. The device shall be rated at 175 psi working pressure with a water temperature range of 32 degrees F to 180 degrees F.

2. The mainline valve, body and caps, relief valve body and cover shall be bronze. Check valve and relief valve components shall be serviceable without

removing the valve body from the piping system. Internal parts shall be of corrosion resistant materials. Included with the reduced pressure device shall be two shutoff valves, an in-line "Y" type strainer, air gap drain accessory, and 4 test cocks. Device shall meet the requirements of ASSE Standards 1013; AWWA Standards C506 and FCCCHR-USC. Acceptable manufacturers: AMES, Febco, Watts, or approved equal.

3. Where indicated on the drawings or required due to construction conditions, the backflow preventer shall be listed for vertical installation.

4. Hose End Vacuum Breakers - Vacuum breakers shall be of brass construction with polished chrome finish. Internal working parts shall be stainless steel with silicone rubber diaphragm and disc. Female inlet and male outlet threads shall be standard $\frac{3}{4}$ " garden hose type. Vacuum breakers shall have provisions for draining and "non-removable" features. Assembly shall comply with ASSE Standard 1011. Acceptable manufacturers: Watts #NF or approved equal.

2.5 INSULATION AND ACCESSORIES

A. Insulation shall have a vapor barrier jacket or facing complying with NFPA 90A fire and smoke hazard rating as determined by Underwriters Laboratories procedure UL 723, ASTM E 84 and NFPA 255 not to exceed a flame spread of 25 and smoke developed of 50. Maximum jacket permeability (if jacketed) shall be 0.02 perms per ASTM E 96. Accessories such as adhesives, mastics, cements, tapes, etc., shall have the same fire and smoke hazard rating as jacket or facing.

B. Fiberglass insulation:

1. Pre-formed, split type, fiberglass pipe insulation with an all service jacket having a maximum "k" factor per ASTM C 335 of 0.23 Btu×in/hr×ft²×°F at a mean temperature of 75 degrees F. Acceptable manufacturers: Certainteed 500 Snap-on, Owens-Corning 25 ASJ/SSL, or approved equal.

2. Domestic cold water piping - $\frac{1}{2}$ " thick.

3. Domestic hot water supply and hot water circulating piping. Branch piping 2" and smaller not exceeding 12'-0" in length - $\frac{1}{2}$ " thick. Branch piping exceeding 12'-0" in length and main piping 2" and smaller - 1" thick. Main piping 2 $\frac{1}{2}$ " and larger 1 $\frac{1}{2}$ " thick.

C. Fitting and valve insulation:

1. Fiberglass blanket insulation equal in thickness to the adjacent pipe insulation, field cut to fit fittings. Valves shall be insulated using oversized pipe insulation field cut to fit valves.

D. Accessories:

1. Fitting Covers - Preformed, one-piece, snap-on PVC jacket covers for fittings. Rated at 25/50 per ASTM E-84. Acceptable manufacturers: Certainteed Snap-Form, Proto LoSmoke, Zeston, or approved equal.

2. PVC Jackets - Smooth white PVC, 0.02" thick with self-sealing strip. Rated at 25/50 per ASTM E-84. Acceptable manufacturers: Proto LoSmoke or approved equal.

2.6 DRAINS - Refer to DRAIN SCHEDULE on drawings for each required drain.

2.7 ELECTRONIC TRAP PRIMERS

A. Electronic trap priming manifold shall supply a minimum of 2 ounces of potable water per opening at 20 PSIG once in each 24 hour period. The electronic trap priming manifold must be capable of equally priming from 4 through 30 individual floor drain traps. Electronic components shall include single point power connection at 120/1/60, manual override switch, minimum 5 amp breaker, 24 hour geared timer with relay and 5 second dwell function.

B. The unit shall be factory assembled, prepiped, tested and shall include a bronze body $\frac{3}{4}$ " female NPT, WOG rated ball valve, $\frac{3}{4}$ " water hammer arrester, copper barrel with brass piston and type "L" copper sweat connection, electronic brass body $\frac{3}{4}$ " solenoid valve, and type "L" copper manifold with brass $\frac{1}{2}$ " compression fitting and orifice opening for precision water distribution to each floor drain trap. Units shall be insulated. In a 16 gauge steel enclosure suitable for surface or recess mounting. In addition, the components must comply with nationally recognized standards. The electronic trap priming manifold shall be fully warranted for the life of the plumbing system. Acceptable manufacturers: Precision Plumbing Products PT series or approved equal.

2.8 ELECTRICAL WORK

A. Materials shall be new and shall be Underwriters Laboratories labeled or listed. Wiring shall be contained in metallic raceways. Raceways shall meet the requirements of DIVISION 16 - ELECTRICAL. Wiring for 115 volts and higher shall be copper #12 AWG or larger. Wiring type, insulation, etc. shall meet the requirements of DIVISION 16 - ELECTRICAL. Wiring less than 115 volts shall be copper. Wire size, type and insulation shall be selected to suit the application.

PART 3 - EXECUTION

3.1 BACKFLOW DEVICES

A. Installation of backflow devices, where indicated on the drawings, shall be by a certified installer. Prior to acceptance of the project, the backflow device shall be tested by the installer and a test report furnished the Architect/Engineer .

B. Backflow devices shall be installed a minimum of 12" above finished floor or grade and shall be protected against physical injury. Vacuum breakers (atmospheric type) shall be installed a minimum of 6" above the flood level of the fixtures or equipment served. Device shall be constructed so that it may be serviced without removing the device from the piping system.

C. When installed inside the building an air gap drain (AGD) funnel shall be installed on each reduced pressure backflow device and piped to the nearest floor drain unless otherwise noted. When installed outside of the building, the device shall be protected by an insulated enclosure.

3.2 INSULATION

A. Pipe, fittings, valves, etc., shall be insulated as hereinafter specified unless otherwise noted.

B. Piping systems:

1. New domestic water piping, fittings and valves installed inside the building or in an accessible crawl space shall be insulated with pipe insulation as hereinbefore specified. Underground domestic hot and tempered water piping, fittings and valves shall be insulated with $\frac{3}{4}$ "-thick foamed elastomeric slip-on tubular type insulation as hereinbefore specified.

2. Fitting insulation shall be covered with jacket covers. Jacket cover joints shall be fastened using stainless steel tack fasteners, pressure sensitive tape, brushed-on vapor barrier mastic or any approved combination.

3. Floor drains and P-traps receiving air conditioning condensate and electric water cooler waste piping above the lowest floor slab, shall have the waste piping and fittings including the bottom of the floor drain insulated from the floor drain or P-trap to the waste stack.

C. Joints:

1. Fiberglass - Transverse joints in exposed fiberglass insulation shall be secured by self-adhering butt strips. Longitudinal joints in exposed fiberglass insulation shall be secured by self-adhering lap strips which are an integral part of the vapor barrier jacket. Longitudinal joints in concealed fiberglass insulation shall be secured as specified for exposed insulation or may be stapled by using outward clinching staples. If the self-adhering lap strips do not adhere firmly, the Contractor shall re-secure the defective lap strips by stapling as specified above.

3.3 SANITARY SYSTEM

A. Sewage piping from soil and waste stack lines shall be extended to 10 feet outside of the building and terminated with a plug for extensions under other Divisions of the Specifications.

B. Horizontal sanitary piping shall be graded not less than 1/8" per foot unless otherwise noted. See drawings for grading other than specified above. Swing joints shall be installed in sewer systems where piping leaves pile supported slabs. Changes in direction in the sanitary system shall be made by the appropriate use of 45 degree wyes, long or short sweep quarter bends, sixth, eighth, or sixteenth bends, or by a combination of these or equivalent fittings. Single or double sanitary tees and short quarter bends may be used only where the flow is from the horizontal to the vertical. Waste and vent lines shall be provided for each fixture and drain, as scheduled on the drawings.

C. Vent piping shall be connected at a height of not less than 12" above the flood level of the fixture served, and shall be graded to drip back into the soil, waste, or vent stack by gravity. Fixtures not specified to be provided with traps as integral parts of their assembly shall have separate traps. No PVC piping shall be installed in any return air plenum space.

D. Vertical stacks, (stack vents and vent stacks) unless indicated otherwise, shall be extended full size not less than 9" above the roof and shall be placed in position before the roofing is applied. Vents shall be flashed using two piece boot and thimble type flashing with the top of thimble turned down into the cavity of the pipe. Flashing shall be of 2½ pound sheet lead and shall extend 8" from the outside of the boot in all directions. Vertical stacks installed through metal roofs shall have flashing furnished and installed under other Divisions of the Specifications. No vertical stacks shall be installed within 10'-0" of any new or existing air intakes. Offset stacks in ceiling below to comply with this requirement.

3.4 CLEANING AND FLUSHING

A. New water lines shall be cleaned and flushed prior to being placed in use and before final acceptance. Water shall be allowed to flow at full main pressure through fixtures and outlets for a minimum of 15 minutes. Prior to flushing, aerators shall be removed and shall be replaced after flushing.

3.5 ELECTRICAL WORK

A. Control or signaling wiring shall not be installed in raceways with power wiring. Wiring and raceways for line voltage interlocking shall be work of this Section. Voltage shall be 115 volts, 1-phase, 60 hertz. Provide transformer where required. Control and signaling wiring and raceways between equipment specified under this Section shall be work of this Section.

B. A source of power may be indicated under DIVISION 16 - ELECTRICAL for activating control devices where power for controls does not originate at the control transformer furnished with the starter or control panel. Work of this Section shall include

wiring required for controls from this source. If additional 120 volt power is required it shall be obtained from spare breakers at a location approved by the Architect/Engineer . The cost of installation of raceways, wiring, etc. shall be included as work of this Division. The Contractor shall review electrical drawings prior to bidding.

- END OF SECTION -

SECTION 15500 - FIRE PROTECTION

PART 1 - GENERAL

1.1 SCOPE

A. The work under this Section includes modifications to the existing wet pipe automatic sprinkler system in accordance with NFPA 13.

B. The wet pipe sprinkler system shall be provided with the required components to provide a complete and working system which shall include but shall not be limited to sprinkler heads, hangers, accessories, appurtenances, and piping.

C. The installation of the modifications and additions to the existing fire sprinkler system shall be coordinated with mechanical work, electrical work, and work of other trades.

1.2 SPECIAL REQUIREMENTS

A. The project includes several unique elements which will require careful attention during preparation of sprinkler system shop drawings. Bidders shall thoroughly review all portions of the contract documents to obtain a full understanding of project requirements. Some of the unique elements which effect layout of the sprinkler system include:

1. The project scope of work also includes replacement of an existing air handling system including new ductwork, installation of ductless AC units, related and unrelated work. Remove, redesign and install the sprinklers in the areas of work to maintain full coverage.

2. The work will require removal and reinstallation of existing ceilings in many areas. Remove and reinstall existing sprinkler system components to suit the work of all trades.

1.3 CONTRACTOR QUALIFICATIONS

The installation of the fire protection system shall be by a licensed Fire Protection Contractor, certified by the State of Louisiana, regularly engaged in the installation of fire protection systems and equipment.

1.4 SUBMITTALS

A. The Contractor shall prepare equipment brochures, and if required, hydraulic calculations and shop drawings for the work of this contract.

B. Equipment brochures shall consist of items specified hereinafter and items

that are pertinent to the work.

C. Hydraulic calculations shall be computer generated in an acceptable NFPA format.

D. Shop drawings shall show the arrangement of piping, equipment and details necessary to install the work. Shop drawing size shall not exceed "E" size (30"x42") sheets.

E. The Contractor shall submit the following to the Architect for review:

1. Six sets of equipment brochures.
2. Hydraulic calculations and shop drawings.
3. Completed Louisiana State Fire Marshal's plan review form.
4. Check for review fee.

F. The hydraulic calculations and shop drawings shall be prepared by and certified by a NICET Level III designer or a registered Louisiana mechanical engineer.

G. In the event additional clarifying details and/or components are required by the inspecting authorities, the Contractor shall prepare the details, secure approval and provide components at no additional cost to the User Agency.

PART 2 - PRODUCTS

2.1 PIPING

A. Wet pipe sprinkler system piping:

1. Piping 2" and smaller - Welded and seamless black carbon steel pipe, Schedule 40, ASTM A 795, fittings shall be threaded black cast iron 125 psi, ANSI B16 .4; joints shall be threaded.

2. Piping 2½" and larger - Welded and seamless black carbon steel pipe, Schedule 40, ASTM A 795; fittings shall be grooved type malleable iron, 125 psi rating, ASTM A 47, listed by UL and/or FM; joints shall be roll-grooved type.

2.2 JOINTS

A. Grooved joints shall be UL listed and FM approved. Gasket material shall be butyl rubber. Coupling shall be secured using track head cadmium plated bolts and nuts. Grooves shall be rolled type for Schedule 40 pipe.

B. Welded joints shall be in accordance with ANSI B31.1.0, ANSI B31.1.0a, and ANSI B31.1.0b.

C. Screwed joints shall be in accordance with ANSI B2.1.

2.3 SPRINKLER HEADS

A. Heads installed in areas without ceilings or in spaces above suspended ceilings shall be upright type with bronze finish. Heads installed in areas with smooth suspended ceilings shall be flush type and shall match existing building standard heads in finish, style, and pressure rating.

B. Heads shall be rated at 165, 212, and/or 286 degrees Fahrenheit as required to suit the hazard protected.

C. Heads shall be tested and listed by UL and/or FM. Sprinklers shall be the product of the manufacturer represented by the successful sprinkler Contractor.

D. Sprinkler heads installed where they may be exposed or subject to mechanical damage shall be provided complete with head guards.

2.4 SPARE HEAD BOX

A. Provide in a conspicuous place near the main riser valve, an enameled steel box housing 12 spare heads and a sprinkler wrench. Style and rating of heads shall be in proportion to the style and ratings of the heads installed.

2.5 IDENTIFICATION SIGNS

Drains required to have signs by NFPA 13 shall have standard identification signs. Signs shall be painted fire red with white lettering and shall be attached in a conspicuous position.

PART 3 - EXECUTION

3.1 TESTS AND ACCEPTANCE

A. The fire protection system shall be tested under hydrostatic pressure not exceeding 200 psi for a duration of not less than two hours. Piping installed above existing ceilings shall be tested with compressed air for two hours at 200 psi.

B. The control valves for existing risers and mains shall be closed during the pressure testing of the new system. Joints shall be proven tight by the test. Defective work or materials shall be corrected or replaced in an approved manner. If necessary, piping shall be dismantled and reassembled with the use of new pipe or fittings. No caulking or makeshift method of temporary repair of defective work will be permitted. Tests shall be

repeated until the particular line or system receives the approval of the representative of the Architect.

C. Final acceptance of the fire protection work will not be granted until the system is inspected and accepted by a representative of the State Fire Marshal.

3.2 WATER DAMAGE

The fire protection Contractor shall be responsible for any damage to the work of others, to the building, property and materials of others caused by leaks in the fire protection system caused during the installation and/or testing of the fire protection system. The fire protection Contractor shall pay for the replacement or repair of any work or items so damaged.

3.3 SPRINKLER HEADS

A. Sprinkler heads shall be provided to provide complete building coverage per NFPA 13.

B. Escutcheon or cover plate shall be installed tight to the ceiling and shall completely cover the opening provided for the head.

3.4 HYDRAULIC CALCULATIONS

A. The hydraulic calculations shall be based on the fire protection system described in paragraph 1.1.A SCOPE. Prepare hydraulic calculations for the design of the system and submit them to the Architect for review.

B. Hydraulic calculations shall be prepared in accordance with NFPA 13 formats.

C. Prior to designing the system, conduct a flow test to determine the current gpm, static and residual pressures available in the public water mains at the site.

3.5 SPRINKLER SYSTEMS

A. The sprinkler systems shall be hydraulically designed in accordance with NFPA 13 for the current occupancy for each space.

3.6 PIPE SUPPORTS

A. Piping shall be supported by means of hangers tested and listed by UL and/or FM. Sizing, spacing and installation shall be in accordance with NFPA 13.

B. Bolts and threaded rods shall have double nuts and washers or single nut, washer and lock washer.

C. Starting length, end length, and alternate lengths of main piping with grooved joint couplings shall be provided with two supports.

3.7 FLUSHING

A. Before filling the interior fire protection system with water and before connections are made to the automatic sprinkler risers, each part of the underground system shall be thoroughly flushed until the water runs clear. Minimum flow during flushing shall be as follows:

Pipe Size	Flow, GPM
3"	300
4"	400
6"	750

B. Before performing pressure tests, the interior mains shall be thoroughly flushed by flowing water through each of the mains for five minutes. Provide temporary piping or hoses as required.

- END OF SECTION -

SECTION 15600 - HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS

PART 1 - GENERAL

1.1 SCOPE

A. Work under this Section shall include providing complete and functioning Heating, Ventilating and Air Conditioning (HVAC) systems for the project and appurtenances indicated or necessary.

B. Items specified or required shall be provided for a complete and operating system as described in SECTION 15010 - MECHANICAL GENERAL PROVISIONS.

1.2 ELECTRICAL WORK

A. Electrical work in connection with work of this Section not indicated as work of DIVISION 16 - ELECTRICAL, shall be work of this Section.

PART 2 - PRODUCTS

2.1 VALVES

A. Valves shall be as listed below unless otherwise noted on the drawings:

1. Shut-off Valves (Chilled Water):

a. 3" and smaller - Watts Series B-6081, Nibco Series S-545, full port ball valve, 400 psi ASTM B 124 - brass body, ASTM B 16 brass ball and blowout proof stem; PTFE seats, packing and gaskets; sweat ends; two piece construction with lever handles.

Acceptable manufacturers: Conbraco, Hammond, Milwaukee, Nibco, Red-White, Watts, or approved equal.

b. 4" and larger - Hammond Series #6211-01, Metraflex Series BW-2, or Nibco Series LD-2000-3 butterfly valve; 200 psi ASTM A 126 or A 536 iron lug style body with aluminum bronze disc, ASTM B 148; EPT liner; for ANSI standard 150 psi flanges; with locking lever handle.

Acceptable manufacturers: Centerline, DeZurik, Hammond, Metraflex, Nibco, or approved equal.

2. Check Valves (Chilled Water):

a. 2½" and smaller - Nibco Series S-413, or Hammond Series IB912 or Jenkins #92-A, 150 psi swing check; ASTM B 62, bronze body and disc holder; composition type removable disc; soldered ends.

Acceptable manufacturers: Crane, Jenkins, Milwaukee, Nibco, Red-White, or approved equal.

b. 3" and larger - Jenkins #624, Hammond IR-1124, or Nibco Series F-918, 125 psi swing check; ASTM A 126, iron body with ASTM B 62 bronze disc and seat ring; flanged ends for ANSI standard 150 psi flanges.

Acceptable manufacturers: Crane, Hammond, Jenkins, Milwaukee, Nibco, Red-White, or approved equal.

c. At the Contractor's option, he may provide for 2½" and larger check valves above grade, Nibco #F-910 or Metraflex #900, 125 psi flanged, globe style check valve; ASTM A 48, Class 35 cast iron body with ASTM B 584 bronze seat and disc; flanged ends for ANSI standard 125 psi flanges.

3. Grooved Type Valves:

a. Valves provided for use with an approved grooved-piping system may be a product of the approved piping system manufacturer. Valve type, style, etc., shall be as hereinbefore specified for valve use.

4. Refrigerant Valves:

a. Valves shall be Henry Valve Co, packing type globe valves with seal cap, or approved equal.

B. Ball or butterfly valves installed in insulated piping systems shall have factory-furnished stem extensions suitable for thickness of insulation installed.

C. Each type of valve provided for the project (ball valves, butterfly valves, etc.) shall be of the same style and manufacturer, unless prior written deviation is granted.

2.2 STRAINERS

A. Strainers shall be as listed below unless otherwise noted on the drawings:

1. Y-type (Chilled Water):

a. 2" and smaller - Muesso #351 or Metraflex #BS-Y solder or screw joint strainer, 150 psi ASTM B 62 bronze body; screw type blow-off and strainer removal.

b. 2½" and larger - Muesso #751 or Metraflex #TF flanged-end strainer; 125 psi ASTM A 126, Grade B, cast iron body; bolted strainer removal and tapped blowoff; for ANSI standard 125 psi flanges.

c. Strainer baskets shall be stainless steel construction and shall have perforations as follows:

- 1) Water - 2" and smaller - 0.033" (1/32").
2 1/2" to 4" - 0.057" (1/16").
5" and larger - 0.125" (1/8").

B. Strainer blow-offs in water systems shall be provided with shut-off valves, as specified for type of service. On water piping sizes 1¼" and smaller, provide with a capped garden hose thread adapter.

2.3 PIPING

A. Piping shall be as listed below unless otherwise noted on the drawings:

1. Chilled piping and fittings above grade:

a. 2½" and smaller - Seamless copper water tube, ASTM B 88 Type L, hard-drawn; wrought copper solder-joint fittings, ANSI B16.22; joints shall be made with 95-5 solder, ASTM B 32, Grade 95A. **All threaded nipples and fittings ¾" diameter and smaller shall be brass.**

b. 3" and larger - ERW black carbon steel pipe, schedule 40, ASTM A 53, Grade B; fittings shall be standard black carbon steel, ASTM A 234; joints shall be welded.

c. ERW black carbon steel pipe, schedule 40, ASTM A 53, Grade B; mechanically rolled grooved; fittings shall be fabricated of malleable iron, ASTM A 47, or ductile iron, ASTM A 536 castings. Where required fitting pattern is not available factory-constructed, standard wall, seamless type welding fittings with rolled grooved ends may be used. Couplings shall be fabricated of ductile or malleable iron castings in two or more parts. Coupling gasket shall be molded synthetic rubber, per ASTM D 2000. Coupling bolts shall be cadmium plated, oval-neck, track-head, heat treated carbon steel type, with hexagonal, heavy nuts per ASTM A 183. Provide required adapters, nipples, flanges, etc., as required to connect to valves specified. Acceptable manufacturers: Victaulic, or approved equal.

2. Refrigerant tubing, piping and fittings:

a. Seamless copper air conditioning and refrigerant tube (ACR), ASTM B 280, Type L, hard-drawn; wrought copper solder-joint fittings, ANSI B16.22; joints shall be silver soldered or brazed, AWS A5.8.

3. Condensate drain piping and fittings:

a. 1" and smaller - Seamless copper water tube, ASTM B 88, Type L, hard-drawn; wrought copper solder-joint fittings, ANSI B16.22; joints shall be soldered using 95-5, ASTM B 32, Grade 95A solder.

b. 1¼" and larger - Seamless copper drainage tube, ASTM B 306, Type DWV; cast bronze solder-joint fittings, ANSI B16.23; joints shall be soldered using 95-5, ASTM B 32, Grade 95A solder.

2.4 SPECIALTIES

A. Water:

1. Expansion Tanks (Diaphragm):

a. Each tank shall have capacity and shall be of the horizontal or vertical style as indicated on the drawings.

b. Upper and lower domes of the tank shall have an outer shell of steel construction designed in accordance with ASME Section VIII Boiler Code. The shell shall be specifically designed for use in a diaphragm type tank. Tank shall be finished with high gloss enamel over zinc chromate primer. Where required due to size an inner support dome shall be provided. An integral support base shall be provided on floor models.

c. Seamless diaphragm shall be constructed of heavy duty Butyl.

d. Bottom liner shall be a separate unit of rigid polypropylene construction.

e. Diaphragm, liner and "O-ring" shall be mechanically bonded to shell for a complete waterproof seal.

f. Fittings shall be copper lined and silver brazed to tank for a watertight dielectric connection.

g. Tank shall be factory precharged to 12 psig.

h. Chilled water system tank shall be insulated as specified under insulation.

Acceptable manufacturers: Amtrol, Bell & Gossett, Taco, or approved equal.

2. Manual Flow-balancing devices:

a. 2½" and smaller: Bell & Gossett Series CB. Bronze or cast iron construction with bronze disc and integral adjustable calibrated balancing valve with readout connections for differential-pressure meter rated 200 psi at 400 F. Balancing valve shall have an indexing pointer and calibrated nameplate to indicate degree of valve closure. Readout connections shall have integral EPT check valves. Flow balancing device shall be sized for a pressure drop at design flow of not less than 1 psi and not more than 5 psi in the fully open position. Provide increasers/decreasers as required to suit line size.

b. 3" to 6": Bell & Gossett series CB cast iron construction with Class 125 flanges. Valves shall be fitted with a bronze seat, replaceable bronze disc with EPDM seal insert, and stainless steel stem. Valve shall have memory stop feature and calibrated nameplate with pointer indicating valve position. Valves shall be rated 175 psi at 250 F and shall close leak-tight at full rated working pressure.

3. Temperature and Pressure test plugs (Chilled Water systems):

a. Each test plug shall be of solid brass construction suitable for 1000 psig and 275° F. Plug shall have ¼" or ½" NPT threads for installing into standard coupling or fitting. An EPT self-sealing valve core with removable brass cap shall be capable of receiving a 1/8" diameter thermometer or pressure-gauge stem. Fitting and cap shall be extended above insulation.

b. The Contractor shall provide the Owner prior to acceptance of the project one pressure/temperature test kit consisting of carrying case, one 1½" test gauge, one gauge adapter and two 1" thermometers.

4. Thermometers and Wells:

a. Bimetal type - Each thermometer not provided as part of packaged equipment shall be liquid-filled rigid or angle style and have a stainless steel case, bezel, fittings and stem. Scale plate shall be of white aluminum with permanent black figures and graduations. Head assembly shall be sealed within a glass window. Bimetal element shall be a silicone coated low-mass helix carefully sized and aged, encased within the thermometer stem. Scale size shall be 5" diameter; stem length shall be 2½". Temperature ranges shall be as follows:

(1) Chilled water systems - 0 to 150° F.

b. For each thermometer provide a separable well of brass construction, lagging extension type, for use in insulated piping systems.

5. Gauges:

a. Each gauge not provided as a part of packaged equipment shall have a 4½" dial diameter, aluminum flangeless case, phosphor bronze bourdon tube, bronze and stainless steel movement; ¼" NPT forged brass socket and tip; accuracy shall be 1 percent of scale range.

b. Gauge scales shall be selected so that the normal operating pressure falls approximately in the middle of the scale selected.

c. Each gauge shall be installed on a tee handle cock, solid brass construction. Gauges shall have a pressure rating to suit the system design pressure, but shall have a minimum rating of not less than 125 psi.

d. Acceptable manufacturers: Marshaltown Model #175P, U.S. Gauge, Weksler #BA14-I, or approved equal.

6. Flexible Connectors:

a. 2" and smaller - Metraflex Model BBS with corrugated bronze inner hose and bronze outer braid with solder-joint copper tube ends; or approved equal. Rated working pressure 165 psi at 250 F.

b. 2½" & Larger - Metraflex Metrasphere, or equal, spherical elastomeric flexible pump connector rated for 190 psi working pressure at 200 F. Provide with tie rod type control units to limit elongation and compression. Provide with Class 150 end flanges. Provide Metraflex Vaneflex connector with internal carbon steel flow straightening vanes for connectors installed on pump discharge piping.

7. Air Separator:

a. Air Separator (Chilled Water Systems). Each separator shall be of cast iron construction up to 2½" in size and welded steel construction in 3" and larger sizes. Construction shall be in accordance with ASME Section VIII Boiler Code for 125 psig and carry the ASME and National Board certification. Tangential inlet and outlet connections shall be NPT up to 3" size and flanged for sizes 4" and larger. Internal collector tube shall be perforated, stainless steel.

b. Acceptable manufacturers: Armstrong #VAS, Bell & Gossett #R, Taco, or approved equal.

8. Air Control Products:

a. Any other air control products such as, but not limited to, the following:

- 1) Compression tank and air charger tank drain;
- 2) Manual air vents;
- 3) Automatic air vents, brass or bronze body, stainless steel float, Hoffman No. 78 or equal.
- 4) Acceptable manufacturers: Armstrong, Bell & Gossett, Taco, or approved equal.

9. Pressure Reducing Valves (Fluids):

a. Body construction of each valve shall be of brass or cast iron as required by piping system. Valves shall be equipped with low inlet-pressure check valve and inlet strainer. Reduced-pressure setting shall be factory set but shall be easily externally adjustable.

b. Wetted parts shall be of noncorrosive construction (Buna-S, rubber, stainless steel or brass). Strainer, valve seat and stem shall be removable for service.

c. Acceptable manufacturers: Armstrong #HRD-11, Bell & Gossett #B3, Taco, Thrush, or approved equal.

2.5 INSULATION

A. Insulation shall have a vapor-barrier jacket or facing complying with NFPA-90A fire and smoke hazard rating as determined by Underwriters Laboratories procedure UL 723, ASTM E 84 and NFPA 255 not to exceed a flame-spread of 25 and smoke-developed of 50. Maximum permeability of jacket shall be 0.02 per ASTM E 96.

B. Accessories such as adhesives, mastics, cements, tapes, etc., shall have the same fire and smoke hazard rating as jacket or facing.

C. Piping Systems:

1. Unless otherwise noted, piping installed inside the building shall be insulated with preformed split-type insulation. Insulation type and thickness shall be in accordance with the following table:

Inside the Building			
Service	Pipe Size	Insulation Type	Insulation Thickness (inches)
Chilled Water	1 1/2" and smaller	Fiberglass	1 1/2"
Chilled Water	2" through 6"	Cellular Glass	2"
Refrigerant Suction and Hot Gas	All	Closed Cellular	3/4"
Condensate Drain	All	Closed Cellular	1/2"

2. Piping installed outside the building and above grade shall be insulated with fiberglass split type pipe insulation in accordance with the following table:

Outside the Building and Above Grade			
Service	Pipe Size	Insulation Type	Insulation Thickness (inches)
Chilled Water	6" and smaller	Cellular Glass	2"
Refrigerant Suction and Hot Gas	All	Closed Cellular	1"
Condensate Drain	All	Closed Cellular	1/2"

3. Fiberglass Piping Insulation - Pre-formed split-type fiberglass insulation, nominal 3-pound per cubic foot density, white all service jacket, and with thermal conductivity (k factor) of 0.23 at mean temperature of 70° F. Insulate fittings, flanges and valves with factory molded or field mitered sections joined with adhesive and wired in place. Provide vapor seal at fittings with a layer of glass fitting tape embedded between two 1/16" coats of vapor retarder mastic. Fitting tape shall extend over the adjacent pipe insulation and overlap on itself at least 2".

4. Cellular Glass Piping Insulation - Preformed split-type cellular glass piping insulation, nominal 7.5 pound per cubic foot density, white all service jacket, and with thermal conductivity (k factor) of 0.29 at mean temperature of 75° F. Apply joint sealant at all joints. Insulate fittings, flanges and valves with factory molded sections joined with adhesive and secured with metal bands. Provide vapor seal with vapor retarder or weather barrier reinforced mastic. Insulation shall be Foamglas by Pittsburg Corning, or approved equal.

5. Closed Cellular - Foamed tubular elastomeric insulation. Insulation shall meet the requirements of ASTM C 534, have a flame spread rating of 25 or less and a smoke developed rating of 50 or less per ASTM E 84. Miter fit insulation at fittings and accessories. All seams and splices shall be glued.

6. Pipe Insulation Jackets - Provide jackets over insulated piping, fittings, flanges and valves. Jackets shall be in accordance with the following table:

Piping Insulation Jackets			
Service	Location	Jacket Type	Color
Chilled Water	All exposed including exposed in Mechanical Rooms	0.030" PVC	White
Refrigerant	Outdoors	2 coats of manufacturer's recommended paint plus 0.020" PVC over straight sections	White

7. Acceptable manufacturers: Knauf, Owens-Corning, or approved equal.

D. Ductwork:

1. Ductwork indicated to be externally insulated.

a. External wrap shall be 2" thick, 1 pound-per-cubic-foot density (or 2.2" thick 3/4 pound-per-cubic-foot density) commercial-grade duct wrap. Insulation shall have a maximum "k" factor per ASTM C 518 of 0.29 Btu×in/hr×ft²×°F at 75° F mean temperature. Maximum permeability of facing shall be 0.02 per ASTM E 96. Provide with FSK (foil-scrim-kraft) jacket.

b. Ductwork external rigid board insulation shall be 2" thick, 6 pound density rigid duct board. Provide with FSK (foil-scrim-kraft) jacket.

c. External duct insulation shall have a vapor-barrier complying with NFPA 90A with fire and smoke hazard rating as determined by Underwriters Laboratories procedure UL 723, ASTM E 84, and NFPA 255 not to exceed a flame spread of 25 and a smoke developed of 50. Maximum permeability of facing shall be 0.02 per ASTM E 96.

2. Duct Lining (Flexible):

a. Ductwork inside buildings specified to have internal acoustical and thermal lining shall have 1" thick, 1½ pounds-per-cubic-foot density, coated, flexible duct liner.

b. Liner shall have a maximum "k" factor per ASTM C 518 of 0.23 Btu×in/hr×ft²×°F at 75° F.

c. Liner shall have a coating on the air-side of the lining which shall comply with Underwriters Laboratories procedure UL 723, ASTM E84, and NFPA 255 not to exceed a flame spread of 25 and smoke developed of 50.

d. Liner surface shall be treated with an EPA registered anti-microbial agent to prevent fungal and bacterial growth. The liner shall conform to ASTM C 1338, G21 and G22. The liner shall have an encapsulant edge coating.

E. Cold Equipment:

1. Cold equipment not provided with factory insulation and jacket shall be field insulated. Insulation shall have a maximum "k" factor per ASTM C 177 or C 158 of 0.28 Btu×in/hr×ft²×°F at 75° F mean temperature. Maximum permeability rating shall be 0.17 per ASTM C 355. Flame and smoke hazard shall comply with NFPA 90A as determined by ASTM E 84 not to exceed a flame spread of 25 and smoke developed of 50.

2. Adhesive used to secure insulation to equipment, etc., shall be of the contact type, approved by the insulation manufacturer, be compatible with the insulation and have the same fire and smoke hazard rating as the insulation.

3. Acceptable manufacturers: Armaflex, Rubatex, or approved equal.

F. Hot Equipment with normal operating temperatures of 180 deg F or less:

1. Hot equipment not provided with factory insulation and jacket shall be field insulated. Insulation shall have a maximum "k" factor per ASTM C 177 or C 158 of 0.28 Btu×in/hr×ft²×°F at 75° F mean temperature. Maximum permeability rating shall be 0.17 per ASTM C 355. Flame and smoke hazard shall comply with NFPA 90A as determined by ASTM E 84 not to exceed a flame spread of 25 and smoke developed of 50.

2. Adhesive used to secure insulation to equipment, etc., shall be of the contact type, approved by the insulation manufacturer, be compatible with the insulation and have the same fire and smoke hazard rating as the insulation.

3. Acceptable manufacturers: Armaflex, Rubatex, or approved equal.

2.6 DUCTWORK

A. General:

1. Inlet and outlet connections to fan equipment shall be made with flexible fiberglass, nylon cloth a maximum of 10" in length, DuroDyne Excelon, or equal. The cloth shall be flame retardant and have a maximum flame spread rating of 25 and a maximum smoke developed rating of 50.

2. Joints and seams in duct systems shall be sealed with joint sealant.

3. Ductwork shall be fabricated and installed in accordance with applicable SMACNA standards.

4. Square and rectangular ductwork shall be constructed in accordance with the following table:

SQUARE AND RECTANGULAR DUCTWORK			
Service	SMACNA Pressure rating (Inches WG)	SMACNA Seal Class	Insulation Type
Supply Ductwork	2	B	Lined
Return and Transfer Air Ductwork	-2	C	Lined
General Exhaust Ductwork	-2	C	None
Outside Air	-2	C	External

5. Round and oval ductwork shall be constructed in accordance with the following table:

ROUND AND OVAL DUCTWORK			
Service	SMACNA Pressure rating (Inches WG)	SMACNA Seal Class	Insulation Type
Supply Ductwork	2	B	External
Return Air Ductwork	-2	C	External
Outside Air Ductwork	-2	C	External
General Exhaust Ductwork	-2	C	None

B. Supply, Return, Outside Air and Exhaust Ductwork:

1. Square and Rectangular:

a. Ductwork shall be constructed from galvanized sheet steel except where stainless steel is indicated. Gauges and construction standard shall be in accordance with "SMACNA HVAC Duct Construction Standards, Metal and Flexible", latest edition.

b. 90-degree elbows in square and rectangular ductwork shall have single-thickness turning vanes on 1½" centers. Other changes in direction less than 90-degrees shall be made with radius type fittings. **Omit turning vanes in internally lined transfer ductwork.**

c. Sizes indicated on the drawings are sheet metal sizes. Where applicable, allowance has already been made for the lining.

2. Single Wall Round and Oval:

a. Except where indicated otherwise, duct and fittings as shown on the drawings shall be unlined, round or oval, spiral wound, manufactured from galvanized sheet steel complying with ASTM A653/653M, A924/A924M. Where indicated, ductwork and fittings shall be stainless steel. Ducts shall have lockseam construction.

b. Fittings shall be compatible with the duct and provided by the duct manufacturer. Elbows up to 8" in diameter shall be die-formed, elbows 9" and larger shall be segmented. Fitting joints shall be brazed or welded.

c. Snap-lock ductwork will not be allowed.

d. Joints between duct and fittings shall be flanged type for exhaust systems and shall be either slip or flanged type for supply.

2.7 FLEXIBLE DUCTS

A. Flexible ductwork shall be acoustical type Flexmaster 8M or equal, factory-fabricated, preinsulated assembly rated for a positive working pressure of 10" w.g. Assembly shall consist of a laminate inner liner encapsulating a high-tensile, spring steel helix wire. A fiberglass blanket with an insulating value of $R=6.0^{\circ}\text{F}\cdot\text{Ft}^2\cdot\text{Hr}/\text{BTU}$ shall cover the inner liner. The insulation shall be covered with a reinforced metalized jacket. Jacket shall have a perm rating of 0.01 per ASTM E 96-A. The entire assembly shall comply with UL 181, NFPA 90A and 90B as a Class 1 Air Duct Material. Assembly shall also have a flame spread rating of 25 or less and a smoke developed rating of 50 or less.

2.8 DUCT FITTINGS

A. Spin-in

1. Each rigid or flexible round duct shall be connected to the square or rectangular sheet metal main or branch ducts using an engineered, galvanized, sheet metal fitting as shown on drawings.

2. Fittings shall be constructed of heavy gauge, galvanized sheet steel with riveted construction. Where duct sizes allow, provide conical-converging type to reduce the pressure-drop through the fitting. Throats of fittings shall be constructed so that positive seals are provided when fittings are installed.

3. The following options shall be provided:

a. Adjustable dampers with positive-locking, damper regulators with handles (delete dampers in VAV systems upstream of VAV boxes).

b. Insulation stand-offs to allow for damper adjustment without damaging insulation.

2.9 DUCT ACCESS DOORS

A. Frame shall be 22-gauge galvanized steel with neoprene gasket seal and "dove tail" edges to attach to ducts. Size of doors shall be as required to service item inside duct.

B. Doors shall be 22-gauge galvanized steel with continuous piano hinge and cam locks. Quantity of locks shall depend on door size.

C. Door shall be insulated with 2" thick, fiberglass insulation compressed to 1". "R" factor shall be 7.7.

D. Access doors installed at fire dampers shall have glass panel insert.

E. Acceptable manufacturers: Air Balance, Karp type KHD, Krueger, Ruskin type ADH-22 or ADHW-22, or approved equal.

2.10 DUCT JOINT SEALANT

A. Indoor Application:

1. Duct and duct mounted equipment installed indoors shall be sealed using a mineral-gypsum impregnated fiber tape and a liquid adhesive. Tape and adhesive shall have a combined UL listing of a flame spread of 10 and a smoke developed of 0. Omit Sealant on ductwork exposed in finished areas.

2.11 VIBRATION ISOLATION

A. Provide isolators as specified. Where vertical height for installation is limited, modifications to the isolator connection may be required; i.e., custom brackets or supports to allow mounting of isolators to the side of in lieu of directly under equipment. Minimum deflection shall be in accordance with ASHRAE 2015 HVAC Applications Handbook, Page 48.45 for the specific installation conditions. Provide structural rails or structural bases where equipment base is not self supporting.

B. Isolation Type:

1. The following type isolation shall be provided unless specifically indicated otherwise on the drawings:

<u>Equipment</u>	<u>Type</u>	<u>Description</u>
Air Handling Units	C	Isolator Pads
Piping Systems	D	Spring and Rubber Hanger

2. Type A: Free-standing, unhoused, laterally stable steel springs incorporating leveling bolts and 1/4" thick ribbed noise isolation pads. The springs shall have a lateral spring stiffness greater than 0.8 times the rated vertical stiffness, and shall be designed to provide 50 percent overload capacity. In capacities up to 5,000 pounds, springs shall be replaceable. In capacities over 5,000 pounds, springs shall be welded to the top and bottom load plate assemblies.

Acceptable manufacturers: Amber/Booth, Vibration Mounting Series AC, Kinetics Model FDS, or approved equal.

3. Type B: Reinforced concrete inertia bases with spring isolators. The steel members shall be designed and supplied by the isolator manufacturer. Concrete shall be poured into a welded steel frame, incorporating prelocated equipment anchor bolts, 1/2" diameter reinforcing bars on nominal 8" centers each way, and recessed isolator mounting brackets to reduce the mountain height of the equipment, but yet remain within the confines of the base. The thickness of the base shall be a minimum of 8 percent of the longest span between isolators, at least 6 inches, or as indicated on the drawings. Where inertia bases are used to mount pumps, the bases shall be wide enough to support piping elbows.

Acceptable manufacturers: Amber/Booth, Vibration Mountings Type WPF, Kinetics Model CIB, or approved equal.

4. Type C: Pads shall be individually coated with a flexible moisture impervious elastomeric membrane. Pads shall have a constant natural frequency over the operating load range, and the stiffness shall increase proportionately with load applied. Pads shall be no taller than the shortest horizontal dimension. Where

the equipment base does not provide a uniform load surface, steel plates shall be bonded to the top of the pads.

Acceptable manufacturers: Kinetics Model KIP-Q Molded fiberglass, Vibration Mountings - Shear-Flex or Cork-Rib, or approved equal.

5. Type D: Combination spring and fiberglass (or rubber) hangers, incorporating precompressed molded fiberglass (or rubber) noise and vibration isolation pads, coated with a moisture impervious elastomeric membrane in series with springs, each encased in welded steel brackets. Springs shall be as hereinbefore specified. Isolators shall be designed for 50 percent overload capacity, and shall accommodate rod misalignment over a 30-degree arc. Brackets shall be designed to carry 500 percent overload without failure.

Acceptable manufacturers: Amber/Booth Vibrations Mounting Series RSH, Kinetics Model SFH, or approved equal.

2.12 PUMPS

A. Provide pumps of the types & capacities indicated on the drawings. Provide the pumps with the features and accessories indicated on the drawings and in the specifications.

B. Each pump suction and discharge connections shall contain threaded gauge tappings for reading pump pressure differential. Pumps not furnished with tappings shall have field installed insert flanges with gauge tappings or spool pieces with gauge tappings. Space requirements must not be exceeded.

C. In-Line Pumps:

1. Provide in-line type pumps for installation in vertical or horizontal piping. Pump body may be rotated to accommodate desired direction of flow; however, pump and motor must be horizontal position with oil cups on top. Pumps must be capable of being serviced without disrupting piping connections. Pumps shall have capacities as scheduled on the drawings.

2. Each pump shall be of close-grained cast iron, rated 175 psi working pressure, with gauge ports at nozzles, and with vent and drain ports. Companion flanges with gaskets shall be furnished with the pump.

3. Each impeller shall be brass, enclosed type, hydraulically and dynamically balanced, keyed to the shaft and secured by a locking capscrew.

4. The liquid cavity shall be sealed from the pump bearings by a mechanical seal with ceramic seat and carbon seal ring, suitable for continuous operation at 225° F or intermittent operation at 250° F. A nonferrous shaft sleeve shall completely cover the wetted area under the seal.

5. Each pump and motor shall have oil lubricated bronze bearing journal a flexible coupling to dampen starting torque and torsional vibrations.
6. The motor shall be securely fastened to the pump bearing housing. Additional support for the unit shall be from the pump bearing housing, not from the motor bracket.
7. Each pump shall be factory tested. It shall then be thoroughly cleaned and painted with at least one coat of high grade machinery enamel prior to shipment.
8. Provide TEFC motors for pumps installed outdoors.
9. Provide shaft grounding rings for pumps controlled by variable frequency drives.
10. Acceptable manufacturers: Bell & Gossett, Aurora, or approved equal.

2.13 AIR HANDLING UNITS (Central Station)

A. Provide air handling units of the central station type. Air handling units shall have the configuration, accessories, capacities and other features as indicated on the drawings and specifications. Each unit shall be complete with casings, fans, coil sections, drain pans, filters, accessories, and special features indicated.

B. Provide fans of type indicated in the unit schedule. Fan class (Class I, II or III) shall be selected to suit design conditions and such that the fan speed at design conditions does not exceed 80% of the maximum fan speed for the fan class. Fan shafts shall be solid steel, coated with a rust-inhibiting coating, and properly designed so that fan shaft does not pass through first critical speed as unit comes up to rated RPM. All fans shall be statically and dynamically tested by the manufacturer for vibration and alignment as an assembly at the operating RPM to meet design specifications. Fans controlled by variable frequency drives shall be statically and dynamically tested for vibration and alignment at speeds between 25 percent and 100 percent of design RPM. Fan wheels shall be keyed to fan shafts to prevent slipping.

C. Provide shaft grounding rings for fans controlled by variable frequency drives.

D. Belt-driven fans shall be provided with grease lubricated, self-aligning, anti-friction bearings selected for L-50 200,000-hour average life per ANSI/AFBMA Standard 9. Lubrication lines for both bearings shall be extended to the drive side of the AHU and rigidly attached to support bracket with grease fittings. Lubrication lines shall be a clear, high-pressure, polymer to aid in visual inspection.

E. Belt drive fans shall be provided with variable pitch sheaves, suitable for adjustment within plus or minus 10 percent of specified rpm but selected so as not to

exceed the maximum rpm of the unit and shall include the required V-belts. Provide replacement sheaves and belts to balance fans to design airflow during the HVAC testing and balancing procedure. Motors shall be selected so that the brake horsepower at design conditions does not exceed 80 percent of the motor nameplate rating and shall be mounted on an adjustable motor base with belt guard, and accessories as indicated on the drawings.

F. All fans, including direct-drive plenum fans, shall be mounted on spring isolation bases. Internally-mounted motor shall be on the same isolation base. Fan and motor shall be internally isolated with spring isolators. Provide a flexible connection (e.g. canvas duct) shall be installed between fan and unit casing to ensure complete isolation. Flexible connection shall comply with NFPA 90A and UL 181 requirements.

G. Fan sections containing multiple fans shall be provided as indicated on the schedule and drawings. Each fan shall operate in parallel to each other fan in the array. The fans shall be SWSI plenum type with high-efficiency AF blades. Fans shall be direct-driven. Motors shall be TEFC type. Fan wheels shall be aluminum. The horsepower characteristic of the fans shall be non-overloading. Provide a gravity backdraft damper for each fan in a fan array.

H. Fan sections containing multiple fans shall be controlled using a common control signal to modulate the fan speed. Provide factory wiring from each fan motor to a factory furnished and factory installed multi-fan terminal box with thermal overloads for each fan mounted on the outside of the unit. Provide an electrical disconnect switch for each fan.

I. Provide hinged and latched access doors as specified herein and as indicated on the drawings.

J. For units with plenum type fans, provide a kill switch on each fan compartment access door and on each fan inlet section access door and interlock the kill switches to de-energize the fan(s) and allow the fan(s) to stop rotating before the access door can be open.

K. The unit shall be constructed as a complete frame with removable panels. Removal of side panels shall not affect the structural integrity of the unit. The casing shall be able to withstand up to 8" w.g. of positive static pressure for sections which operate under positive pressure and 8" w.g. of negative static pressure for sections which operate under negative pressure. All exterior wall panels shall be made of galvanized steel. Closed-cell foam gasketing shall be provided where modules join to prevent air leakage.

L. Modules shall be factory insulated. Insulation and insulation adhesive shall comply with NFPA-90A requirements for flame spread and smoke generation. Insulation adhesive shall be UL listed.

M. Panels shall be 2" double-wall construction to facilitate cleaning of the unit interior. The interior wall shall be constructed of galvanized steel. Casing panels shall have a minimum R-Value of 13 hr x ft² x deg F/BTU.

N. Provide perforated metal fiberglass acoustical liner in fan compartment, discharge plenum section and where elsewhere indicated on the drawings. Liner shall be fiberglass with a perforated stainless steel cover to completely encapsulate the fiberglass insulation to prevent deterioration of the insulation.

O. Unit construction shall include thermal breaks and continuous insulation to ensure that condensation will not form on the exterior surfaces of the unit when operating at a 55 deg F supply air temperature with the surrounding air at 81 deg F dry bulb and 73 deg F wet bulb.

P. Provide a drain pan for all cooling coil sections. Drain pans shall be type 304 stainless steel, insulated double wall construction. Drain pan insulation shall be a minimum ½" thick foamed-in-place type insulation, securely fastened to pan with an approved adhesive and sandwiched between the bottom pan and a stainless steel liner. Seams shall be sealed with a suitable mastic. Pans shall be pitched to the drain connections for positive drainage.

Q. Coils shall be of the aluminum fin, copper tube type. Tubes shall be mechanically expanded to bond the fin collars to the tube surfaces. Coils shall be a minimum of ½" O.D. copper tubes with aluminum fins. Cooling coils shall have a type 316 stainless steel casing no lighter than 16-gauge. Heating coils shall have a type galvanized steel casing no lighter than 16-gauge. Coils shall be mounted in the coil casing and be accessible for service and shall be removable from the unit without dismantling the entire unit. Water cooling coils shall be enclosed in an insulated coil section. Coil header and "U" bends shall be contained within the unit's cabinet. Coils shall be pitched in the unit casing for proper drainage and shall be completely drainable, with both supply and return headers supplied with drain and vent connections extending through the unit casings. Coils shall be tested at 150 psig air pressure under water.

R. Filter boxes shall be a side access housing assembly designed to receive filters of the type and capacities scheduled on the drawings. Box shall be designed to insure snug fit of filters to prevent air by-pass. Provide necessary transition pieces to match unit inlet.

S. Access Sections and Doors

1. Access sections shall be furnished for fans, and coils, and the upstream side of filters, and elsewhere as shown on the drawings.

2. Access door shall be furnished in each access section. Doors shall be 4" less than height of access section unless otherwise shown on the drawings. Doors shall be equipped with hinges and hand-operated (no tools required) latch on both inside and outside of casing.

3. Access doors shall be hinged to open against system pressure.

T. Provide unit demounts to allow for air handling unit rigging and installation through building openings.

U. Acceptable manufacturers: Trane, Carrier, York, Daikin, Temtrol or approved equal.

2.14 FILTERS

A. Provide filter sections with filters having capacities and efficiencies indicated on the drawings.

B. Prefilters:

1. Filter media shall have a minimum efficiency of 30 percent when tested in accordance with ASHRAE Standard 52–76. Filters shall have permanent frames, replaceable media, and rated by Underwriters Laboratories Standard 900 as Class I.

2. Filter boxes shall be of the same construction as the air unit and provided with spring loaded filler strips to prevent air from bypassing the filter media.

3. Acceptable manufacturers: American Air Filter, Cambridge, Continental, or approved equal.

4. Isolators shall be as specified for air handling units.

2.15 ELECTRIC DUCT HEATERS

A. Provide electric open coil duct heaters having capacities indicated on the drawings. Voltage size, wattage, number of steps and accessories as scheduled.

B. Heaters shall be UL listed for zero clearance and meet the applicable requirements of the National Electrical Code.

C. Heaters shall be made with galvanized steel frame.

D. Resistance coil terminals and nuts shall be stainless steel, and terminal insulators and bracket bushings shall be of high grade ceramic and securely positioned. Resistance wire shall be iron free, 80% nickel and 20% chromium. Bracket supports for the sheathing shall be reinforced with stiffening ribs and gussets, and spaced no more than four inches apart. Heaters shall be tested dielectrically for 1000V plus twice the rated voltage or 2000V, whichever is higher. Heaters shall be derated to 35 watts/sq.in. of wire surface.

E. Heaters shall be interchangeable for mounting in a horizontal or vertical duct, and air flow may be through the heater in either direction.

F. Electric heaters shall be of the slip-in type.

G. Each heater shall be furnished for electrical characteristics scheduled. Three phase heaters shall be provided with balanced three phase steps.

H. The control panels shall be integral with heater for duct mounting. Enclosure material shall be heavy gauge galvanized steel with gray paint finish. Metal gauge shall meet NEMA I and UL minimum gauge requirements. Control panels with single doors shall have hinged doors. Control panels over 24" in width shall have double doors. Doors shall be secured with heavy duty continuous hinges and latches or 3 point catch, as required. Control panels shall be provided for installation on the bottom or sides of the duct as indicated on the drawings or as required for access to controls.

I. Built-in components shall be mounted and prewired on removable subpanel board. Panels containing SCR's or other heat sensitive equipment shall be provided with adequate heat dissipating devices. Power and control wiring knockouts shall be provided for ease of installation.

J. The terminal box shall be internally insulated. Insulation shall prevent condensation when the heater is in a 50 F air stream.

K. Magnetic contactors and primary fused control power transformers shall be provided. Overcurrent protection shall consist of automatic circuit breakers as required by NEC. An integral fused safety disconnect switch shall prevent the door from being opened unless the disconnect switch is in the off position. When a pneumatic control system is provided a pneumatic electric switch shall be provided to cycle the heater stages in response to a thermostat. Control voltage shall be 24 volts. Magnetic contactors shall be disconnecting type. The contactors shall disconnect power from ungrounded conductors.

L. A differential pressure type air flow switch shall be built into the heater.

M. A disc-type automatic reset thermal cutout shall be provided for primary protection. For secondary protection, a sufficient number of heat limiters (fusible links) in the power lines shall de-energize the elements in case the primary cutout fails. Both devices shall be serviceable through the terminal box without having to remove heater from duct.

N. Heater construction shall be arranged with allowances made for internal duct liner or external duct insulation as required.

2.16 DUCTLESS SPLIT SYSTEMS

A. Provide complete ductless splits systems with the features indicated in the contract documents. The systems shall be provided with all equipment, controls, wiring,

pipng, insulation, accessories and appurtenances for complete and properly operating systems.

- B. Provide five year parts warranty on compressors.
- C. Acceptable manufacturers: Mitsubishi, Daikin Industries or approved equal.

2.17 CURBS AND SUPPORTS

A. Prefabricated metal roof curbs shall be provided for roof mounted fans, rooftop air conditioning units, etc.

B. Prefabricated metal roof support rails supporting roof mounted equipment shall be of 18-gauge galvanized steel construction with mitered and welded corner seams, integral base plate and integral cant strips.

C. All roof mounted curbs and supports shall be fully coordinated with the roof type and the roofing manufacturer's installation details and requirements.

D. Curbs and rails on sloped roofs shall be sloped to suit the roof and installed tih the top surface level.

E. All curbs and rails shall be fastened to the building structure to withstand hurricane force winds.

F. All equipment installed outdoors shall be fastened to their curbs, rails, supports and or building structure to withstand hurricane force winds. Provide galvanized or stainless steel straps or cables to anchor roof mounted equipment securely to structure to withstand hurricane force winds.

2.18 VARIABLE SPEED DRIVES (VSD)

A. Where variable speed drives are not provided under Specification Division 16, provide motor control equipment to convert motors operating at a constant 60 Hz frequency to variable speed operation with the use of an adjustable frequency AC drive and the necessary hardware to provide the functions as herein specified.

B. Construction

1. The VSD shall be of the Pulse Width Modulated design converting the fixed utility voltage and frequency to a variable voltage and frequency output via a two step operation. Efficiency shall be 95% minimum at 100% speed and load. Line side displacement power factor shall not be less than (0.95) regardless of speed and load. The AFC shall be rated for 100% current for one minute.

2. The VSD including the bypass, all components, and accessories shall be housed in a NEMA 12 metal enclosure where installed indoors, NEMA 3R when

installed outdoors and NEMA 4X when installed outdoors within 25 feet from a cooling tower.

3. Standard operating conditions shall be:
 - a. Incoming three phase AC power, rated voltage +10%, 60 Hz.
 - b. Humidity 0 to 95% (noncondensing and noncorrosive).
 - c. Altitude 0 to 3,300 feet above sea level.
 - d. Ambient temperature 0 to 40 C.

C. Design Characteristics and Features

1. The VSD shall provide the following design features as standard:
 - a. Microprocessor logic. The VSD shall be microprocessor based and utilize digital input for parameter adjustments. Use of potentiometers for parameter adjustment is not acceptable.
 - b. Auto restart. The VSD shall automatically attempt to restart after a malfunction or an interruption of power. The number of attempted restarts shall be selectable (0 to 5). If the drive reaches the limit of restarts without successfully restarting and running for a selectable length of time (60 to 600 seconds), the restart circuit shall lockout and shall provide contact annunciation.
 - c. Current limit. A current limit circuit shall be provided to limit motor current to a preset adjustable maximum level by reducing the drive operating speed or acceleration rate when the limit is reached. Range of adjustment shall be from 50 to 110%.
 - d. Digital output displays and input parameter programming. The VSD shall include a digital display and digital input programming capability on the main logic board. The display shall be programmable for indication of output speed in rpm, frequency or percent of base speed; motor amps, output motor volts, and output load. The display shall also function as a first fault indicator.
 - e. Input signal follower. The input signal follower circuit shall have selectable differential inputs and accept an electrical speed command from an external pneumatic (0 - 15 psi) source.
 - f. Motor overload protection including phase reversal and single phasing. Electronic motor protection shall be provided which is capable of predicting motor winding temperature based on inputting specific parameters

including motor design type - TEFC, ODP, or other type, and speed range. The protection shall provide an orderly shutdown should the motor's thermal capabilities be exceeded.

g. Output signals. The VSD shall include analog output signals for output load, output speed, and motor voltage. The signals shall be 0 to 9 VDC @ 1mA.

h. Input power. The VSD shall operate within the following parameters:

i. Rated voltage +10%

j. Setup adjustments. Standard setup adjustments shall include:

k. Minimum speed, 0 to 60%

l. Maximum speed, 45 to 100%

m. Linear accel., 1 – 120 seconds

n. Linear deaccel., 1 – 120 seconds

o. Maximum output voltage, adjustable

p. V/Hz, adjustable with selectable profiles

q. Current limit, 50 to 110%

r. Operator panel. An operator panel shall be provided for the following functions:

s. Shall digitally display motor speed, load, motor amps, and output volts.

t. Shall have eight (8) LEDs for indicating drive run, drive ready, drive fault, plus operator function/status indication such as auto speed reference, and auto restart.

u. Shall provide selection for start, stop, auto, manual and/or Hand Off - Auto.

v. Keypad shall include electronic lock-out feature to prevent unauthorized personnel from parameter access.

w. Bypass control circuitry. Bypass control circuitry mounted integrally to the VSD enclosure. The bypass shall utilize an input circuit

breaker disconnect switch to feed both the VSD and the bypass starter. An input contactor shall be utilized to feed the VSD and isolate the VSD for trouble shooting. An output contactor which is electrically and mechanically interlocked with the bypass starter shall be utilized on the VSD to provide a positive disconnect between the VSD and the motor. **Provide dual drives in lieu of drive and bypass assemblies for direct drive fans, for systems with fabric type supply duct and where specifically indicated on the drawings.**

- x. Additional Protective Features
- y. Input disconnect switch door shall be interlocked and padlockable.
- z. Undervoltage protection.
 - aa. DC bus overvoltage protection.
 - bb. Able to withstand output line-to-line short circuits without component failure.
 - cc. Surge protection from ac line transients.
 - dd. Overload capability shall be 110% of the motor FLA based on the NEC ratings for 60 seconds.
 - ee. Line reactors for units 30 hp and larger.
 - ff. Opening of an output disconnect under load will not result in component damage.
 - gg. Rotating Motor Start. VSD shall be able to start into a rotating motor and accelerate (decelerate) to set speed without tripping or component loss.
 - hh. The VSD shall provide a programmable proof of flow form c relay output (broken belt/broken coupling) The drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus. Relay outputs shall include programmable time delays that will allow for drive acceleration from zero speed without signaling a false underload condition.
 - ii. The VSD shall include EMI RFI filters. The VSD shall comply with standard EN 61800-3 for the first environment, restricted level with up to 100' of motor cables.

jj. The VSD shall include a communications port to communicate with the Energy Management and Control system (EMCS). The port shall be an RS-485 port as standard. The standard protocols shall be Modbus, BACnet, Johnson Controls N2 bus, and Siemens Building Technologies FLN. Interface shall be provided by the drive manufacturer. As a minimum, the following points shall be controlled or accessible:

- 1) Start/Stop
- 2) Speed Reference
- 3) Fault Diagnostics
- 4) Meter Points
 - a) Motor Power in HP
 - b) Motor Power in KW
 - c) Motor kW-Hr
 - d) Motor Current
 - e) Motor Voltage
 - f) Hours Run

D. Codes and standards. The VSD shall meet the following standards:

1. CSA
2. ETL (UL 508)
3. NEMA
4. NEC
5. IEEE Standard 519

E. Maintainability:

1. Control circuit voltages (12 VDC, 24 VDC, 160 VDC and 120 VAC) shall be physically and electrically isolated from power circuit voltages (380 to 600 VAC, 600 VDC) to insure safety to maintenance personnel.

2. The VSD shall be provided with an alphanumeric diagnostic display with fault indications to include the following: bus overvoltage, bus undervoltage, overcurrent, ground fault, timed overload and drive fault.

3. Printed circuit boards shall utilize quick disconnect plugs and/or pull apart terminal blocks to facilitate maintenance by providing quick change out without disconnecting terminal strip connections thereby reducing wiring errors.

4. VSD shall be capable of starting and operating without a motor connected.

5. Setup and operating parameters shall be stored in nonvolatile memory. The static memory module shall be to be removed and installed in replacement logic boards with setup and operating parameters intact requiring no adjustment of replacement boards.

F. Service

1. The VSD manufacturer shall provide at no additional cost to the Owner, a startup service package for VSD's provided. Service shall include inspection, final adjustment, operational checks, and a final report for record purpose. The service package shall include a two year parts warranty from date of substantial completion and be performed by local factory employed service engineers. The service center must be permanently located within 200 miles of the jobsite.

G. Acceptable manufacturers: Trane, ABB, Yaskawa, Danfoss or approved equal.

2.19 DAMPERS

A. Provide fire, smoke and volume dampers at locations indicated on the drawings. Installation of dampers shall be in accordance with the applicable requirements of NFPA-90A and the guidelines of the Sheet Metal and Air Conditioning Contractor's National Association (SMACNA). Fire and smoke dampers shall be UL approved listed and labeled as required. The sizes of the dampers listed on the drawings are approximate sizes. The Contractor shall verify the actual size required by field measurements before final ordering. Where dampers include multiple sections, provide mullions, angles and other supports and accessories for an installation in full conformance with the manufacture's installation instructions for the velocities and static pressures the damper will be subjected to.

B. Fire Dampers:

1. Provide Style B dynamic fire dampers with fusible links listed for 165° F.

2. Dampers shall be classified for dynamic closure to a minimum of 4000 FPM and 4" WG static pressure. Fire dampers shall have the same minimum rating as the partitions in which they are installed, but in no case shall the rating be less than 1½ hours in accordance with UL 555 Standard for Fire Dampers. Dampers shall be rated U.L. leakage Class I.

3. Each fire damper shall be installed within an approved sleeve and secured with mounting angles.

4. Where required due to the application, substitute thinline dampers, multi-blade dampers, dampers specifically designed for installation at grilles, etc., to allow for full conformance with UL installation requirements for fire dampers.

5. Dampers at outside air intake louvers may be static type.

C. Manual Volume Dampers:

1. Damper frames shall be of welded 16-gauge hot rolled galvanized steel construction with integral top and bottom blade stops.

2. Blades shall be constructed of triple-crimped 16-gauge hot rolled galvanized steel. Blades shall be a maximum of 8" wide and shall be of the opposed type, center pivoting and shall have blade edge seals on mating edges.

3. Blade actuators shall be ¼" diameter steel connecting bars attached to alternate blades with 12-gauge blade clips and bronze trunnion pins. Shaft end linkages shall be connected to adjacent blades.

4. Blade shafts shall be ½" diameter with steel stub ends on all but actuator shaft which shall be full length of blades with 6" extension and locking hand quadrants for duct mounting. Bearings shall be nylon type.

5. Dampers larger than 48" in any dimension shall be provide in multiple sections. Finish shall be standard mill finish.

6. Provide insulation stand-offs on externally insulated ductwork so that damper can be adjusted without damaging insulation.

D. Backdraft Dampers:

1. Provide Ruskin Model CBD2 counter-balanced backdraft damper with aluminum blades, vinyl edge seals and adjustable counter weight. Damper must be suitable for both horizontal and vertical installation with airflow in both directions.

E. Acceptable manufacturers: Ruskin, Nailor, Greenheck, or approved equal.

2.20 AIR DISTRIBUTION DEVICES

A. General

1. **Ceiling mounted air distribution devices shall be fully compatible with the ceiling type in each area. See architectural drawings and specifications. Ceiling mounted air distribution devices shall be fully compatible with the ceiling type in each area. All lay-in devices installed in narrow (or wide) tee ceilings shall have narrow (or wide) tee design borders.**

All lay-in devices installed in ceilings with dropped panels shall be dropped panel design.

2. For square or rectangular neck diffusers with round branch ducts, provide a square-to-round galvanized sheetmetal adapter with the round neck size equal to branch duct size indicated. Adapter shall be minimum of 4" deep so as not to reduce the effective area of the diffuser.

3. Provide an air extracting device where supply grilles or supply registers are installed on a branch duct tap.

a. At each supply register or grille with a rectangular duct tap not exceeding 1'-6", install a Titus Model AG-45 air-extracting device with a #3 key operator and access through face of register/grille.

b. At each supply register or grille with a rectangular duct tap from 1'-7" long to 3'-0" long and at each ceiling diffuser with a rigid duct tap up to 3'-0" long, install a Titus Model AG-45 air-extracting device with a push-pull wire operator.

c. At each ceiling diffuser with a rigid duct tap over 3'-0" long and any branch duct tap serving two or more supply air devices, provide a Titus Model AG-45 air-extracting device. Device shall be complete with end bearings, square shaft and a concealed operator in an accessible location.

B. Registers, Grilles and Ceiling Diffusers:

1. Supply Registers (SR) - Titus Model 272; ¾" spacing, airfoil blades, double deflection register with vertical face bars; Model AG-15 opposed blade damper and Model PF surface mount frame. Register, frame and damper shall be aluminum construction with aluminum enamel finish.

2. Ceiling Diffusers (CD) - Titus Model TDC-AA; louvered face square and rectangular ceiling diffuser with square or rectangular neck, with removable 1, 2, 3 or 4 way blow cores with opposed blade dampers. Diffuser and damper shall be aluminum construction with white enamel finish. . Face style lay-in type where in a full size lay-in tile. Face style shall be Type 1 - surface mount where installed in gyp board ceilings and in lay-in ceilings where there is not a full size tile.

3. Ceiling Diffusers (CD2) - Titus Model TMS-AA; louvered face square and rectangular ceiling diffuser with round neck, with 4 way directional baffles with opposed blade dampers. Entire diffuser shall be aluminum construction with white enamel finish. Face style shall be 24 x24 lay-in.

4. Wall Mounted Return Grille (RG) - Titus Model 355; ½" spacing, 35 degree fixed deflection with horizontal face bars. Provide with PF mounting frame and all aluminum construction with satin aluminum enamel finish.

5. Ceiling Mounted Return Air Grille (RG) - Titus Model PAR-AA perforated. Grille shall be aluminum construction with white enamel finish. Frame style shall be 24x24 lay-in type 3.

6. Wall Mounted Return Register (RR) - Same as wall mounted return grille plus aluminum opposed blade damper.

2.21 CHILLED WATER TREATMENT

A. General:

1. Provide equipment and chemicals and provide the necessary service for a complete and operating water treatment system. A single water treatment company shall be responsible for products and services and be a recognized specialist in the field of industrial water treatment for a minimum of 10 years. The water treatment company shall have regional water analysis laboratories, research and development facilities, plus technical service representatives located within the trading area of the job site.

B. Preoperational System Cleanout:

1. The system and related piping shall be thoroughly flushed out with precleaning chemicals designed to remove deposits such as pipe dope, oils and loose rust, mill scale and other extraneous materials. Add recommended dosages of precleaner chemical products any circulate throughout the water system. Drain, fill and flush water system until no foreign matter is observed and total alkalinity of the rinse water is equal to that of the make-up water.

C. Chemical Feeding and Control Equipment:

1. For each system, install a one-shot feeder with funnel, and air release valve, (minimum five gallon capacity) designed to meet pressure requirements of the system.

D. Water Treatment Chemicals:

1. Provide one year's supply of the recommended chemical formula for scale and corrosion protection of closed recirculating system. Formulation shall not contain any ingredients which are harmful to system materials of construction.

E. Testing Equipment:

1. Provide basic water test equipment, including carrying case and spare reagents for maintaining control of program standards in the hot water boiler systems. Test kits shall include the following:

a. Reagents and apparatus for determination of corrosion inhibitor level in the hot water boiler system.

F. Water Treatment Service Program:

1. The water treatment supplier shall provide consulting services for a period of one year from start-up of the hot water boiler system which will include:

a. Installation and system start-up procedure recommendations.

b. Preoperation system close-out procedure supervision.

c. Initial water analysis and recommendations.

d. Training of operating personnel on proper feeding and control techniques.

e. Periodic field service and consultation meetings.

2.22 ELECTRICAL WORK

A. Materials shall be new and shall be Underwriters Laboratories labeled or listed.

B. Wiring shall be contained in metallic raceways. Raceways shall meet the requirements of DIVISION 16 - ELECTRICAL.

C. Wiring for 115 volts and higher shall be copper #12 AWG or larger. Wiring type, insulation, etc. shall meet the requirements of DIVISION 16 - ELECTRICAL.

D. Wiring less than 115 volts shall be copper. Wire size, type and insulation shall be selected to suit the application.

PART 3 - EXECUTION

3.1 PIPING

A. General:

1. Per the National Electrical Code, piping shall not be routed over electrical panels or other electrical equipment. National electrical code service clearances shall be maintained for electrical equipment. Coordinate trades.

2. Open ends of piping and fittings shall be plugged or capped upon delivery to the jobsite and shall be stored in a manner that keeps the interior and exterior surfaces clean and dry.

3. Provide caps or plugs in all manual drains and vents.
4. Changes of pipe sizes shall be made by using eccentric pipe reducers only. In pump suction connections the flat part shall be on the top. In all other piping the flat part shall be on the bottom. The use of bushings is prohibited.
5. The piping arrangement shown is a design based on currently available equipment. The plans show typical equipment to scale and show practical arrangement. Modification will be necessary during construction, at no additional cost to the Owner, to adapt the equipment layout and piping plans to the precise equipment purchased by the Contractor. Accessibility for operation and maintenance must be maintained.
6. All piping shall be installed parallel to walls and column centerlines. Fully coordinate work of each trade to provide the designed systems without interference between systems.
7. When air handling units are provided with multiple (stacked) water coils, in addition to the coil connection requirements indicated in coil piping details, provide P&T plugs at each coil connection, provide a manual drain and vent for each coil, provide a flow balancing device on the leaving branch piping from each coil and a shut-off valve on the entering branch piping to each coil. Provide a supply and return water header with branch piping to each coil sized not to exceed 4 feet per second for sizes 2" and smaller and not to exceed 8 feet per second for sizes 2 1/2" and larger.
8. Manufactured fittings only shall be installed on piping 2½" and smaller. Manufactured fittings shall be used on piping systems 3" or larger except "weld-o-lets" or "thread-o-lets" may be used for branch connections if the branch is less than one-half the size of the main. The use of "stab" type connections is prohibited.
9. Piping shall be racked and handled in a manner to prevent the entrance of dirt or foreign matter. Open pipe ends shall be plugged or capped at the end of each working day.
10. Automatic air vents shall be provided at each high point in the system and drain valves shall be provided at each low point. Drain lines from air vents shall be piped to the nearest floor drain or drain pan.
11. Piping shall be installed to permit proper circulating of fluids and to permit drainage. Circulating water piping shall be pitched upward in the direction of flow. Installation of piping shall include accessories as hereinbefore specified, as shown on the drawings or as required for the proper operation of the system.

B. Drain Line Piping:

1. Provide for evaporator coils and air conditioning equipment, a complete drainage system. Lines shall be installed to pitch down in the direction of flow not less than 1 inch in 40 feet, changes in directions shall be made using tees with plugs or caps.

2. Cooling coil drain outlets shall have a deep seal trap. Also provide a deep seal trap at drain connections for air handling system components with a positive or negative static pressure at the drain connection.

3.2 TESTING AND CHARGING REFRIGERANT SYSTEMS

A. Testing and charging of refrigerant systems shall be in strict accordance with the equipment manufacturers written recommendations.

3.3 PREPARED OPENINGS

A. Provide a prepared opening for duct penetrations through partitions, walls, and floors.

B. Insulated ducts and piping passing through prepared openings and pipe sleeves shall have a 0.016" aluminum jacket installed over the external insulation. Jacket shall extend a minimum of 2" on either side of the wall. Secure jacket on each end with aluminum draw bands.

C. Where wall is fire and/or smoke rated and the opening is required to be sealed, the annular space between the two metal surfaces shall be packed solid with mineral fiber type fire rated safing insulation.

D. Where ducts and piping are exposed in any area or below a suspended ceiling a sheet metal flange or a chrome plated escutcheon large enough to cover the annular space and sleeve flange shall be installed.

3.4 PIPE JOINTS

Refer to SECTION 15010 - MECHANICAL GENERAL PROVISIONS for installation of any pipe joints.

3.5 SPECIALTIES

A. Flow Balancing Device:

1. Flow balancing devices shall be installed with the manufacturer's recommended straight length of pipe in front of and behind the device.

2. Readout connections shall be installed so that they are easily accessible and are above the horizontal center line of the fitting.

B. Gauges and Gauge Cocks:

1. Gauge cocks and T&P plugs shall be installed so that they are easily accessible and usable.
2. Permanently-installed gauges shall be positioned so that they are easily readable.

C. Flexible Connectors:

1. Flexible connectors shall be installed where indicated on the drawings. Connectors shall be installed at right angles to each other.
2. Piping systems shall be adequately braced and supported on each side of flexible connectors such that there are no longitudinal or transverse loads from the piping system imposed on the connector.

D. Air Separators:

1. Separators shall be installed in the vertical position and sufficient clearance shall be provided for strainer removal.
2. Separators shall be adequately hung from the structural system or supported from the floor independently of the piping system.
3. A valved blowdown connection shall be provided and piped to the nearest floor drain.

3.6 INSULATION

A. Piping System:

1. Piping, valves and fittings shall be insulated as indicated on the drawings and specifications.
2. Where insulation is installed between hangers and pipe, install an 18" long section of rigid insulation of similar thickness suitable to support the pipe and its contents at each hanger, saddle, or support location. Insulation type and density shall be selected so that compression does not exceed 1/16".
3. Fitting insulation shall be covered with jacket covers. Jacket cover joints shall be fastened using stainless steel tack fasteners, pressure sensitive tape, brushed-on vapor barrier mastic or any approved combination.

4. Pipe Joints:

- a. Fiberglass:

1) Transverse joints in exposed fiberglass insulation shall be secured by self-adhering butt strips.

2) Longitudinal joints in exposed fiberglass insulation shall be secured by self-adhering lap strips which are an integral part of the vapor barrier jacket.

3) Longitudinal joints in concealed fiberglass insulation shall be secured as specified for exposed insulation or may be stapled by using outward clinching staples.

4) Insulate fittings, flanges valves and piping accessories with factory molded or field mitered sections joined with adhesive and wired in place. Provide vapor seal at fittings with a layer of glass fitting tape embedded between two 1/16" coats of vapor retarder mastic. Fitting tape shall extend over the adjacent pipe insulation and overlap on itself at least 2".

5) If the self-adhering lap strips do not adhere firmly, the Contractor shall resecure the defective lap strips by stapling. Stapling will only be allowed in concealed spaces. Exposed insulation shall be replaced.

b. Cellular Glass:

1) Install cellular glass insulation in strict conformance with the manufactures's installation instructions for the specific application.

2) Insulate fittings, flanges valves and piping accessories with factory molded or field mitered sections joined with adhesive and wired in place. Provide vapor seal at fittings with a layer of glass fitting tape embedded between two 1/16" coats of vapor retarder mastic. Fitting tape shall extend over the adjacent pipe insulation and overlap on itself at least 2".

c. Foamed Elastomeric:

1) Where possible, tubular insulation shall be slipped onto the piping prior to joining piping.

2) When installing on already joined piping systems, insulation shall be slit longitudinally, snapped over the pipe and longitudinal and butt joints shall be coated with contact adhesive and glued together.

3) Fittings shall be insulated by mitering and notching insulation. Valves shall be insulated by using oversized insulation.

4) All joints, seams and splices shall be glued.

B. Protective Covering (Piping):

1. Where insulation is exposed on equipment platforms, or in equipment rooms, unconditioned open buildings or in areas of physical abuse, insulation up to 7'-0" above the floor or platform shall be covered with a metal jacket secured with metal bands on 12" centers.

2. Where insulation is installed in a crawl space or is exposed to the weather insulation shall be covered with two layers of 15 pound inorganic roofing felt secured in place with aluminum tie wires in 12" centers. Transverse joints of the felt shall be lapped a minimum of 6". The felt shall be covered with an aluminum jacket, as hereinbefore specified, secured by soft aluminum bands on 12" centers.

3. Where exterior piping is required to be insulated, the first 3 feet of the piping above the ground level shall be insulated with a nonabsorbent (foam-glass) type of insulation. The insulation shall be weatherproof as hereinbefore specified. The transition joint between the two dissimilar insulations shall be sealed to prevent the ground water from entering.

4. Fitting insulation shall be covered with UV stabilized PVC jacket covers. Joints shall be waterproofed.

5. Elastomeric insulation shall be weatherproofed by applying two coats of manufacturer approved paint to the exterior surface of the insulation and providing piping jackets on all straight lengths.

C. Ductwork:

1. Externally insulated ductwork:

a. Ductboard insulation shall be used for all exposed square and rectangular ductwork which is indicated to be externally insulated. **This includes ductwork exposed in storerooms, mechanical and electrical rooms.** All ductwork which is not installed above suspended ceilings or is not concealed in furrings or chasses shall be considered exposed.

b. Ductwrap shall be used for round and oval ductwork and for concealed square and rectangular ductwork which is indicated to be externally insulated.

c. All supply, return and outside air ductwork which is not indicated to be internally lined shall be externally insulated.

2. External Wrap:

a. Joints and seams in the duct wrap shall be secured by a double row of staggered outward clinching staples on 6" centers. Staples and joints shall then be sealed by applying an approved pressure sensitive foil tape.

3. External Board Insulation:

a. Board insulation shall be impaled over weld pins or studs and secured with clips, spaced on not more than 16' centers. At pins or stud locations, apply a 4" x 4" layer of vapor barrier material adhered with vapor barrier adhesive at each pin or stud penetration.

b. Firmly butt sections of insulation board and cover with glass fiber reinforced vapor barrier tape.

4. Where insulated ducts or equipment connect to lined ducts the insulation shall extend over the lined duct a minimum of 6". For cold ducts the ends of the duct lap shall be sealed to the lined duct with vapor barrier tape and mastic.

D. Equipment:

1. Cold Equipment:

a. Insulate cold equipment, which has a normal operating temperature of 55° F or less.

b. Insulation may be applied as a single layer or multiple layers of sheet-type elastomeric insulation which shall total 1½" in thickness.

c. Adhesive shall be applied in accordance with the manufacturers instructions.

d. Insulated parts of other prefabricated equipment such as, but not limited to ceiling diffusers, mixing boxes, variable volume control boxes, coils, dampers, heaters, filters, etc., installed in or part of a duct system which is required to be insulated or lined by these specifications shall be externally insulated to prevent condensation or excessive heat loss of equipment.

2. Hot equipment:

a. Insulate hot equipment, which has a normal operating temperature of 110° F or higher.

E. Duct Lining:

1. Ductwork shall be completely covered with liners. Liner shall be cut to assure overlapped and compressed corner joints. Transverse joints shall be neatly butted and shall have no gaps. The coated surface shall face the air stream.

2. Liner shall be attached to the sheet metal with 100 percent coverage of adhesive and exposed leading edges and transverse joints coated with adhesive. Liner shall additionally be secured using mechanical fasteners installed per SMACNA Duct Liner Application Standard.

3.7 DUCT SYSTEMS

A. Duct systems shall be constructed and installed in accordance with "SMACNA HVAC Duct Construction Standards" latest edition and good engineering practices.

B. Provide externally insulation for supply, return and outside air duct systems which are not indicated to be internally lined.

C. Open ends of ductwork including fittings and accessories shall be capped when stored on the site. Interior and exterior surfaces shall be cleaned just prior to installation. The open ends and open taps of each duct section shall be capped immediately after installation. Also cover grilles, registers and diffusers immediately after installation.

D. Per the National Electrical Code, ductwork shall not be routed over electrical panels or other electrical equipment. National electrical code service clearances shall be maintained for electrical equipment. Coordinate trades.

E. Fire, fire/smoke, and smoke dampers shall be installed in accordance with the manufacturer's installation instructions and in accordance with the damper UL listing. Provide duct, wall and ceiling access doors at each damper for inspection and service.

F. Interior surfaces of ductwork visible through air distribution devices shall be painted flat black. All items visible through air distribution devices shall also be painted flat black. This includes items like turning vanes, liner pins, dampers and similar items.

G. There shall be no flex ductwork routed through partitions.

3.8 INSULATED FLEXIBLE DUCT

A. Maximum length of flexible duct between main, trunk or branch duct and diffuser shall be 8 feet. For sound attenuation, use full 8' long flex to diffusers and grilles with a minimum of one 90 degree ell.

B. Maximum length of flexible duct between main, trunk or branch duct and a VAV box shall be 5 feet. For sound attenuation, use 5' long flex to VAV box inlet connections.

C. Duct shall be supported at intervals not to exceed manufacturers recommended spacing using metal or approved fabric type hangers.

D. Flexible ducts shall not be installed through walls or partitions.

3.9 DUCT ACCESS DOORS

A. Access doors shall be installed adjacent to fire dampers, smoke dampers, duct smoke detectors, electric duct heaters and terminal heating coils.

B. Doors shall be installed in ductwork on the upstream side of the equipment, so that the door can be fully opened and item inside ductwork can be readily serviced.

C. Where required due to space problems, the hinge may be omitted and double cam locks provided.

3.10 DUCT SEALANT

A. Duct sealants shall be used as follows:

1. Gasket type may be used only on flanged joints.

2. Mastics may be used on flanged joints, as a fillet or groove sealant and as a surface sealant between ductwrap and a rigid duct system.

3. Embedded fabric shall be used on all other type joints.

4. Omit Sealant on ductwork exposed in finished areas.

3.11 VIBRATION ISOLATION

A. Install vibration isolators as hereinbefore specified for equipment specified on this project.

B. Specified type isolators shall be installed on each suspended piping system 1" diameter and larger. Piping/tubing systems coming from or going to equipment requiring isolators shall be provided with isolators for a minimum of 50 feet from each piece of equipment.

C. The first 3 hangers from the equipment shall be capable of handling the same deflection as the equipment isolators. Remaining isolators shall provide $\frac{3}{4}$ " deflection.

3.12 EQUIPMENT

A. Floor-mounted mechanical equipment (heat pump units, pumps, boilers, etc.) shall be installed on concrete housekeeping pads.

B. Provide safety pan under equipment containing cooling coils (air handlers, heat pump units, etc.). Provide emergency drain piping to nearest drain.

C. If required due to excess vibration the Contractor shall statically and dynamically balance air handling and ventilating unit fan wheels after the equipment has been installed. Fan wheels must be balanced to within ½ the ARI tolerance levels.

D. The HVAC systems shall not be operated at any time without all filtration in place. Provide clean filters at substantial completion. Temporary filter media shall be installed across return and exhaust grilles and registers if systems are operated prior to occupancy. Temporary filter media shall be merv 8. Prior to starting a unit, the contractor must obtain the owner's consent that it is acceptable to owner for the contractor to utilize the equipment during the construction phase. The systems shall not be started until the jobsite is thoroughly cleaned. Whenever floors or walls are sanded, the HVAC systems must be de-energized and the areas must be cleaned before the HVAC systems are restarted.

E. Keep interior surfaces of ductwork and air handling equipment clean throughout the construction period. Access doors to air handling units shall not be left in the open position. Inlet and outlets to air handling equipment shall be capped when stored on the site and shall remain capped until ductwork is connected.

3.13 AIR DISTRIBUTION DEVICES

A. Grilles, diffusers, door grilles, etc., shall be adequately secured using only oval-head, countersunk, sheet metal screws or screws specifically provided by the device manufacturer. Finish on head of fastener shall match the finish of the device.

B. Fully coordinate installation and supports for plenums and accessories associated with linear diffusers, flow bars and similar items with the ceiling systems.

C. Support all ductwork, plenums and air distribution system components from the building structure.

D. Where air distribution devices are cut into lay-in ceiling tiles, provide galvanized supports concealed above the ceiling tile so that the weight is transferred to the lay-in support system in lieu of the ceiling tile.

3.14 FLUSHING AND CLEANING

A. Piping, coils, heaters, etc., installed for heating, cooling or other operations of the building shall be thoroughly flushed of debris and foreign objects before any system is placed in operation. After flushing strainers, traps and dirt legs shall be checked and cleaned.

3.15 TESTS OF PIPING

A. Chilled Water

1. Piping systems shall be tested with air or dry nitrogen at 100 psi for a minimum of 12 hours with no more than 3% loss in pressure.

2. Piping shall be hydraulically tested for four hours with no drop in pressure. Test pressure shall be 125 psi or 1½ times the working pressure, which ever is greater.

B. Protection:

1. In systems in which are installed devices such as valves, gauges, steam traps, etc., having a design pressure less than the test pressure, the device shall be isolated or removed from the system during the pressure test.

3.16 PREPARATION FOR AND ADDITIONAL WORK ASSOCIATED WITH TESTING AND BALANCING OF AIR AND HYDRONIC SYSTEMS

A. Scope of Work:

1. The contractor shall have equipment in operation and shall field verify operation prior to HVAC testing and balancing.

B. Additional Work:

1. Install clean filters as described in other sections of the specifications, prior to the beginning of the testing and balancing work. Temporary filter media for the purpose of protecting permanent filters during balancing may be used.

2. Air Handling Unit total air flows shall be balanced for "dirty" filter conditions. If necessary, provide manual dampers or temporary perforated plates or other approved restriction to simulate these conditions.

3. Debris resulting from or caused by installation of air conditioning and exhaust duct work shall be removed. Suction and discharge plenums shall be clean and made ready before the commencement of the balancing work.

4. Debris resulting from or caused by installation of air conditioning and exhaust duct work shall be removed. Suction and discharge plenums shall be clean and made ready before the commencement of the balancing work.

5. Remove and clean strainers. Operate air vents at the high points of the system to eliminate air.

3.17 TESTING AND BALANCING OF AIR AND HYDRONIC SYSTEMS

A. Scope of Work:

1. The services of a single, independent air balance and testing agency, approved by the Architect, shall be obtained to test, adjust and balance supply, return, exhaust and hydronic systems. The agency shall specialize in the testing and balancing of heating, ventilating, air conditioning and hydronic systems.

B. General Requirements:

1. Testing and balancing shall be performed in complete accordance with the sections applicable to air distribution and hydronic balancing of the Associated Air Balance Council (AABC), National Standard for Field Measurement and Instrumentation latest edition.

2. The testing and balancing firm shall be an Agency whose primary responsibility is testing, adjusting and balancing of heating, ventilating, air conditioning and hydronic systems.

3. Testing and balancing shall not begin until systems have been completed and are in full-working condition. Heating, ventilating, air condition and hydronic equipment shall be put into full operation by the Contractor and shall continue the operation of same during each working day of testing and balancing.

4. The work required herein shall consist of setting air volumes, water flows, and speed adjustments to within 10 percent of design requirements as shown on the drawings or listed in the specifications.

5. A minimum of two visits to the job site, for inspection of duct installation and damper accessibility, pipe installation and flow measurement points are required during construction prior to the installation of the ceilings. Any inconsistencies found or additional balancing dampers or measuring points needed shall be reported to the Architect.

6. The Test-and-Balance Agency shall cooperate with the Architect, Mechanical, Controls and Sheet Metal Sub-contractors, to effect smooth co-ordination of the balancing work with job schedule.

7. Upon the completion of the test and balance work, with test data recorded, the Test-and-Balance Agency shall submit six copies of the completed report to the Architect for his review and evaluation.

8. Prior to review of the balancing of the air conditioning system, the Architect may request that the balancing Contractor perform a "spot check" a selected 10 percent of air outlets in his presence. If the readings do not coincide with the report or within specified tolerances, the system balance shall be rejected

and the Test-and-Balance Agency shall be required to rebalance the system. This procedure shall be repeated until the balance of the system is acceptable.

C. Submittals:

1. Copies of a detailed procedure to be followed in the testing and balancing of each air distribution, exhaust and hydronic system being used in this project shall be submitted to the Architect as described in SECTION 15010 - MECHANICAL GENERAL PROVISIONS. An acceptable copy must be returned to the Architect before balancing work is begun.

2. Sample forms to be used in listing information and data shall be submitted.

D. Air Balancing Procedure:

1. Air Handling Unit total air flows shall be balanced for "dirty" filter conditions. If necessary, provide manual dampers or temporary perforated plates or other approved restriction to simulate these conditions.

2. Pitot transverses shall be taken in main ducts to obtain the cfm of each fan.

3. Minimum standards, as listed in the Associated Air Balance Council (AABC) National Standards shall be followed in balancing each system installed on this project.

4. 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.

a. Record fan numbers, manufacturers, model numbers and serial numbers.

b. Test, adjust and record required and measured total cfm for each fan system.

c. Test, adjust and record any required and measured outside air and return air quantities.

d. Test and record required and measured system static pressures; filter differentials, coil differentials and fan total static pressures.

e. Record any installed fan drive assemblies, fan sheaves, motor sheaves and belts.

- f. Record each installed motor manufacturer and each motor horsepower together with nameplate electrical characteristics; i.e., voltage, amperes, hertz and rpm.
- g. Test, adjust and record each blower rpm.
- h. Test and record any entering and leaving air D.B. temperatures.
- i. Test and record any entering and leaving air W.B. temperatures.
- j. Test and adjust any supply, return, outside and return air ducts to proper design cfm.
- k. Test and adjust the cfm delivery of each diffuser, grille, and register to within 10 percent of design requirements.
- l. Identify and record the location of each diffuser, grille and register.
- m. Record size, type and manufacturer of each grille, register and diffuser.
- n. 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.
- o. Diffusers, grilles and registers shall be adjusted to minimize drafts.
- p. Tests shall be made with supply, return and exhaust systems operating, and doors, windows, etc., closed or in their normal operating condition.
- q. Damper positions shall be permanently marked after air balancing is complete.
- r. Cooperate with control contractor's representative. Automatically operated dampers shall be set and adjusted to operate as specified or indicated. Testing agency shall check controls for proper operation and calibration.
- s. The final balanced condition for each area shall include the testing and adjusting of pressure conditions. Front doors, exits, elevator shafts, etc., shall be checked for air flow so that exterior conditions do not cause excessive abnormal pressure conditions.

E. Water Balancing Preliminary Procedure:

1. Balancing of hydronic water systems shall not begin until air balance is complete.
2. Prepare the hydronic water systems for balancing in the following manner:
 - a. Remove and clean each strainer.
 - b. Examine water in system and determine if water has been cleaned and treated.
 - c. Check pump rotation.
 - d. Check expansion tanks to determine that they are not air-bound or waterlogged and the system is properly charged.
 - e. Check air vents at the high points of the system to determine that they are installed and operating.
 - f. Open valves to full-open position. Close coils by-pass valves. Set mixing valves to full coil-flow.
 - g. Set temperature controls to full cooling for balancing chilled water and to full heating for balancing heating water coils.

F. Water Balancing Procedure:

1. After completion of preliminary procedure the following procedure shall be followed.
 - a. Test pumps at shut-off to establish impeller size and plot on approved, certified curve.
 - b. Set chilled and heating water pumps to specified gallons-per-minute delivery.
 - c. Set and record chilled, condenser, loop, and heating water flows at hydronic equipment (chiller, coils, heat exchangers, cooling towers, closed circuit coolers, etc.).
2. Upon completion of flow readings and adjustments at coils and by-passes, recheck settings at the pumps and readjust if necessary.

3. After each hydronic system has been balanced to design requirements the following test shall be performed and recorded in the final report.

a. Test and record leaving water temperatures and return water temperatures through chillers.

b. Test and record entering and leaving water temperatures at cooling coils, heating coils and heat exchangers.

c. Test and record entering and leaving air temperatures: wet bulb and dry bulb at each cooling coil and dry bulb across each heating coil.

d. List mechanical specifications of pumps, rated and actual running amperage, voltage, horsepower of pump motor and shut-off dynamic head.

e. Test and record final operating suction and discharge pressures and total dynamic head.

f. Test and record drops through each coil and coil by-pass in the system. Set each coil by-pass to match coil full-flow pressure drop.

g. Where flow devices are installed test and record actual flow-metered readings and corresponding gallons-per-minute.

4. Valve positions shall be permanently marked after the water balancing is complete.

3.18 ELECTRICAL WORK

A. Control or signaling wiring shall not be installed in raceways with power wiring. Wiring and raceways for line voltage interlocking shall be work of this Section. Voltage shall be 115 volts, 1-phase, 60 hertz. Provide transformer where required. Control and signaling wiring and raceways between equipment specified under this Section shall be work of this Section.

B. A source of power may be indicated under DIVISION 16 - ELECTRICAL for activating control devices where power for controls does not originate at the control transformer furnished with the starter or control panel. Work of this Section shall include wiring required for controls from this source. If additional 120 volt power is required it shall be obtained from spare breakers at a location approved by the Architect/Engineer. The cost of installation of raceways, wiring, etc. shall be included as work of this Division. The Contractor shall review electrical drawings prior to bidding.

- END OF SECTION -

SECTION 15650 - HEATING, VENTILATING AND AIR CONDITIONING CONTROL SYSTEMS

PART 1 - GENERAL

1.1 SCOPE

Work described in this Section includes providing labor, materials, and equipment indicated, specified, or necessary for a complete and operating energy management and control system. See SECTION 15010 - MECHANICAL GENERAL PROVISIONS which apply to this Section.

A. DESCRIPTION OF SYSTEM

1. The system shall be a fully integrated direct digital (DDC) type Energy Management and Control System (EMCS). The system shall incorporate direct digital control for energy management, equipment monitoring and control, and subsystems with open communications capabilities. The system shall include required equipment, wiring, raceways, appurtenances, engineering, labor and labor supervision. For the purpose of this specification, Energy Management and Control System (EMCS), Building Automation System (BAS) and Facility Management System (FMS) are used interchangeably.

2. The system shall be as manufactured by Johnson Controls, Siemens, Schneider Electric, Alerton or equal. To exhibit proven reliability, materials and equipment used shall be standard components, regularly manufactured for this and/or other systems and not custom designed especially for this project. Systems and components shall have been thoroughly tested and proven in actual use.

3. Surge transient protection shall be incorporated in design of system to protect electrical components in all DDC Controllers and operator's workstations.

4. Provide open communications system. The system shall be an open architecture with the capabilities to support a multi-vendor environment. To accomplish this effectively, system shall be capable of utilizing standard protocols as follows as well as be able to integrate third-party systems via existing vendor protocols.

a. System shall be capable of high speed Ethernet communication using TCP/IP protocol.

b. System shall be capable of BACnet communication according to ANSI/ASHRAE 135-2004.

c. The system shall be capable of supporting both standard and vendor specific protocols to integrate a wide variety of third-party devices and legacy systems.

d. The intent is to either use the Operator Workstations provided under this contract to communicate with control systems provided by other vendors or to allow information about the system provided in this contract to be sent to another workstations. This allows the user to have a single seat from which to perform daily operation.

5. The intent of the specification is to describe through specification paragraphs, the criteria for providing a control system consisting of control devices, control panels, wiring, relays, and other materials and devices required to accomplish the functions and operation described herein.

6. Furnish, install, program, and place into operations all controls. All hardware, software, and firmware points provided with the direct digital control system provided as part of this project shall be displayed and controlled through the operator interface.

7. Although such work is not specifically indicated, provide all supplementary or miscellaneous items, software, appurtenances, and devices necessary for a sound, secure, and complete system.

B. QUALIFICATIONS

1. The EMCS system shall be designed and installed, commissioned and serviced by factory trained personnel. EMCS contractor shall have an in-place support facility within 100 miles of the site with technical staff, spare parts inventory and necessary test and diagnostic equipment. The EMCS contractor shall provide full time, on site, experienced project manager for this work, responsible for direct supervision of the design, installation, start up and commissioning of the EMCS. The contractor shall be regularly engaged in the installation and maintenance of EMCS systems and shall have a minimum of ten (10) years of demonstrated technical expertise and experience in the installation and maintenance of EMCS systems similar in size and complexity to this project.

2. The EMCS contractor shall maintain a service organization consisting of factory trained service personnel and provide a list of 10 projects, similar in size and scope to this project, completed within the last five years.

3. Materials and equipment shall be the catalogued products of manufacturers regularly engaged in production and installation of automatic temperature control systems and shall be manufacturer's latest standard design that complies with the specification requirements.

4. The contractor shall have an established 24-hour emergency service organization to respond to service requests. A dedicated telephone number shall be provided to the Owner for requesting emergency service.

C. SHOP DRAWINGS

A complete set of control drawings and a complete sequence of control shall be submitted for approval prior to installation or fabrication of any equipment. The Submittal shall include a Schematic Flow diagram for systems and equipment showing locations of instruments and devices along with a written description of the sequence of operation for the system or subsystem depicted in the diagram. Submittal shall indicate interconnecting wiring between devices and equipment. Each drawing shall include a Bill of Material showing device number, quantity, and manufacturers' catalog number for devices shown. Submittal data shall include a schedule of devices to be located, including properly sized control valves. Drawings shall include interlock wiring components, motor starters, contactors and numbered terminals on equipment. Submittal shall include a detailed input/output summary and a list of proposed initial setpoints. Refer to SECTION 15010 - MECHANICAL GENERAL PROVISIONS for details.

D. ELECTRICAL WORK

1. Work of this Section shall include all wiring, conduit, disconnects, etc., required for controls. Where additional 120 volt power is required, provide breakers in and extend circuits from the nearest suitable 120 volt panelboard. The cost of installation of conduit, wiring, etc., shall be included as work of this Division.

2. Control and power wiring for control devices, including raceways, breakers, disconnects etc. required for a complete and operating control system shall be provided as work of this Section.

3. Power for each automatic damper, smoke damper, and combination fire and smoke damper shall be provided as work of this section.

4. Where equipment being controlled is powered from the emergency electrical service, the power for the associated controls shall also be obtained from the same emergency power circuit.

E. OPERATION AND TYPE OF SYSTEM

1. General

a. The sequence of operations as described herein is intended to provide a general description of the operation, functions and capabilities required. Some detailed description of features of the control operation are included for clarity.

b. To assist in establishing a means by which certain operations can be accomplished as described, the following should be noted:

1) Where sequence control is required, an adjustable dead band shall be provided between modes.

2) Where a change of mode is specified, such as, but not limited to, activating or deactivating dampers or coil valves, start-up, or by limit controllers of any sort, the control signal to the controlled devices shall have a means to provide time delay (approximately 60 seconds-adjustable) in the action of the controlled device to prevent hunting. The exception to this is the operation of any device when either a firestat or other safety device is activated. Any exception shall be caused to occur quickly but without damage to the controlled device or equipment.

2. Type of Equipment

a. Any necessary relays, switches, or other devices required to accomplish the operating sequences and functions described shall be provided under this Section, whether or not mentioned herein.

3. Identification

Any devices associated with a given item of equipment shall be identified as shown on the drawings and shall be shown on the shop drawing submittal with a suffix number which identifies it with that equipment.

PART 2 - PRODUCTS

2.1 POWER, COMMUNICATION AND CONTROL WIRING

A. All wiring shall be copper and shall be UL labeled for 90°C minimum service.

B. Wire Sizing and Insulation

1. Wiring shall be selected and sized for the application, shall meet the requirements of the National Electrical Code and shall comply with minimum wire size and minimum insulation ratings based on services listed below:

Service	Minimum Gage/Type	Insulation Class
AC 24V Power	12 Ga Solid	600 Volt
DC 24V Power	10 Ga Solid	600 Volt

Class 1	14 Ga Stranded	600 Volt
Class 2	18 Ga Stranded	300 Volt
Class 3	18 Ga Stranded	300 Volt

2. Where exposed cable is permitted, provide plenum-rated cable.

3. Power Wiring:

a. 115V power circuit wiring above 100 feet distance shall use minimum 10 gage.

b. 24V control power wiring above 200 feet distance shall use minimum 12 gage.

4. Control Wiring:

a. Digital Input/Output wiring shall use Class 2 twisted pair, insulated.

b. Analog inputs shall use Class 2 twisted shielded pair, insulated and jacketed and require a grounded shield.

c. Actuators with tri-state control shall use 3 conductor with same characteristics.

5. Communication Wiring:

a. Ethernet Cable shall be minimum CAT5.

b. Secondary level network shall be 24 gage, TSP, low capacitance cable.

2.2 CONTROLS AND DEVICES

A. Miscellaneous

Low Limit Thermostats shall be of manual reset type, with setpoint adjustment. The sensing element shall be 20 foot minimum and shall be installed completely across the coil. When any one foot of the element senses a temperature as low as the setpoint, the thermostat contacts shall open. These shall contain double pole switches for simultaneous remote alarms or as desired.

Duct Type Temperature Transmitter shall be a general purpose RTD sensing element, moisture resistant transmitter for mounting into a duct. The

operating range shall be as indicated with an accuracy of + 1% over the full range. The output shall be compatible with the panel it serves.

Duct Averaging Type Temperature Transmitter shall be a general purpose RTD sensing element, moisture resistant transmitter for mounting into a duct. The operating range shall be as indicated with an accuracy of + 1% over the full range. The output shall be compatible with the panel it serves. Transmitter shall be with 17 feet of sensor capillary.

Space Temperature Transmitter shall contain an RTD sensing element to monitor room air temperatures in the range of 30 degrees F to 90 degrees F, unless indicated otherwise. The transmitter shall be factory calibrated to an accuracy of + 1%. The assembly shall be installed within a metal ventilated enclosure suitable for wall mounting. The output shall be an compatible with the panel it serves. Transmitter shall be factory calibrated to an accuracy of + 1% over the full range.

Outdoor Air Temperature Transmitter shall contain an RTD sensing element mounting in an enclosure rated for outdoor use. The output shall be compatible with the panel it serves. Transmitter shall be factory calibrated to an accuracy of + 1% over the full range.

Humidity Transmitter Duct shall be capable of providing continuous measurement of percent relative humidity with an accuracy of + 4% over the range of 10 to 80% RH. The output shall be proportional VDC over a cable pair.

Humidity Transmitter Outside Air shall be capable of providing continuous measurement of percent relative humidity with an accuracy of + 2% over the range 20 to 90% RH. The output shall be a 4 to 20 Ma signal over a shielded cable pair. Transmitter shall have outside weather enclosure.

Humidity Transmitter Space shall be capable of providing continuous measurement of percent relative humidity with an accuracy of + 3% over the range of 20 to 60% RH. The output shall be proportional VDC over a cable pair.

Pressure Transducer shall be for steam service and have a stainless steel sensor. The device shall output a 4-20 milliamp signal which is linear in relation to the sensed pressure. Accuracy shall be + .05% of the full scale. Power shall be from the controller and range from 22-26 volts DC. The unit shall have temperature compensation so that thermal effects are no more than + .05% of the full scale from 0-175 DEGF. The unit shall be suitable for the media and pressure measured.

Differential Pressure Transducer shall be for air or water service. The device shall output a 4-20 milliamp signal which is linear in relation to the

sensed pressure. Accuracy shall be + .01% of full scale. The power shall be from the controller and shall be in the range of 22-26 volts DC. The unit shall have temperature compensation so that thermal effects are no more than + .05% of the full scale from 32-100 DEGF. The transducer shall be suitable for the media and pressure measured.

B. Devices

1. Instrument Control Cabinets

a. Furnish and install, for components other than space thermostats, cabinets to house control equipment. Cabinets shall consist of extruded aluminum alloy frames with all corners securely riveted and supported by angle brackets. The cabinet is to have removable face and back panels and these panels are to be made of aluminum bonnet on both sides over a poly wood core. The cabinet door is to be supported by non-removable piano-type hinge which spans the entire height of the cabinet. A keylocking latch is to be provided on all cabinets to insure only authorized access. All temperature and status indications and toggle switches are to be flush mounted on the face of the cabinet. Cabinets installed outdoors shall be rated NEMA 3R or better.

2. Sensing/Control (Provide the following devices as required by the monitoring and control functions).

TEMPERATURE SENSORS

Room temperature:

Local setpoint adjustment	Yes
Local RJ-11 communications	Yes
Temperature monitoring range	+32/+130F
Output signal	Changing resistance
Factory calibration point	70 degree F (21 C)
Accuracy at calibration point	+/- 0.7% @ 70F

Duct temperature:

Temperature monitoring range	+20/+120F
Output signal	Changing resistance
Factory calibration point	70 degree F (21 C)
Accuracy at calibration point	+0.5 degree F
RTD resistance	1000 ohms +/-0.1%

Outside air temperature:

Temperature monitoring range	-20/+120
Factory calibration point	70 degree F (21 C)
Accuracy at calibration point	0.5 degree F
RTD resistance	1000 ohms +/-0.1%

HUMIDITY SENSORS

Relative humidity sensor:

Humidity monitoring range	10-90% RH
Output signal	0-5VDC or 4-20Ma
Factory calibration point	70F (21 C)
Accuracy at calibration point	+/- 3% RH
Sensing element	Polymer

START/STOP AND CONTROL RELAYS

Power requirements	24 VAC at .015 amps
Relay contacts	SPDT – 10 amps at 120 VAC
Data	UL listed, CSA approved
Indication	LED – on when energized
Override	built-in H-O-A switch

C. Application Specific Controllers

1. Digital Controller

a. Each controller shall operate as a standalone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each controller shall be a microprocessor-based, multi-tasking, real-time digital control processor.

b. Controllers shall support, but not be limited to, the following configurations of systems to address current requirements described in the "Execution" portion of this Specification, and to address future expansion.

- 1) Single boiler or chiller plants with pump logic.
- 2) Air Handling Units.
- 3) Generic system interlocking through hardware.

c. Point types – Each Controller shall support the following types of point inputs and outputs:

- 1) Analog inputs shall monitor the following analog signals:
 - a) 4-20 mA Sensors
 - b) 0-10 VDC Sensors
 - c) 1000 ohm RTDs

2) Binary inputs shall monitor dry contact closures. Input shall provide filtering to eliminate false signals resulting from input "bouncing."

3) Counter inputs shall monitor dry contact pulses with an input resolution of one HZ minimum.

4) Analog outputs shall provide the following control outputs:

a) 4.20 mA – Sink or Source

b) 0-10 VDC

5) Binary outputs shall provide SPDT output contacts rated for 2 amps at 24 VAC. Surge and noise suppression shall be provided on all pilot relays.

d. Controllers shall have a built-in status, and adjust panel interface to allow for the local adjustment of all setpoints, temporary override of any input or output points, and status of any points in alarm.

e. Powerfail Protection – All system setpoints, proportional bands, control algorithms, and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate reprogramming the controller.

f. The capability to extend the input and output capacity of the Controller via Point Expansion Modules shall be provided.

1) The Point Expansion Modules shall communicate to the controller over a local RS-485 expansion bus.

2) The Point Expansion Modules shall have available a range of configurations of 4, 8, 12, or 16 data points:

Analog Inputs – 0-10V, 4-20mA, 1000 ohm RTD

Analog Outputs – 0-10V, 4-20mA

Digital Inputs w/ digital counter

Digital Outputs – triacs or relay contacts

3) Expansion module data points shall be available for inclusion in all control strategies.

D. Miscellaneous devices

1. Valve and damper actuators shall be sized to operate their appropriate dampers or valves with sufficient reserve power to provide smooth modulating action.
2. Controllers for sensors shall have adjustable sensitivity.
3. Any necessary relays, switches, or other devices required to accomplish the operating sequences and functions described shall be provided under this Section, whether or not mentioned herein.

2.3 OPERATOR INTERFACE REQUIREMENTS

- A. Provide a Web Browser Interface & Provide a Touch Screen Interface

2.4 WEB BROWSER INTERFACE

A. WEB BROWSER CLIENTS

1. The system shall be capable of supporting an unlimited number of clients using a standard Web Browser such as Internet Explorer™ or Netscape Navigator™. Systems requiring additional software resident on the client machine or manufacture-specific browsers shall not be acceptable.

2. The Web Browser client shall support at a minimum, the following functions:

User log-on identification and password shall be required. If an unauthorized user attempts access, a blank web page shall be displayed. Security using Java authentication techniques to prevent unauthorized access shall be implemented.

Graphical screens developed for the GUI shall be the same screens used for the Web Browser client. Storage of the graphical screens shall be in the system, without requiring any graphics to be stored on the client machine. Systems that require graphics storage on each client are not acceptable.

Depending on user access privileges, the user shall be able to view data, modify and command objects such as start/stop, and adjust set points. In addition, users can be provided with the ability to view logs and view and acknowledge alarms.

3. The system shall provide the capability to specify a user's (as determined by the log-on user identification) home page. The capability to limit the user to just their home page shall be provided. From the home page, links to other views, or pages in the system shall be possible.

4. Graphic screens on the Web Browser client shall support hypertext links to other Web pages on other Internet or Intranet site.

2.5 OBJECT LIBRARIES

A. A standard library of objects shall be included for development and setup of application logic, user interface displays, system services, and communication networks.

B. The objects in this library shall be capable of being copied and pasted into the user's database and shall be organized according to their function. In addition, the user shall have the capability to group objects created in their application and store the new instances of these objects in a user-defined library.

C. In addition to the standard libraries specified here, the supplier of the system shall maintain an on-line accessible (over the Internet) library, available to all registered users to provide new or updated objects and applications as they are developed.

D. The library shall include applications or objects for the following functions:

Scheduling Object. Provide a BACnet compliant, 7-day plus holiday & temporary scheduling object to allow for a minimum of 10 on/off events per day. Data entry to be by graphical sliders to speed creation and selection of on-off events.

Calendar Object. Provide a BACnet compliant 12-month calendar object to allow for holiday or special event data entry. Data entry to be by graphical "point-and-click" selection. This object must be "linkable" to any or all scheduling-objects for effective event control.

Duty Cycling Object. Provide a universal duty cycle object to allow repetitive on/off time control of equipment as an energy conserving measure. Any number of these objects may be created to control equipment at varying intervals

Temperature Override Object. Provide a temperature override object that is capable of overriding equipment turned off by other energy saving programs (scheduling, duty cycling etc.) to maintain occupant comfort or for equipment freeze protection.

Start-Stop Time Optimization Object. Provide a start-stop time optimization object to provide the capability of starting equipment just early enough to bring space conditions to desired conditions by the scheduled occupancy time. Also, allow equipment to be stopped before the scheduled un-occupancy time just far enough ahead to take advantage of the building's "flywheel" effect for energy savings. Provide automatic tuning of all start / stop time object properties based on the previous day's performance.

Demand Limiting Object. Provide a comprehensive demand-limiting object that is capable of controlling demand for any selected energy utility (electric, oil, and gas). The object shall provide the capability of monitoring a demand value and predicting (by use of a sliding window prediction algorithm) the demand at the end of the user defined interval period (1-60 minutes). This object shall also accommodate a utility meter time sync pulse for fixed interval demand control. Upon a prediction that will exceed the user defined demand limit (supply a minimum of 6 per day), the demand limiting object shall issue shed commands to either turn off user specified loads or modify equipment set points to effect the desired energy reduction. If the list of sheddable equipment is not enough to reduce the demand to below the set point, a message shall be displayed on the users screen (as an alarm) instructing the user to take manual actions to maintain the desired demand. The shed lists are specified by the user and shall be selectable to be shed in either a fixed or rotating order to control which equipment is shed the most often. Upon suitable reductions in demand, the demand-limiting object shall restore the equipment that was shed in the reverse order in which it was shed. Each sheddable object shall have a minimum and maximum shed time property to effect both equipment protection and occupant comfort.

E. At a minimum, the library shall include services to support LonWorks and BACnet networks.

F. The library shall include control objects for the following functions at a minimum:

Analog Input Object - Minimum requirement is to meet the BACnet standard for data sharing. Allow high, low and failure limits to be assigned for alarming. Also, provide a time delay filter property to prevent nuisance alarms caused by temporary excursions above or below the user defined alarm limits.

Analog Output Object - Minimum requirement is to meet the BACnet standard for data sharing.

Binary Input Object - Minimum requirement is to meet the BACnet standard for data sharing. The user must be able to specify either input condition for alarming. This object must also include the capability to record equipment run-time by counting the amount of time the hardware input is in an "on" condition. The user must be able to specify either input condition as the "on" condition.

Binary Output Object - Minimum requirement is to meet the BACnet standard for data sharing. Properties to enable minimum on and off times for equipment protection as well as interstart delay must be provided. The BACnet Command Prioritization priority scheme must also be incorporated to allow multiple control applications to execute commands on this object

with the highest priority command being invoked. Provide sixteen levels of priority as a minimum. Systems not employing this contention resolution shall not be acceptable.

PID Control Loop Object - Minimum requirement is to meet the BACnet standard for data sharing. Each individual property must be adjustable as well as to be disabled to allow proportional control only, or proportional with integral control, as well as proportional, integral and derivative control.

Comparison Object - Allow a minimum of two analog objects to be compared to select either the highest, lowest, or equality between the two linked inputs. Also, allow limits to be applied to the output value for alarm generation.

Math Object - Allow a minimum of four analog objects to be tested for the minimum or maximum, or the sum, difference, or average of linked objects. Also, allow limits to be applied to the output value for alarm generation.

Custom Programming Objects - Provide a blank object template for the creation of new custom objects to meet specific user application requirements. This object must provide a simple BASIC-like programming language that is used to define object behavior. Provide a library of functions including math and logic functions, string manipulation, and e-mail as a minimum. Also, provide a comprehensive on-line debug tool to allow complete testing of the new object. Allow new objects to be stored in the library for re-use.

Interlock Object - Provide an interlock object that provides a means of coordination of objects within a piece of equipment such as an Air Handler or other similar types of equipment. An example is to link the return fan to the supply fan such that when the supply fan is started, the return fan object is also started automatically without the user having to issue separate commands or to link each object to a schedule object. In addition, the control loops, damper objects, and alarm monitoring (such as return air, supply air, and mixed air temperature objects) will be inhibited from alarming during a user-defined period after startup to allow for stabilization. When the air handler is stopped, the interlocked return fan is also stopped, the outside air damper is closed, and other related objects within the air handler unit are inhibited from alarming thereby eliminating nuisance alarms during the off period.

Temperature Override Object - Provide an object whose purpose is to provide the capability of overriding a binary output to an "On" state in the event a user specified high or low limit value is exceeded. This object is to be linked to the desired binary output object as well as to an analog object for temperature monitoring, to cause the override to be enabled. This object will execute a Start command at the Temperature Override level of start/stop command priority unless changed by the user.

Composite Object - Provide a container object that allows a collection of objects representing an application to be encapsulated to protect the application from tampering, or to more easily represent large applications. This object must have the ability to allow the user to select the appropriate parameters of the "contained" application that are represented on the graphical shell of this container.

G. The object library shall include objects to support common LonMark devices. These devices shall include, but not be limited to, devices for control of HVAC, lighting, access, and metering.

2.6 GRAPHICS

A. Provide at minimum the following graphical displays:

1. A side elevation of the building. Choosing any of the floors from this view will penetrate to a graphic of the chosen floor.

2. A floor plan of each building floor (including outdoor HVAC equipment). Choosing an air handling unit, VAV box, fan coil unit, exhaust fan, or other piece of equipment within that floor plan with the mouse shall penetrate to a detailed flow diagram graphic of the chosen equipment showing piping and ductwork layouts, control valve location, sensor locations and dynamic point information.

3. Users shall be able to penetrate from one graphic to another from assigned key areas designed in to the graphic.

2.7 PRIMARY DDC PANELS

A. Provide a minimum one EMCS primary DDC panel for each mechanical room and for each area where air handling units, chillers, pumps, or other similar equipment is installed. The application specific controllers installed for the terminal units on a floor shall be connected to a primary DDC panel on the same floor. DDC Panels serving air handling units shall not to be used to meet this requirement. Separate panels will be required.

B. Provide stand-alone Application Specific Controllers (ASCs) for terminal equipment (such as VAV boxes, and fan coil units).

2.8 ELECTRICAL WORK

A. Materials shall be new and shall be Underwriters Laboratories labeled or listed.

B. Wiring and raceways shall be concealed wherever possible. Wiring in equipment rooms, wiring installed outdoors, wiring installed in inaccessible spaces and wiring

in areas without ceilings shall be contained in metallic raceways. Raceways shall meet the requirements of DIVISION 16 - ELECTRICAL.

- C. All wiring which is not in raceway shall be U.L. rated for use in plenums.
- D. Control or signaling wiring shall not be installed in raceways with power wiring.
- E. Wiring and raceways for line voltage interlocking shall be work of this Section. Voltage shall be 115 volts, 1 phase, 60 hertz. Provide transformers where required.

PART 3 - EXECUTION

3.1 GENERAL

All temperature control and interlock wiring shall be installed in accordance with these specifications, and the approved engineered submittals and wiring diagrams. Power and interlock wiring shall be run in separate conduit from sensor wiring.

Thermostats or sensors mounted on outside walls shall be mounted on 1" minimum thickness rigid fiberglass (or equal) insulating base.

All temperature sensors located in water lines shall be installed in separable wells packed with heat conductive compound.

3.2 MOUNTING HEIGHTS

A. Adjustable devices in public areas shall be installed at ADA height. Control devices installed in equipment rooms shall be located at eye level so that it may be visually inspected and adjusted, unless otherwise indicated on the drawings or as required to accomplish the control sequence.

3.3 ELECTRICAL WORK

- A. Power for control devices shall be obtained from one of the following sources:
 - 1. A step-down transformer with fused primary and fused secondary connected to an equipment power source. The control power source must be intended for control devices associated only with that piece of equipment or system.
 - 2. A circuit from an electrical panel at a location approved by the engineer.

3.4 COMMISSIONING

A. The control system to be set up and checked out by factory trained competent technicians skilled in the setting and adjustment of EMCS equipment used in

this project. This technician to be experienced in the type of systems associated with this EMCS. All initial setpoints and the first year of start/stop schedules shall be programmed by the technician. The Contractor shall coordinate initial setpoints and schedules with the Owner.

B. This project includes several systems with factory controls by the equipment manufacturer. Work of this section shall include fully coordinating factory and field supplied controls. The subcontractor responsible for this section shall work directly with equipment manufacturer's and shall become fully familiar with the factory controls supplied with various equipment so that he can serve as a single point contact regarding all HVAC control issues during the construction and warranty periods.

3.5 TRAINING

A. Provide a minimum of 4 hours of instructions to Owner's personnel in the operation and maintenance of the control system. Provide training after the system has been installed and fully debugged & commissioned.

3.6 ADDITIONAL TRAINING AND SUPPORT

A. Provide a minimum of one four-hour visit every other month during the 12-month period following substantial completion for the purpose of ongoing training and support. These visits shall be scheduled at the convenience of the Building Engineer and shall be in addition to warranty service visits and in addition to the Owner training described above. These visits are intended to assist the Building Engineer with changes, adjustments and other special needs which arise outside of formal training.

3.7 WARRANTY

A. Equipment shall be warranted for one year (including defects in workmanship and material) under normal use and service. During warranty period supplier shall also replace or repair, free of charge, any equipment proven to be defective in workmanship or material.

3.8 SEQUENCE OF OPERATION AND SPECIAL REQUIREMENTS

Special Requirements

Control and power raceways shall be concealed in walls and above ceiling wherever possible. The building is historic and many of the existing walls are solid masonry. Provide surface metal raceway as specified in Division 16 for raceways which cannot be concealed.

Demolition

Demolish existing controls associated with equipment being demolished including wiring, raceways, tubing, accessories and appurtenances. Modify, re-route, re-support or otherwise adjust existing controls to equipment and systems which are intended to remain as necessary to ensure continued operation.

Electrical Power for Control Devices

Some electrical power for controls may be provided under DIVISION 16 at selected locations as indicated on the Division 16 drawings. Work of this section shall include wiring required for controls from this source. Where additional 120 volt power is required, it shall be obtained from spare breakers at a location approved by the Engineer. The cost of raceways, wiring, etc., shall be included as work of this Division. The contractor shall review electrical drawings prior to bidding.

Power for control devices shall be work of this section.

Damper Closure

Dampers which are indicated to close when the respective unit is de-energized (stopped), shall be directly interlocked with the respective unit so that it closes whenever the unit is de-energized by any means. The intent is to close the damper regardless of how (manually or automatically) the unit is de-energized.

Smoke Detectors

Air handling unit smoke detectors are indicated in Division 16 - Electrical. Interlock the smoke detectors to de-energize the unit if products of combustion are detected.

Graphic Displays

Provide color graphic floor plan displays, and system schematics (for each piece of mechanical equipment). Graphical shall at minimum consist of the following: A floor plan of each level of the building showing all HVAC equipment of the respective floor (including all HVAC equipment). Choosing a piece of equipment within that floor with the mouse will penetrate to a detailed graphic and flow diagram graphic of the chosen equipment. The equipment graphic shall include all control and monitoring points and shall allow for adjustment to all control points and all setpoints..”

Operator Interface

Provide a 15" touchscreen operator interface mounted at an easily accessible location in the mechanical room housing AHU-31. The touchscreen shall be set up so that only the campus control system is displayed. The interface shall be provided with quad core Cortex A17 chipset with a 1.8GHz peak frequency. It shall be configured with Power over Ethernet (POE) to power the tablet over the network connection.”

Ductless Split System (Typical)

Space thermostats are indicated in the equipment schedules. Provide field wiring and controls in accordance with the equipment manufacturer's requirements and recommendations.

The ductless split systems are heat pumps.

The ductless split indoor unit shall be started and stopped from its 7-day programable space thermostat. The thermostat shall have independent occupied/unoccupied setpoints. Cooling and heating shall be staged by the space thermostat. Change-over from heating

mode to cooling mode, and vice versa shall be in strict conformance with the equipment manufacturer's recommendations.

Space thermostats shall be interlocked so that they can be "grouped" to share setpoints and schedules. Groups setting shall be controlled from the thermostats. See manufacturer's literature for the thermostat which is indicated in the equipment schedules.

The ductless split systems shall be provided with BACnet EMCS interface.

Provide full interface of controls provided by the equipment manufacture. Fully map all input, output and monitoring points for each system the EMCS.

Single Zone VAV Air Handling Unit AHU -31

With the hand-off-auto switch in the cover of the variable speed drive in the auto position, the fan shall be started and stopped by the EMCS. Provide a current sensing relay on the fan motor lead to monitor fan status from the EMCS.

Air handling unit smoke detectors are indicated in Division 16 - Electrical. Interlock the smoke detectors to de-energize the unit if products of combustion are detected.

Fan kill switches are indicated on the air handling unit schedule. Interlock the switches to de-energize the fan before the fan compartment access door can be opened.

Provide an averaging type temperature sensor (freezestat) with manual reset sensing mixed air temperature at the inlet of the cooling coil. The unit shall be de-energized if mixed air temperature drops below 40°F. Also provide an averaging type sensor for EMCS monitoring of mixed air temperature.

Provide an airflow monitoring station in the outside air ductwork. and control damper for outside air is to be provided on the air handling unit mixing box. Outside air flowrate shall be monitored and controlled by the EMCS. During the occupied mode of operation, mixing box dampers shall be modulated in sequence to maintain constant outside airflow as supply airflow varies. Outside air flowrates in the occupied and unoccupied modes shall be independently adjustable from the EMCS. Provide a stop on the return air damper to keep return damper from closing completely so as not to overpressurize outside air ductwork.. Coordinate field adjustments with testing and balancing agency. The minimum return air damper position shall be permanently marked on the damper and shall be documented on the record drawings.

The outside air damper for each air handling unit shall close when the respective air handling unit is in the unoccupied mode and when the unit is de-energized.

Provide a space temperature sensor (with remote sensor in common Council Chamber return duct) and a space humidity sensor. Space temperature & humidity setpoints for both the occupied and the unoccupied modes shall be adjustable through the EMCS.

Provide an averaging type air temperature sensor at the discharge of the cooling coil and provide a three-way modulating chilled water control valve. On a call for cooling or dehumidification, the chilled water control valve shall be modulated to maintain 55° F supply air temperature, and fan speed shall be modulated between minimum and maximum cooling setpoints (initial cooling setpoints - 60% min / 100% max speed during the occupied mode and 30% min / 100% max speed during the unoccupied mode) to maintain space temperature setpoint. When the fan is at its minimum speed, the cooling coil discharge temperature shall be reset based on space relative humidity. The initial space humidity setpoint shall be 50% at 75° F. The setpoints and reset schedule shall be fully adjustable through the EMCS.

Electrical duct heat EDH-31 is to be installed in the air handling unit supply ductwork. On a call for heating, the chilled water control valve shall close and the fan speed shall go to its heating mode setpoint (initial heating mode setpoint - 60% max speed) and the SCR controlled electric duct heater shall be modulated to maintain space temperature setpoint. The heating mode setpoint shall be adjustable from the EMCS.

On a call for de-humidification, the fan speed shall go to its de-humidification mode setpoint (de-humidification mode setpoint - 50% max speed) unless there is a greater demand for cooling, and the reheat hot water control valve shall be modulated to maintain space temperature setpoint while a 52° F cooling coil discharge temperature is maintained.

The EMCS shall monitor supply temperatures entering and leaving the electric duct heater and shall monitor return and mixed air temperatures.

Chilled Water System

The existing air cooled chiller is the only portion of the existing chilled water system which is to be reused. Provide an EMCS interface from the chiller manufacturer (Carrier). Interface the chiller with the EMCS. The EMCS shall monitor status (on/off), chilled water supply temperature, chilled water return temperature and chiller safety status.

Replace the existing chiller flow switch with like kind. Interlock the flow switch in accordance with the manufacture's requirements to lock-out compressors until evaporator flow is proven.

Chilled Water Pumps CWP-1 & CWP-2 are redundant. Pumps shall be started and stopped through the auto position of the hand-off-auto switch in the cover of its respective motor starter. Only one pump is required for system operation. The pumps shall be controlled lead / lag and the lead pump shall be interlocked to start and stop with the chiller. Provide a current sensing relay across the pump motor lead to each pump to monitor pump operation from the EMCS.

All (lead & lag) primary chilled water pumps shall start for freeze protection whenever outdoor air temperature drops below 40 degrees F.

The EMCS shall start & stop the chiller and pumps. Chilled water supply temperature setpoint shall be controlled by the EMCS.

Intranet Connections

The Owner will provide a single RJ45 connection for the EMCS at the Data backboard. The contractor shall provide all wiring to the RJ45 connection. The contractor will be assigned IP addresses to allow for communication through the Owner's backbone. However, the entire EMCS system shall be stand-alone and shall have completely independent communications wiring between its various components. Only a single connection to the Owner's backbone will be permitted.

The contractor shall meet with the Owner's IT representatives at completion of the shop drawing phase to coordinate details regarding use of the existing backbone.

Occupied / Unoccupied Setpoints

The EMCS shall be programmed for occupied / unoccupied space temperature setpoints for all systems.

Testing of Fire Alarm System Interface

Work of this section shall include complete testing of the HVAC system fire alarm system interfaces under all modes of operation. Provide written certification that all systems have been tested. Provide the services of a fire alarm system subcontractor to assist in verification and certification.

Additional Controls

Provide controls for all HVAC system equipment and components for a complete and fully functional building HVAC system. Where a specific sequence of operation is not specified, provide controls in accordance with good engineering practices similar in type and function of the sequences included herein. Each of the control and monitoring points described in the sequences of operation or shown in the control schematics shall be included as an input/output point of the EMCS.

Outdoor Air Conditions

The EMCS shall monitor outdoor air temperature and outdoor air humidity.

END OF SECTION

D I V I S I O N

16

ELECTRICAL

SECTION 16010 - ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the contract, including general and special conditions and general requirements, apply to the work specified in DIVISION 16 -ELECTRICAL.

B. Separation of Division 16 into Sections is for convenience only and is not intended to establish limits of work. Sections are as follows:

16010	ELECTRICAL GENERAL PROVISIONS
16100	ELECTRICAL BASIC MATERIALS AND METHODS
16400	ELECTRICAL SERVICE AND DISTRIBUTION SYSTEMS
16500	ELECTRICAL LIGHTING
16600	ELECTRICAL SPECIAL SYSTEMS

1.2 SCOPE

A. The work under this Section includes furnishing and installing wires, conductors, cables, conduit and conduit fittings, wiring devices, junction and outlet boxes, panelboards, circuit breakers, fuses, relays, contactors, safety switches, lighting fixtures, automatic lighting shut-off devices, grounding connections, fire alarm system, and other equipment specified or necessary for a complete installation. The work also includes making building modifications if necessary to get these items to the locations for installation.

B. The work shall include removal of existing electrical equipment not being reused. Lighting fixture and lamp disposal shall meet regulatory agency requirements.

1.3 CUTTING AND PATCHING

A. Contractor shall do his work in such a way to avoid cutting where possible. Holes cut shall be patched in a suitable manner and shall be refinished to match the existing finish. Holes cut in exterior walls shall be patched, flashed, and completely waterproofed. Contractor shall patch and/or repair walls, ceilings, and floors where existing equipment is removed.

B. Cutting and patching for the work of this Division shall be in accordance with

the requirements of the General Conditions. Openings around conduit penetrations shall be sealed. At exterior walls, these shall be completely waterproofed.

C. Work of this Division shall include providing information for any required openings to those responsible for concrete slabs and other concrete members.

D. Field cut openings in concrete shall be located to avoid the reinforcing. These areas shall be scanned (x-ray or other suitable method) to obtain locations of reinforcing and other obstructions. Locations shall be subject to approval of those responsible for DIVISION 3 - CONCRETE.

E. No structural members shall be field cut or pierced without the approval of the Architect.

F. Inserts in slabs and beams for fastening work shall be drilled type.

G. For post-tensioned slabs and beams, inserts for fastening work shall be drilled type. Drilling shall not penetrate the post-tensioning tendons. Powder driver fasteners shall not be used.

H. Grouting shall be provided around raceway penetrations through concrete floors equal to the fire rating of the floor using non-shrinking waterproof grout to inhibit water from leaking through the floor.

1.4 DRAWINGS

A. Outlets shown on electrical drawings are located approximately only. Refer to architectural drawings for necessary dimensions. Refer to architectural, structural, and mechanical drawings as well as] equipment manufacturer's shop drawings and rough-in drawings, and adjust work accordingly to provide a coordinated installation.

1.5 LAWS AND PERMITS

A. The National Electrical Code (2020) and Louisiana Building Code for State Owned Buildings, State, Parish, City and local building codes shall be considered a part of these specifications, and pertinent articles will not be repeated herein. These codes shall establish the minimum acceptable criteria where more stringent requirements have not been defined in these specifications and/or drawings.

B. The Contractor shall apply for permits and pay inspection fees incidental to electrical work.

C. No work shall be concealed until approved by the local inspector and local regulations shall be adhered to.

D. Upon completion, a certificate of approval from the appropriate regulatory

agency shall be furnished to the Architect.

1.6 VISITING SITE

The bidder shall visit the site of proposed work so that he may understand the facilities, difficulties, and restrictions attending the execution of the contract. He will be allowed no additional compensation for failure to be so informed.

1.7 INTERRUPTION OF SERVICES

Services in existing building(s) are to be kept in operation at all times, except when specific permission is given to do otherwise. Before any services are interrupted, arrangements shall be made with the occupants to do this work at a time most convenient to them. This procedure may involve working at night, on Saturday or Sunday, or at a special time of the year, with the length of time of the interruption agreed upon in advance. Once any service is interrupted, work to restore the service in the shortest possible time shall be on a continuous basis unless temporary service is provided or approval is obtained from the Owner to do otherwise. Any temporary services required shall be work of this Division. Allowance shall be made in the Contractor's bid for the cost of any overtime work in this connection.

1.8 GUARANTEE

The Contractor shall guarantee materials and workmanship for one year after final acceptance of entire project unless a longer guarantee is indicated hereinafter for specific equipment.

PART 2 - PRODUCTS

2.1 MATERIAL AND WORKMANSHIP

Equipment and materials shall be new and shall be listed by Underwriters Laboratories, Inc. in categories for which standards have been set by that agency. Whenever two or more of the same product are indicated, they shall be of the same manufacturer. Methods of installation shall be in full accord with the latest and best electrical and mechanical engineering practices.

2.2 SUBSTITUTIONS

A. Names of manufacturers or catalog numbers are mentioned herein in order to establish a standard as to design and quality. Other products similar in design and of equal quality may be used if submitted to the Architect and found acceptable by him. Refer to General Conditions and other portions of the specifications for additional information.

B. When the Contractor elects to use an acceptable alternate manufacturer's

equipment, the Contractor shall be responsible to coordinate the change with the trades affected. The Contractor shall also pay for any additional work required under this Division as well as any other Division if the alternate equipment is used.

C. Lighting fixture substitutions shall also be similar in appearance, construction and photometrics (photometric information shall be based on independent laboratory reports) to specified lighting fixtures.

2.3 SUBMITTALS

A. Within 30 days after award of contract, the Contractor shall submit to the Architect for review one PDF copy of descriptive literature or shop drawings for the following material which he proposes to use. He shall also submit one printed color (hard) copy of this directly to the Electrical Engineer without routing through the Architect:

Wiring devices and plates.	Safety switches.
Automatic lighting shut-off devices.	Lighting fixtures.
Panelboards.	Fire alarm system.
Fuses.	Fault current & protective device coordination study.

B. In addition, the name of the manufacturer of conduit, E.M.T., and conductors to be used shall be submitted for review. Contractor is reminded that 600V conductors shall be rated for wet locations at 90 degrees C.

C. Where applicable, submissions shall include installation drawings and brochures showing locations, methods of anchoring, connections to work of others, wall or ceiling conditions at each particular installation and special floor mounting conditions.

D. Submissions shall be identified with project name, equipment name and number (if assigned a number) same as the name and number indicated on the drawings; shall be properly marked to show model numbers and any accessories being furnished; and shall have the Contractor's stamp showing he has reviewed the submittal and found it to be in accordance with the specifications and drawings. Items of Division 16 to be submitted shall be submitted in one package.

E. Fault current and protective device coordination studies shall be submitted with printed color copies of coordination curves.

F. Submittals which do not comply with the above will be returned without review, for resubmittal.

PART 3 - EXECUTION

3.1 RECORD DRAWINGS

At the completion of the work, unless noted otherwise in the General Conditions, mark-up a set of prints in a neat and understandable manner to show significant changes made during construction. Wiring and raceways installed shall be indicated (routings, wire size and quantity) on the record drawings even if not indicated on the contract drawings. Underground raceways and wiring shall be measured and dimensioned from above-grade structures. Copies of panelboard circuit directories shall be included. These prints shall be scanned and a PDF file (on an external electronic drive), as well as one set of prints made from the PDF, shall be provided. Final payment will be withheld until these drawings are furnished to the Engineer. The Contractor shall pay for the reproduction costs.

3.2 OPERATING INSTRUCTIONS

A. Before final acceptance, prepare and deliver to the Architect two bound copies of operating instructions, which shall include:

1. Description of major components of power systems and each special system, including the function of major items.
2. Detailed operating instructions and instructions for making routine minor adjustments.
3. Routine maintenance operations.
4. Manufacturer's catalog data and service instructions and parts list for each piece of operating equipment.
5. Final reviewed submittals (including review comments).

B. Instruct Owner in the care and operation of equipment and provide the services of a competent mechanic for this purpose.

C. Literature shall be substantially bound in a suitable number of volumes so as to permit heavy usage and shall include wiring diagrams, fabrication drawings and other information as may be required.

3.3 MECHANICAL EQUIPMENT

A. Unless indicated otherwise, magnetic starters (including variable speed drives) will be furnished under other Divisions for installation under this Division.

B. Overload elements in starters shall be selected according to actual motor nameplate full load current. Responsibility for this coordination shall lie with the Division under which the particular starter is furnished.

C. Unless indicated otherwise, power disconnect switches and single speed manual starting switches shall be furnished and installed under this Division. Where combination magnetic starters are provided as work of another Division, the associated disconnect switch will be furnished as work of that Division.

D. Where Division 15 schedules indicate that equipment is furnished with a disconnect, the disconnect shall be installed and connected as work of Division 16.

E. Whether indicated on drawings or not, circuits to 480V, 3-phase VAV boxes shall include a neutral conductor.

F. Whether indicated on drawings or not, provide 120V circuits for HVAC control power where required by DIVISION 15 - MECHANICAL.

G. Refer to DIVISION 15 - MECHANICAL, and to mechanical drawings for any additional electrical power work required.

3.4 WORK RELATED TO EQUIPMENT NOT FURNISHED AS WORK OF THIS DIVISION

A. Unless specifically indicated otherwise, any required electrical services for and required electrical connections to items shown on the architectural drawings or specified to be furnished in other Divisions of specification or by Owner shall be electrically connected as work of this Division.

B. As work of this Division, Contractor shall assure that the ceiling support requirements for lay-in lighting fixtures (described in execution portion of the Lighting Section) are met. Contractor shall determine which subcontractor is to include funds for this work.

3.5 PAINTING

Painting, including painting of exposed conduit, is specified under DIVISION 9 -FINISHES. Damaged surfaces of factory-finished items, however, shall be repaired to the satisfaction of the Architect as the work of this Division.

3.6 PROTECTION OF WORK

Protect the equipment, fixtures, and work from damage. Damaged work will be rejected and replaced at the expense of the Contractor. Lighting fixtures, panels and similar equipment shall likewise be protected from damage and from the weather. Provide adequate and proper storage facilities for such items during the progress of the work.

3.7 BUILDING CODE RESTRICTIONS

Contractor shall assure that he does not install electrical equipment including raceways in or through areas restricted by the building codes. These areas include I.T communication rooms in Health Care Facilities, fire pump rooms, elevator shafts, and stairs.

3.8 EXISTING WORK

A. Remove existing lighting fixtures from areas affected by new construction and from areas to be relighted. After completion of work in a given area, the Contractor shall reinstall the existing lighting fixtures or install new lighting fixtures as indicated.

B. Where existing ceilings are being removed, provide new supports for raceways, outlets, junction boxes, and other electrical items which are to remain and which depend upon the existing ceiling suspension system for support. The new supports shall be attached to the structure/slab above.

C. Existing outlets not to be reused shall be removed unless directed otherwise. Where outlets are indicated to remain as junction boxes, wall outlets shall be provided with blank device plates of the type hereinafter specified and ceiling outlets shall be provided with covers to match existing surfaces.

D. Where new wall or ceiling finishes are applied, existing equipment and cover plates for wiring devices, junction boxes, telephone outlets and data outlets, etc., shall be removed and reinstalled. Provide extension rings on outlets to remain, where necessary. [New cover plates shall also be installed on boxes that do not contain cover plates. Existing outlets, boxes, etc., are not shown on the drawings; bidder shall visit the site to locate these.]

E. Existing exposed conduit and other electrical equipment not to be reused shall be removed. Existing conduit not to be reused and located in accessible attic spaces also shall be removed.

F. Existing conduits in good condition (and of the type and size required) may be reused. Existing conductors, wall switches and receptacles which are required to be removed, unless otherwise individually indicated, shall not be reused.

G. Electrical equipment removed and not to be reused shall be stored in one location on the site; any equipment and material which the Owner does not wish to retain shall become the property of the Contractor and shall be removed from the site by him.

H. Where apparent routings of existing raceways are indicated, it is not possible to guarantee that these routings are correct. The Contractor shall allow for contingencies.

I. Where existing raceways are indicated to be reused, it is not possible to guarantee that the existing raceways are in suitable condition to be reused. Before

conductors are installed in existing raceways, the raceways shall be cleaned out and a try-plug 1/4" smaller than the inside diameter of the raceway pulled through to assure continuity. Raceways which are found to be broken, blocked, and/or defective in any way shall have the defective sections replaced or entirely new raceway provided with routing subject to approval of the Architect. The Contractor shall allow for contingencies in connection therewith.

J. Where outlets to remain are fed from outlets in partitions to be removed, or ceilings and walls to which new finishes are to be applied, the Contractor shall provide such new homeruns or other rerouting as may be required by job conditions to insure service to the outlets to remain.

K. Where existing equipment including wiring and raceways is in conflict with work of this project, Contractor shall rework/reroute/relocate this equipment as necessary.

L. Since a portion of the existing building will be occupied during construction, Contractor shall provide temporary fire alarm protection in the renovated areas during construction. Maintain system during construction.

3.9 UTILITY CONNECTIONS

A. Coordinate connection of utilities (raceways, wiring, etc.) which are work of this contract to existing utilities and utilities installed as work of other contracts. Verify connections points prior to commencing any work. No additional compensation will be allow for conflicts that occur due to the lack of coordination.

- END OF SECTION -

SECTION 16100 - ELECTRICAL BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SCOPE

Work described in this Section includes providing labor, materials and equipment indicated, specified and necessary for a complete and operating electrical system and related systems in accordance with SECTION 16010 - ELECTRICAL GENERAL PROVISIONS.

PART 2 - PRODUCTS

2.1 CONDUIT AND TUBING

A. Rigid steel conduit and electrical metallic tubing shall be manufactured by Allied, Triangle-PWC, Republic, Wheatland, or approved equal. Conduit shall be threaded heavy-wall hot-dipped galvanized (inside and out) steel conduit. Electrical metallic tubing shall have galvanized exterior and galvanized or equivalent plastic coated interior to protect against corrosion.

B. Rigid aluminum conduit shall be manufactured by New Jersey Aluminum, or VAW of America from 6063-T42 extruded Schedule 40 pipe. The interior surface shall be coated with special approved lubricating liner.

2.2 CONDUCTORS

A. Conductors shall be copper.

B. Branch circuit wiring shall be #12 AWG or larger (as required for the particular equipment to be fed) with flame resistant insulation. Conductors #8 AWG and larger shall be stranded. Insulation on branch circuit conductors shall be type THWN-2 (rated 90 degrees C, dry or wet), unless indicated otherwise or otherwise required by the particular application. Branch circuits connecting motors to variable speed drives shall be #12AWG or larger, listed flexible motor supply cable type RHW-2 or XHHW-2. Thermoplastic insulation shall not be used for variable speed drive branch circuits.

C. Feeds to surface and/or suspended lighting fixtures shall be #12 AWG type THWN-2 or XHHW-2. Wiring through channels of continuous rows shall be #12 AWG and type THWN-2, or XHHW-2. Recessed lighting fixtures shall be fed with #12 AWG type THWN-2 or type XHHW-2 conductors.

D. Feeders shall be of the size as indicated, with type THWN-2 insulation (rated 90 degrees C, dry or wet), unless indicated otherwise.

E. Except as may be otherwise indicated, conductors shall be manufactured by Triangle-PWC, American Insulated Wire, Senator, Royal, Southwire, or approved equal.

2.3 OUTLETS

A. All boxes, fittings and supports (including wireways) shall be galvanized steel. However, where these items are located near cooling towers, they shall be stainless steel type.

B. Boxes for concealed wall outlets shall be 4" square by 1½" deep, or larger, with raised device covers. Device covers for 4" square boxes in masonry walls which are not plastered or otherwise finished shall be 1" minimum in depth with straight rectangular openings for dry wall type construction. Covers for boxes in sheetrock or wood walls shall be of the same depth as the sheetrock or wood thickness and shall have straight rectangular openings.

C. Where 4" junction boxes are indicated or installed, they shall be complete with raised device covers as hereinbefore specified. Blank plates shall be as specified for devices.

D. Boxes for concealed ceiling outlets shall be 4" octagonal by 1½" deep, or larger. Boxes in plaster ceilings shall have plaster covers. Fixture outlet boxes shall be equipped with fixture studs secured to the boxes. Boxes above lay-in ceilings shall be supported by bar hangers or other suitable means; they shall not be supported by ceiling tiles.

E. Concrete boxes shall be used for fixtures on concrete ceilings.

F. Outlet boxes for exposed work at dry locations in Mechanical and Electrical rooms (where exposed raceways are installed) shall be 4" square x 1½" deep or larger with Appleton ½" deep raised surface metal covers to accommodate the devices indicated. For other exposed work at dry locations inside buildings, Bell boxes of similar capacity shall be used, unless surface metal raceway system is specified for these areas. Outlet boxes for exposed work that is exposed to weather or in damp locations shall be of cast or malleable iron, similar to Crouse-Hinds type FS or FD condulets. Boxes shall have metal covers to accommodate the devices indicated.

G. In walls or ceilings of concrete, tile, or other noncombustible material, boxes and fittings shall be so installed that the front edge of the box or fitting will not set back of the finished surface more than ¼". In walls or ceilings constructed of wood or other combustible material, outlet boxes and fittings shall be set flush with the finished surface. If a fixture canopy or pan is used as an outlet box cover, any combustible wall or ceiling finish between the edge of the canopy and the outlet box shall be covered with noncombustible material.

H. For conduits 1" and smaller, the following shall be the maximum number of conductors permitted in a box:

<u>Trade Size</u>	<u>Max. No. #12</u>
1-1/2" x 4" octagonal	6
1-1/2" x 4" square	9
1-1/2" x 4-11/16" square	12
2-1/8" x 4-11/16" square	16
2-3/4" x 3" x 2"	6
3-1/2" x 3" x 2"	8

I. Where a fixture stud is installed in box, the number of conductors permitted shall be reduced by one. Where a wiring device is installed in box, the number of conductors permitted shall be reduced by two. A conductor running through the box is counted as one conductor, and each conductor terminating in box is counted as one conductor.

J. Outlet boxes, junction boxes, wireways, etc. used for emergency systems and fire alarm systems shall have permanent legible marking to identify these systems per NEC 700.11(A) and NEC 760.30.

2.4 WIRING DEVICES

A. Wiring devices shall be as manufactured by P&S/Sierra, Hubbell, Leviton, or Eagle. Comparable catalog numbers of devices furnished shall conform with the following, with color as directed by Architect:

1. Duplex receptacles 20A/2 pole, 3-wire, 125 volt, grounding type, -- Hubbell #HBL5362-I. Face shall be nylon or polycarbonate.

2. GFI duplex receptacles 20A/2 pole, 3-wire, 125 volt, GFI, tamper-resistant, weather-resistant, grounding type, -- Hubbell #GFR5362-ITR. These shall be used for weatherproof applications, and damp locations. Unless noted otherwise, GFI receptacles shall not be used to control downstream receptacles.

3. Wall switches 20A/1 pole -- Hubbell #HBL1221, or equal.

B. All 20A/2 pole, 3-wire receptacles shall be mounted with a "U" shaped grounding connection at the top, except for weatherproof receptacles, and except for locations where existing receptacles are mounted with "U" shaped grounding connection at the bottom.

C. Where receptacles are located in wet or damp locations, they shall be weather-resistant type to meet NEC 406.9.

D. Switches shall have visible labeling to indicate whether they are in the open (off) or closed (on) position.

E. Unless indicated otherwise, lighting fixtures within each room shall be switched by the wall switch or switches indicated in the room.

2.5 DEVICE PLATES

A. Plates shall be of the one-piece type, [with color as directed by Architect.

B. Where weatherproof switches are indicated, P&S/Sierra type 302 series WP plates shall be used, unless indicated otherwise on drawings.

C. Where weatherproof receptacles are indicated, metal canopy-type weatherproof covers similar to T&B Red Dot Code-Keeper (UL listed for wet locations at all times) shall be used with the weather-resistant receptacles, unless indicated otherwise on drawings.

D. Use multi-gang plates where switches, receptacles, and/or other devices are grouped.

E. Plates shall be installed with the four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed with an alignment tolerance of 1/16" from the vertical or horizontal.

F. Plates for devices fed with exposed conduit shall be as hereinbefore specified.

G. Device plates shall not be installed until painting is completed. Device plates having paint on their surfaces, or having their finish marred by use of paint remover, shall be replaced at no additional cost to the Owner.

2.6 SAFETY SWITCHES

A. Safety switches shall be of the quick-make, quick-break visible blade-knife switch type. They shall be of the fused or nonfused type as required. Fused switches shall have positive pressure fuse clips. Heavy duty switches shall be fully interlocked, with provision to neutralize the interlock by a screw driver while under load without interrupting the circuit. Switches shall be complete with insulated base, and pressure or solderless lugs (suitable for use with 75 degrees C conductors). Handles shall be front or side operated. Switches shall be horsepower rated, capable of breaking stalled-rotor motor current at these ratings. Unless noted otherwise, outdoor locations shall have NEMA type 3R enclosures; indoor locations shall have NEMA 1 enclosures. Switches shall have provision for padlocking in the "off" position. 600 ampere or smaller switches shall be

complete with rejection feature to ensure rejection of fuses other than Class R. Safety switches shall be Square D General Duty type for 208-240 volt non-fused switches and Heavy Duty type for 480 volt switches and 208-240 volt fused switches. Equal equipment as manufactured by GE, Siemens or Cutler Hammer will be acceptable.

B. Nonfused disconnect switches for single phase motors may be Hubbell #HBL1221I, 20A/1P horsepower rated (for 115V motors) or #HBL1222I, 20A/2P horsepower rated (for 208-240 motors) as required; in outdoor locations these switches shall be mounted in FS condulets with #DS 185 covers and gaskets.

2.7 FUSES

Provide one complete set of fuses, together with 33% spares, for each fuseholder. Fuses 600A and below shall be Buss Low-Peak, Littlefuse LL, or Ferraz Shawmut Amptrop 2000, Type RK-1, current limiting and time delay, rejection type, unless noted otherwise. Fuses above 600A shall be Bussman LCL, Littlefuse KLP-C or Shawmut Amptrop, UL listed Class L, current limiting and time delay, with 200,000 amp rms interrupting rating, silver plated contact surfaces. Where fuses are used with magnetic starters, fuses shall be reduced in ampere rating (from the sizes indicated) to the maximum rating allowed for each particular starter, as stated on starter nameplate. All fuses shall be of a single manufacturer.

2.8 AUTOMATIC LIGHTING SHUT-OFF DEVICES

A. Ceiling mounted automatic lighting shut-off devices shall be Watt Stopper LMDC-100 series or equal, ceiling mounted, low-profile, with selectable passive infrared detection technology and 360 degree active ultrasonic detection technology, and selectable "initial" and "maintained" settings. Passive ultrasonic sensors that listen for audible sounds are not acceptable.

B. Wall-mounted automatic lighting shutoff devices (with integral on/off control) shall be Watt Stopper DW-100 series or equal, with selectable passive infrared detection technology and active ultrasonic detection technology, with selectable "initial" and "maintained" settings. Device shall have on and off buttons for control of fixtures. Passive ultrasonic sensors that listen for audible sounds are not acceptable.

C. Wall-mounted automatic lighting shutoff devices (with integral dimming up/down control) shall be Watt Stopper DW-311 series or equal, with selectable passive infrared detection technology and active ultrasonic detection technology, with selectable "initial" and "maintained" settings. Device shall have up and down buttons for 0-10V dimming control of fixtures. Passive ultrasonic sensors that listen for audible sounds are not acceptable.

D. On/off control stations shall be Watt Stopper LMSW-10x or equal, wall-mounted, with quantity of buttons as required for control of associated lighting fixture zones

to be switched and with LED indicators.

E. Dimming up/down control stations shall be Watt Stopper LMDM-101-W or equal, wall-mounted with on/off/raise/lower toggle push button and with LED array in bezel to indicate dimming level of associated zone of lighting fixtures.

F. Each dimming up/down lighting control station and multi-button scene wall switch input shall contain a custom engraving (Watt Stopper LMSW-KIT-10x series or equal) to indicate function controlled. Exact engraving designation shall be as directed by Architect and included in the submittal.

G. Color of devices and associated device plates shall match that specified for wiring devices.

H. Provide on/off room controllers (Watt Stopper LMRC-10x series or equal) and on/off/dimming controllers (Watt Stopper LMRC-21x series or equal) as required for control of lighting fixture zones in associated room/area. Provide wiring in raceway as required to interconnect automatic lighting shut-off device(s), master lighting on/off control stations, dimmer lighting control stations, room controllers, dimming controllers, lighting fixtures, etc. for a complete and properly operating lighting control system within each space to be provided.

I. Where automatic lighting shut-off devices control lighting fixtures, the automatic lighting shut-off system shall be compatible with the voltage of the lighting fixtures. Where automatic lighting shut-off devices control lighting contactors, the automatic lighting shut-off system shall utilize same control voltage as lighting contactor coil.

J. Lighting fixtures in a room/area shall be turned on by the associated control station(s) in the room/area. Automatic lighting shutoff devices shall have a programmable time delay before automatically turning off the lighting fixtures upon no sensing of occupants. This setting shall be a minimum of 30 minutes unless otherwise directed by the Owner.

K. Where an automatic lighting shut-off system is to control a fan, automatic lighting shut-off device (and associated power supplies/relay packs) shall be horsepower rated as required.

L. Automatic lighting shut-off devices with ultrasonic detection technology shall be adjusted from where indicated in drawings so as to be mounted no closer than 6'-0" from air distribution devices (registers, diffusers, etc.). Generally, automatic lighting shut-off devices shall not be mounted in areas with high volume of air flow.

M. Contractor shall furnish and install complete automatic lighting shut-off systems including wiring and raceways, and all other equipment, whether specifically indicated or not, to provide complete and operating systems. Submittal shall be provided

to show locations of components, (recommended by the manufacturer of the particular system), wiring, and operation.

N. During submittal preparation, manufacturer shall determine the appropriate sensing technology for both 'initial occupancy' and 'maintain occupancy' for its location and application and make alterations as necessary. Care shall be taken when selecting the sensing technology when detecting occupants in rooms which contain windows, partitions, aisles, etc. These settings shall be indicated in the submittal. A factory-trained technician shall make adjustments to the sensors on the jobsite for proper performance. In addition, a factory-trained technician shall visit the project 3 months after substantial completion to review operation of these devices, review operation with Owner, and make adjustments. He shall also do this at 6 months, 9 months, and 1 year after substantial completion.

2.9 WARNING SIGNS

A. Standard industry "DANGER HIGH VOLTAGE" warning signs shall be provided as required by the National Electric Code and as follows:

1. On each door of pad-mounted transformer and on each side of surface available.
2. On each door of automatic transfer switches.
3. On each removable panel of transformers.
4. On other equipment (such as safety switches, time switches, contactors, dimmer panels, etc.) containing energized components which are exposed when door is opened or access panel is removed.

B. A warning sign shall be provided on switchboards, panelboards, and motor control centers to warn of potential electric arc flash hazards.

PART 3 - EXECUTION

3.1 METHODS OF WIRING

A. Systems shall be 4-wire, 3-phase, 120/240 volts, A.C.

B. A permanent sign (white phenolic to show black letters) shall be provided on panelboards and switchboards with stinger leg to indicate "Caution ___ phase has 208 volts to ground.

C. Provide power wiring as required whether indicated on drawings or not. [Homerun raceways to panelboards shall be provided for wiring and shall be limited to the

following combinations (which shall also include equipment grounding conductor):

1. One 1-pole circuit (hot and neutral conductors).
2. Two 1-pole circuits (2 hot conductors and 2 neutral conductors), if derated per NEC table 310.15(B)(3)(a).
3. Three 1-pole circuits (3 hot conductors and 3 neutral conductors), if derated per NEC table 310.15(B)(3)(a).
4. One 2-pole circuit (2 hot conductors).
5. One 2-pole circuit (2 hot conductors and one neutral conductor).
6. One 3-pole circuit (3 hot conductors and one neutral conductor).

Where wiring sizes are not indicated on the drawings, the Contractor shall install #12 AWG or larger wiring as required for the ampacity of the particular equipment to be fed. These sizes shall be increased in size (to reduce voltage drop) for the following:

7. 120/208 wiring from panelboard to center of load with length (single conductor length) greater than 50'.
8. 277/480 wiring from panelboard to center of load with length (single conductor length) greater than 100'.

Additional increases in wire sizes shall be made as required to avoid excessive voltage drops. In particular, #8 conductors shall be used for 20A branch circuits with single conductor length (to center of load) greater than 100'.

D. Where a neutral conductor is required for a branch circuit, it shall be dedicated to that branch circuit and shall not be shared by other branch circuits.

E. Unless otherwise indicated on drawings or specified hereinafter, wiring installed outdoors (not underground or in fill beneath slab and under building) shall be contained in rigid threaded heavy wall galvanized steel conduit (hot dipped, inside and out).

F. Unless otherwise indicated on drawings or specified hereinafter, other wiring shall be contained in electric metallic tubing.

G. All raceways shall be concealed unless otherwise indicated.

H. Branch circuit raceways feeding outlets in masonry walls shall be concealed in the masonry. Where outlet boxes are indicated in bare masonry walls, the box shall be mounted so that two edges of the box or plaster cover will fall in a mortar joint. Where switch boxes will not accommodate the number of conductors required and 4" square or

larger boxes are installed, provide device covers 1" minimum in depth with straight rectangular openings for dry-wall type construction. Where grouting is required to fill up improperly cut openings in the masonry, the work will be rejected. The work of this section shall be coordinated with the masonry work to insure a neat and workmanlike job.

I. Solderless spring type connectors similar to Scotchlok connectors, Ideal colored Wingnuts, or Ideal Crimps with Wrapcaps shall be used for branch circuit wiring and fixture splice connections. Solderless connectors of the split-bolt type shall be used for splices on conductors #8 and larger.

J. Splices in low voltage wiring (50 volts and less) shall be made at terminal blocks furnished with the equipment. At junctions or where other splices are required, these splices shall be soldered or made with approved compression connectors.

K. Termination of branch circuit and feeder conductors shall be made using mechanical or compression lugs, unless noted otherwise. Where lugs are not furnished with equipment (including Owner-furnished equipment), Contractor shall provide lugs, and/or replace lugs with appropriate size, as required for a complete installation. Also, where conductors are to be connected to equipment furnished with lugs not sized for the conductors, Contractor shall change the lugs to the appropriate size.

L. Termination of low voltage wiring (50 volts and less) and control/monitor/instrumentation wiring (120 volts and less) shall be made using compression type (ring or spade) terminals similar to T&B Sta-Kons.

M. Connections to motors (not equipped with a portable cord) shall be made with a short piece of steel flexible metal conduit between rigid conduit system and motor terminal box. Where the motor is located inside a vibrating housing, connection between housing and motor terminal box shall be made with a short piece of steel flexible metal conduit, and connection between rigid conduit system and housing shall be with a short piece of steel flexible metal conduit. Ground bond of separate copper conductor shall be made between motor frame and rigid conduit system. In outdoor locations and other locations subject to moisture or water leakage (including fire pumps), liquid-tight flexible metal conduit shall be used. Wiring within these flexible metal conduits shall be stranded. "Short piece of flexible metal conduit" is defined as the shortest piece that will provide proper vibration isolation.

N. Taps in feed-thru panelboards and/or wireways and junction boxes shall be made with clear-taps, or OZ gutter taps, complete with bakelite covers.

O. Recessed LED troffers shall be wired with #12 AWG type THWN-2, or XHHW-2 conductors in 4 to 6 feet of ½" flexible metal conduit from a box at least 1 foot from the fixture. Recessed downlights (incandescent, compact fluorescent, LED, and H.I.D.) shall be wired with conductors as heretofore specified in 4 to 6 feet of flexible metal conduit from a box at least 1 foot from the fixture, unless the fixture is of the pre-wired type with an integral outlet box approved for the number and type of branch circuit conductors

indicated and/or specified. Not more than two individual fixtures shall be connected to any of these outlet boxes. This box shall be located above the ceiling and shall be accessible from attic, by removing acoustical tile in accessible ceiling or by removing fixture in a non-accessible ceiling. Installing blank covers on ceilings to provide access to such boxes will not be acceptable.

P. Typewritten directory of circuits shall be provided for each panelboard to include spares and spaces. The room numbers and items served shall be indicated for each circuit. (Circuit numbers indicated on the drawings are shown for the purpose of clarifying the grouping of outlets. The actual number assigned to the circuits in the panelboard shall suit the bussing and branch circuiting to panelboard.) [In existing panelboards, the directories shall be corrected as required for changes made to the circuits.] [Phenolic nameplates (white with black-cut letters) shall be provided in lieu of directories for changes to switchboards, motor control centers, and panelboards without doors.]

Q. Branch circuit wiring through lighting fixtures shall be in accordance with Articles 410.11, 410.31, 410.32, and 410.33 of the National Electrical Code; however, conductor types shall be as specified hereinbefore.

R. Unless a larger size is indicated or required by code or manufacturer, raceways shall be sized in accordance with Table 1 for the number and conductor size (AWG and MCM) shown or specified. Where combination of secondary (0-600 volt) conductor sizes are indicated, the raceway shall be sized in accordance with Table 2 based on the insulated conductor areas of Table 3, for the project conductor sizes (AWG and MCM) indicated even though the actual diameters and areas of the conductors to be installed may differ from those in Table 3.

Table 1

Maximum Number of Conductors in Trade Sizes of Conduit or Tubing													
	Conduit Trade Size (Inches)												
	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6
Conductor Size AWG, MCM													
14	3	6	10	18	25	41	58	90	121	155			
12	3	5	9	15	21	35	50	77	103	132			
10	2	4	7	13	18	29	41	64	86	110	138		
8	1	2	4	7	9	16	22	35	47	60	75	94	137
6	1	1	2	5	6	11	15	24	32	41	51	64	93
4	1	1	1	3	5	8	12	18	24	31	39	50	72
3	1	1	1	3	4	7	10	16	22	28	35	44	63
2		1	1	3	4	6	9	14	19	24	31	38	56
1		1	1	1	3	5	7	11	14	18	23	29	42
0		1	1	1	2	4	6	9	12	16	20	25	37
00			1	1	1	3	5	8	11	14	18	22	32
000			1	1	1	3	4	7	9	12	15	19	28
0000			1	1	1	2	4	6	8	10	13	16	24
250				1	1	1	3	5	6	8	11	13	19
300				1	1	1	3	4	5	7	9	11	17
350				1	1	1	2	4	5	6	8	10	15
400				1	1	1	1	3	4	6	7	9	14
500				1	1	1	1	3	4	5	6	8	11
600					1	1	1	2	3	4	5	6	9
700					1	1	1	1	3	3	4	6	8
750						1	1	1	3	3	4	5	8

Table 2

Dimensions and Percent Area of Conduit and of Tubing										
Trade Size	Internal Diameter Inches	Total 100%	Area – Square Inches							
			Not Lead Covered			Lead Covered				
			2 Cond. 31%	Over 2 Cond. 40%	1 Cond. 53%	1 Cond. 55%	2 Cond. 30%	3 Cond. 40%	4 Cond. 38%	Over 4 Cond. 35%
1/2	.622	.30	.09	.12	.16	.17	.09	.12	.11	.11
3/4	.824	.53	.16	.21	.28	.29	.16	.21	.20	.19
1	1.049	.86	.27	.34	.46	.47	.26	.34	.33	.30
1 1/4	1.380	1.50	.47	.60	.80	.83	.45	.60	.57	.53
1 1/2	1.610	2.04	.63	.82	1.08	1.12	.61	.82	.78	.71
2	2.067	3.36	1.04	1.34	1.78	1.85	1.01	1.34	1.28	1.18
2 1/2	2.469	4.79	1.48	1.92	2.54	2.63	1.44	1.92	1.82	1.68
3	3.068	7.38	2.29	2.95	3.91	4.06	2.21	2.95	2.80	2.58
3 1/2	3.548	9.90	3.07	3.96	5.25	5.44	2.97	3.96	3.76	3.47
4	4.026	12.72	3.94	5.09	6.74	7.00	3.82	5.09	4.83	4.45
4 1/2	4.506	15.94	4.94	6.38	8.45	8.77	4.78	6.38	6.06	5.56
5	5.047	20.00	6.20	8.00	10.60	11.00	6.00	8.00	7.60	7.00
6	6.065	28.89	8.96	11.56	15.31	15.89	8.67	11.56	10.98	10.11

Table 3

Dimensions to be Used for Insulated Conductors		
Size AWG MCM	Approx. Diam. Inches	Approx. Area Sq. In.
Col. 1	Col. 2	Col. 3
18	.146	.0167
16	.158	.0196
14	.204	.0327
12	.221	.0384
10	.242	.0460
8	.328	.0854
6	.397	.1238
4	.452	.1605
3	.481	.1817
2	.513	.2067
1	.588	.2715
0	.629	.3107
00	.675	.3578
000	.727	.4151
0000	.785	.4840
250	.868	.5917
300	.933	.6837
350	.985	.7620
400	1.032	.8365
500	1.119	.9834
600	1.233	1.1940
700	1.304	1.3355
750	1.339	1.4082
800	1.372	1.4784
900	1.435	1.6173
1000	1.494	1.7531
1250	1.676	2.2064
1500	1.801	2.5475
1750	1.916	2.8895
2000	2.021	3.2079

S. However, unless a larger size is indicated or required by code or manufacturer, raceway for communication wiring (defined by NEC Chapter 8) shall be sized as a minimum per Table 1 in NEC Chapter 9.

T. Other routings than those indicated may not be used without the approval of the Architect, but the Contractor shall make allowance for possible obstruction to routes indicated.

U. Certain areas and hollow spaces between suspended ceilings and slabs above are being used for environmental air and electrical work therein shall be in accordance with Article 300.22 of the National Electrical Code and the Jefferson Parish building code.

V. Raceways shall be supported in accordance with the National Electrical Code for the particular type of raceway; however, for rigid metal conduit and electrical metallic tubing, the maximum spacing between supports shall not exceed ten feet.

W. Wall switches indicated by doors shall be located on the strike side (lock side), 6" maximum from door frame to the side of the outlet box; however, for double doors switches shall be located where shown, usually clear of the door in the full open position.

X. The Contractor shall install additional boxes or fittings in raceways as required to properly install conductors. The locations of these boxes or fittings shall be subject to the Architect's approval.

Y. Top of wooden poles shall be cut on an angle to allow for drainage of rain water.

Z. In multi-section panelboards, circuit breakers, fusible switches, and spaces shall be divided equally between sections (unless indicated otherwise). The circuit arrangement on panelboard schedules is used only to convey circuit assignment, not locations of circuit breakers in panelboard.

AA. Where a maximum fuse (or circuit breaker) rating is indicated on the nameplates of the magnetic starters, control panels, contactors, etc. (or equipment containing these components) for the specific mechanical equipment, the Contractor shall reduce ampere rating of fuses (or circuit breaker) to be installed (from the sizes indicated). These ratings shall also be increased as necessary to comply with NEC Paragraph 430.52 (C)(1), Exception 2.

BB. Where conductors without raceway penetrate smoke partitions and/or fire rated partitions and floors, a conduit sleeve shall be installed rigidly in the penetration so that the conductors can pass through it. A UL listed fire-stop putty such as Nelson Flameseal shall be installed around the sleeve and inside the sleeve after the conductors are installed.

CC. Where roof penetrations are required for conduits supplying roof-mounted HVAC equipment, these penetrations shall be of the piping roof curb type per National Roofing Association standards.

DD. Where variable speed drives are used, the disconnect switch at the motor shall have an auxiliary contact wired to the variable speed drive to turn off the drive when the disconnect is opened.

EE. Where electrical work penetrates or is installed in fire and/or smoke partitions, this work shall be installed per UL standards. A U.L. listed fire-stop putty such as Nelson Flameseal shall be installed around raceway penetrations.

FF. A branch circuit neutral conductor shall be installed to each lighting switch outlet box, and if not connected, it shall be terminated with a wire nut. This requirement also applies to wall-mounted occupancy sensors. This conductor is not shown on drawings.

GG. Where a safety switch, toggle switch, etc. is to be used as a Code-required in-sight disconnect switch for an item of equipment, Contractor shall obtain dimensional data of the associated equipment prior to rough-in and the location of the disconnect switch shall be adjusted as necessary so that the switch is readily accessible after equipment is installed.

3.2 WIRING IN CONDUIT (APPLIES ALSO TO E.M.T.)

A. Where several conduits (concealed and/or exposed) are run parallel to each other, they shall be grouped together on galvanized P-1 000 Unistrut, with suitable clamps, which shall be attached to the wall or hung from the roof or structural ceiling. Where exposed conduit is indicated, the conduit shall be installed parallel with or at right angles to the building walls and/or ceiling (roof) and shall be supported adequately by pipe straps or other approved devices. Where a single conduit is run exposed in a damp and/or wet location, standoff straps of the type which permit a ¼" air space between the conduit and the wall shall be used. Fastening of conduit shall be as follows: to wood by means of screws; to masonry by means of threaded metal inserts, metal expansion screws, or toggle bolts; and to steel by means of machine straps, bolts, or power actuated fasteners. Raceway fasteners shall be approved for the purpose (tie wire, zip-ties, ty-raps shall not be used).

B. Conduits which must cross building expansion joints shall, where practicable, cross same in furred ceilings areas rather than in slabs or walls, arranged with sufficient flexibility to accommodate the building expansion. However, where such routing is not possible, galvanized expansion fittings shall be provided in each raceway [in concrete or] attached to the structure whenever the raceway crosses an expansion joint [in the concrete structure]. Expansion fitting shall be installed on one side of the joint with its sliding sleeve end flush with the joint and with a length of bonding jumper in the expansion joint equal to at least three times the normal width of the joint. Each expansion fitting shall be

zinc-coated steel and contain heavy factory installed packing and internal copper braid packing and shall be complete with UL approved bonding jumper.

C. Conduits shall be kept at least 6" from runs of hot water piping, flues, or other hot object.

D. Where conduits rise through a concrete floor, the curved portion shall not be visible above the finished floor. Approved waterproof compound or conduit sealing bushing shall be used where underground conduits enter building.

E. Where conduit fittings are installed, these shall be Crouse-Hinds or Appleton cast type.

F. Connectors and couplings for electric metallic tubing shall be of the steel compression type. Couplings for rigid heavy wall conduit shall be of the threaded type; two locknuts and one bushing shall be provided where heavy wall conduits enter boxes or equipment. Flexible metal conduit connectors shall be of the squeeze type with screw and locknut. Liquid-tight connectors shall be steel compression type.

G. Insulated bushings shall be provided for conductors #4 and larger.

H. From each flush panelboard and cabinet (including fire alarm control panels, telephone cabinets, etc.), provide three empty 3/4" conduits to elbow out 6" into space above ceiling for future use.

I. No wiring shall be installed in raceways until the raceway system is complete. Only approved type pulling lubricant shall be used.

J. During construction, outlet boxes and conduit stub-ups shall be suitably protected against the entrance of foreign materials.

K. Conduit in suspended ceilings shall be located, where practicable, in the space between the ceiling and the concrete slab above. Raceways shall not be installed immediately above accessible acoustical ceiling (restricting tile removal) without written approval of [Architect] [Engineer] for the specific location. Raceways shall also not be installed in such a manner to restrict or block access to plenums, equipment, etc.

L. Tie-wires shall not be used for support of raceways. Raceways shall be supported by threaded rods, strut, building structure, etc. that secure the raceways (to prevent both vertical and horizontal movement) in addition to supporting them.

M. Where concrete joist construction is employed, arrange with those responsible for DIVISION 3 - CONCRETE to provide in contact ceilings and in unfinished ceilings such headers as may be required to receive boxes for fixtures.

N. Threaded heavy-wall galvanized conduit with vapor-proof fittings shall be

used in cold storage rooms, and drain and sealing fittings (and expansion fittings, where necessary to compensate for thermal expansion) shall be provided where conduits enter room. Type MI cable may be used in lieu of threaded conduit for this wiring, in which case drain and sealing fittings will not be required.

O. Where raceways pierce walls of HVAC housings, these penetrations shall be made per requirements of the HVAC housing manufacturer.

P. Raceways shall not be installed within 24" of VAV units, fan-powered boxes, and other mechanical equipment located above ceilings, except for those raceways that serve these units. Raceways shall be located to allow maintenance personnel to remove ceiling tiles below these spaces to service this equipment.

Q. Where flexible metal conduit or liquid-tight flexible metal conduit is installed, it shall be securely fastened within 12" of connection point, and additional supports shall be provided per NEC 348 & 350.

R. Where conduits are installed on roofs, unless indicated otherwise, they shall be installed on supports consisting of rubberized base with galvanized strut (B-Line Dura-Blok series DB or Caddy Pyramid series ST fixed strut supports).

S. Where installed under metal-corrugated sheet roof decking, cables, raceways, and boxes shall be installed and supported so there is no less than 1 1/2" between the lowest surface of roof decking and the top of the cable, raceway, or box.

3.3 NONMETALLIC SHEATHED CABLE

A. No joints or splices shall be made except at junction boxes or outlet boxes. Cable shall be fastened to outlet boxes by means of built-in cable clamps or squeeze connectors.

B. Cable shall be secured by approved straps, staples, Or similar fittings so designed and installed as not to injure the cable. Attachment to bar joists shall be made with 10" long piece of #12TW (solid), twisted two turns on each side of the cable, so as to ensure clearance between cable and joist.

C. Cable shall be secured in place at intervals not exceeding 4½ feet and within 12" from every outlet box.

D. Bends shall have a radius of not less than five times the diameter of the cable. Where cables are run through studs, joists or similar wood members, holes shall be bored at the approximate center of wood members, or at least 1½" from the nearest edge.

E. No cable shall be embedded in masonry or concrete. Where cable is run through the air voids of exterior concrete block walls, the cable shall be contained in

electric metallic tubing.

F. Cable shall have copper conductors and shall be complete with insulated ground conductor.

3.4 GROUNDING

A. Grounding bushings with bonding jumpers shall be used around concentric or eccentric knockouts on equipment and on raceways stubbed up below open-bottom equipment such as pad-mounted transformers, switchgear, substations, and switchboards.

B. Each branch circuit and feeder shall be provided with a ground conductor installed with the circuit conductors. Each ground conductor shall be a green insulated copper conductor, with minimum size in accordance with Table 250.122 of the National Electrical Code NFPA-70. These grounding conductors are not shown on the drawings.

C. All receptacles (and their outlet boxes) and non-current carrying conductive surfaces of fixed electrical equipment likely to become energized that are subject to personal contact in patient care areas, operating at over 100 volts, shall be grounded (directly connected) by green insulated copper conductor, sized in accordance with Table 250.122 of the National Electrical Code, NFPA 70, and installed with the branch circuit conductors to meet NEC 517.13(B).

D. See drawings for additional grounding requirements.

3.5 MOUNTING HEIGHTS

A. If not otherwise indicated, mounting heights to centerline of outlets shall be as follows:

1. Receptacles -- 18" above floor.
2. Switches -- 48" above floor.
3. Panelboards -- not more than 5'6" from topmost operating handle to floor.
4. Wall-mounted lighting fixtures -- 7'0" above floor or, where mounted above exterior door, mirror or medicine cabinet, at a height just sufficient to clear the swing of the door or medicine cabinet.
5. Exit lights -- at a height just sufficient to clear the swing of the door, unless noted otherwise.

B. The above mounting heights may be adjusted as required to permit bottom or top of plate to align with mortar joints in unfinished masonry walls, provided joints are

not raked. Where joints are raked, adjust height as required to insure that center of outlet box will be in the center of masonry unit. Where outlets at different levels are shown adjacent, they shall, where possible, be installed on a common vertical centerline. Where these adjustments are made, 18" shall be the minimum mounting height for receptacles, telephone outlets, and computer outlets, and 48" shall be the maximum mounting height for switches.

3.6 MARKING OF STARTERS, SAFETY SWITCHES, PANELBOARDS, AND METER ENCLOSURES

A. Each surface manual starting switch out of sight of the motor which it controls, and each panelboard, switchboard, transformer, enclosed circuit breaker, automatic transfer switch, contactor, magnetic starter, safety switch, and toggle switch used as an in-sight disconnect for any equipment regardless of location, shall be suitably identified by means of 1/4" high letters cut in white laminated phenolic strips to show black letters. Strips shall be attached to cover by means of two screws. Device plate for each flush manual starting switch and wall switch used as starting switch or safety switch shall be suitably engraved to identify the equipment controlled. [Where equipment is used for emergency systems, they shall also be labeled "Emergency System" with the white phenolic to show red letters; labeling shall include boxes, enclosures, panelboards, ATS's, engine generators, etc.] [Device plate for each switch for heat trace cable connection shall also be engraved.] [Labeling of fire pump disconnects (including fire pump controllers), including placard shall make use of 1" high lettering. See NEC 695.4(B)(3) for wording.]

- END OF SECTION -

SECTION 16400 - ELECTRICAL SERVICE AND DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.1 SCOPE

Work described in this Section includes providing labor, materials, and equipment indicated, specified, and necessary for a complete and operating distribution system and related systems, in accordance with SECTION 16010 - ELECTRICAL GENERAL PROVISIONS.

1.2 APPLICABLE PARAGRAPHS

Applicable paragraphs of SECTION 16100, ELECTRICAL BASIC MATERIALS AND METHODS, shall apply to this Section as though repeated herein.

1.3 EQUIPMENT LOCKS

Panelboards, cabinets, and other electrical equipment having doors with locks, shall be keyed alike. Keys (one set for each electrical equipment item containing locks) shall be provided to the Owner.

1.4 CIRCUIT BREAKER ARRANGEMENT

In multi-section panelboards, circuit breakers, fusible switches, and spaces shall be divided equally between sections (unless indicated otherwise). In general, each section of multi-section panelboards shall have the same quantity of pole capacity (i.e. two sections with 36 poles in each rather than one section with 42 poles and one section with 30 poles). The circuit arrangement on panelboard schedules is used only to convey circuit assignment, not locations of circuit breakers in panelboard.

1.5 CIRCUIT DIRECTORIES FOR PANELBOARDS/SWITCHBOARDS

Type-written circuit directories shall clearly indicate the associated room as well as the load and location of the load (e.g., Classroom 101 - Lighting Fixtures, Storage 102 - Receptacle on Northwest Wall, Mechanical 103 - Heat Trace on South Wall, etc.).

1.6 PANELBOARD CONFIGURATION

Panelboard configurations shall be altered (bus ratings, heights, etc.) as necessary to suit specified panelboard options (feed through lugs, surge protection devices, etc.).

PART 2 - PRODUCTS

2.1 CIRCUIT BREAKER LIGHTING BRANCH CIRCUIT PANELBOARDS (120/240V)

A. Unless noted otherwise boxes shall be approximately 20" wide by 5³/₄" deep with 5" minimum side and end gutters. Boxes shall be constructed of code gauge galvanized steel.

B. Fronts shall be for flush or surface mounting as indicated and shall be complete with door and flush chrome-plated combination cylinder lock and catch. Fronts shall be full finish code gauge steel with prime coat and finish coat of baked enamel in manufacturer's standard color, with concealed adjustable trim clamps and circuit directory with transparent covers. Door shall have concealed hinges.

C. Bussing shall be copper, and lugs or main breaker, and branch circuit breakers shall have ampere ratings indicated. Breakers shall be connected to the bus in a sequence phase arrangement using full size breakers (double module breakers shall not be used).

D. Two-pole and three-pole breakers shall have common trip. Branch circuit breakers shall be of the bolted type, quick-make, quick-break, thermal magnetic, 10,000 amp minimum interrupting capacity at 250 volts a.c. Trip position shall be between the "on" and "off" positions to positively identify faulted or overloaded circuits from "off" circuits. Where specifically indicated, breakers shall be complete with ground fault circuit interrupter. 15A and 20A one-pole breakers shall be approved for switching duty. Where used to switch H.I.D. lighting, circuit breakers shall be rated (calibrated) to properly carry the inrush current (labeled "HID"). Where used to switch fluorescent lighting, they shall be labeled "SWD" or "HID".

E. Panelboards shall be Square D type NQ, or equal, factory assembled. Equal equipment as manufactured by GE, Cutler Hammer, or Siemens will be acceptable.

2.2 CIRCUIT BREAKERS

A. Each circuit breaker shall have continuous current rating visible without removing an enclosure cover, and the rating shall be engraved. This may be accomplished by installation of a phenolic label (white with black cut letters) adjacent to the circuit breaker. Circuit breakers shall be suitable for use with 75 degree C conductors. Where circuit breakers are used to supply HVAC equipment having motor group combinations, type HACR circuit breakers shall be used. Circuit breakers installed in existing panelboards or switchboards shall be of the proper type to be installed therein, shall include bussing kits/alterations as required, and shall have an interrupting capacity of not less than that of the existing circuit breakers. Where circuit breakers are not available to fit existing panelboard, panelboard shall be removed and replaced with new. Circuit breakers used for vending machines, hard-wired electric water coolers, hand dryers,

dwelling unit refrigerators within 6' of sink, and dwelling unit dishwashers, and for other indicated equipment shall be GFI type.

B. Unless indicated otherwise, circuit breaker spaces and spare circuit breakers shall be divided equally between sections of multi-section panelboards.

C. Where ground-fault protection is provided for 3-pole circuit breakers (or fusible switches), performance testing of the ground fault protection system shall be provided after installation. Written documentation for this test shall be provided to the Engineer.

D. Where a circuit breaker with adjustable long time trip (where cover over adjustment is not lockable per NEC 240.6 (C)) is used, conductor size for the protected feeder shall be increased by the Contractor to match maximum long time setting of the circuit breaker.

E. Circuit breakers in panelboards shall be fully rated for AIC; that is, series ratings are not acceptable.

F. Circuit breakers used for power sources to fire alarm system equipment shall be dedicated to fire alarm equipment. Each shall have red-colored marking and labeled "FIRE ALARM CIRCUIT", as well as provided with a circuit breaker lock-on device.

2.3 LIMITED SCOPE FAULT CURRENT STUDY

A. A limited scope fault current and protective device coordination study shall be prepared by the Contractor within 30 calendar days following final review of circuit protective devices, including circuit breakers, fuses, overloads, and protective relays. The study shall include calculations and composite time-current characteristic coordination curves (in color) to demonstrate optimum coordination of protective devices to be installed and to protect equipment and conductors against fault currents and sustained overload conditions for conductors and equipment to be installed. The study is not required to include all electrical equipment associated with the building. The study shall be of limited scope for the purpose of indicating optimum coordination with the new equipment and existing protective devices. The study shall include the proper ratings of fuses and proper settings of adjustable circuit breakers associated with the protection of equipment and conductors and optimum selective coordination. If necessary, the study shall also make recommendations for changes to new protective devices, and these changes shall be made by the Contractor at no additional cost to the Owner. For this reason, the study shall be finalized prior to Contractor releasing equipment for production. Also for this reason, the Contractor should consider using the electrical distribution equipment manufacturer to make this study. Contractor shall test and calibrate protective devices in accordance with the manufacturers' specification after making the proper device settings and before the initial energization of the conductors and equipment. Contractor shall obtain required data from the utility company. The Study shall be submitted as printed copies using color

copies for the coordination curves. The Study shall be prepared by a registered professional Engineer and shall contain his signed and dated seal on the first page.

B. The scope of this study shall not only be limited to the equipment indicated on the Schematic Feeder Diagram; rather, the study shall also address safety switches, motor starters, branch circuits (including those rated 20A and less), etc. This will require a complete understanding of the entire set of construction documents by the preparer of the study.

C. Unless otherwise noted, selective coordination shall consist of localization of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the selection and installation of overcurrent protective devices and their ratings or settings for the full range of available overcurrents, from overload to the maximum available fault current, and for the full range of overcurrent protective device opening times associated with those overcurrents.

D. The study shall be prepared by a licensed professional engineer engaged primarily in the design, installation, or maintenance of electrical systems. Furthermore, the study shall contain the engineer's seal and date indicating responsibility for the correctness of the study. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.

E. A phenolic nameplate (white with black-cut letters) shall be provided on each item of switchboards, switchgear, and panelboards to indicate "available fault current is ____KA" and date that "calculation was performed on ____".

PART 3 - EXECUTION

3.1 EMERGENCY LIGHTING SYSTEM

A. Emergency fixtures including internally illuminated exit signs shall be permanently fixed in place and connected to building branch circuits. Fixtures shall contain a rechargeable battery, battery charging means, one or more lamps and other components to be UL approved and meet NEC Article 700.12(F).

B. Where battery backup for fixtures is used with switched branch circuits, the sensor circuit of each fixture shall be connected ahead of any local switching. This will permit "switching-off" fixture without signaling to sensor circuit that a power failure has occurred and "turning-on" of lamps on battery circuit. A failure of the branch circuit shall cause the lamps to turn on whether the switch is in the on or off position.

C. Exit fixtures shall not be switched.

- END OF SECTION -

SECTION 16500 - ELECTRICAL LIGHTING

PART 1 - GENERAL

1.1 SCOPE

Work described in this Section includes labor, materials, and equipment indicated, specified, and necessary for a complete and operating lighting system and related systems in accordance with SECTION 16010 - ELECTRICAL GENERAL PROVISIONS.

1.2 APPLICABLE PARAGRAPHS

Applicable paragraphs of SECTION 16100 - ELECTRICAL BASIC MATERIALS AND METHODS, shall apply to this Section as though repeated herein.

PART 2 - PRODUCTS

2.1 EXIT LIGHTS

A. Exit lights shall be Lithonia LES-R-120/277/ELN-SD series with red letters on a metal stencil. Stencil and trim shall be cast aluminum. Housing shall have matte black finish and stencil shall have brushed aluminum finish. Each fixture shall have concealed LED's. Unit shall be rated for dual voltage 120/277V. Housing thickness shall be maximum 1 7/8". Units shall be UL approved with nicad battery, two-stage solid state charger, pilot light to indicate charging mode, test switch, and accessories (operation in emergency mode shall be 1½ hours minimum). Each shall have an NFPA approved self-test feature that tests the battery and provides visual signal upon sensing a battery failure. See symbol schedule on drawings for mounting details. Fixtures shall meet NFPA 101, with Chevron style arrows.

2.2 LIGHTING FIXTURE GENERAL REQUIREMENTS

A. Fixtures shall be as specified in schedule on drawings. However, each lighting fixture shall be fully compatible with the ceiling type in the area in which it is to be installed. During the preparation of submittal, Contractor shall coordinate the mounting type required for each lighting fixture with the type of ceiling system in the area in which the fixture is to be installed. Contractor shall coordinate with architectural ceiling plans and other details and adjust the mounting type of each lighting fixture proposed to be installed to suit the associated ceiling system regardless of the specified lighting fixture mounting details specified. Submittal shall also include recommended installation details for each lighting fixture to suit the type of associated ceiling system.

B. Fixtures shall be finished (painted or other finish as specified) after fabrication.

C. Trims for recessed fixtures shall be of the type necessary for compatibility with each ceiling type (such as concealed T, wide T, slot grid, flange trim, etc.). Coordinate with architectural drawings and specifications.

D. Where ceiling tiles are thicker than standard ceiling tiles, fixture throat/trim ring assemblies shall be custom-made to accommodate the ceiling system.

2.3 LED (LIGHT EMITTING DIODE) LIGHTING FIXTURES

A. Provide LED fixtures complete with LED module, aluminum heat sink, drivers, [base, pole,] and other accessories as shown on drawings.

B. Fixtures shall be completely designed based on LEDs and not designed around an LED-based lamp meant to install into an existing fixture. Retrofit LED lamp/module into an existing fixture shall not be allowed.

C. Aluminum Heat Sinks: All LED luminaires shall have an aluminum heat sink integral to fixture housing and designed for proper electrical bonding of LED module to allow maximum heat dissipation and to provide thermal management within the allowable operating range of the LED as specified by the LED manufacturer. The junction temperature (T_j) of each LED shall not exceed the maximum junction temperature specified in the manufacturer's product data sheet.

D. Unless noted otherwise on the drawings, LEDs installed in each fixture shall be of the type specifically recommended by the manufacturer of the fixture for use in the fixture.

2.4 LED (LIGHT EMITTING DIODE) DRIVERS

A. Provide LED system drivers, of ratings, types and makes as recommended by LED manufacturer. Driver for LED systems shall be electronic, 1 phase, 60 hertz, high power factor, constant current without elevated inrush current, electronic, low noise level, a minus 40 deg C temperature rating, and shall be furnished by the manufacturer of each type or particular lighting fixture specified.

B. Driver shall have a Class A sound rating.

C. Driver shall have a guaranteed minimum power factor of 0.90. (PF = Watts/Volt-Amps).

D. Driver shall be installed inside an electrical enclosure. Wiring inside electrical enclosure shall comply with 600V/105degC rating or higher.

E. Driver shall be available in a plastic/metal can or all metal can construction to meet all plenum requirements.

F. Driver shall be provided with poke-in wire trap connectors or integral leads color coded per ANSI C82.11.

G. Driver shall comply with UL standard UL1012

H. Driver shall have a rated lifetime of 50,000 hours

I. Driver shall operate from 60 Hz input source of 120 to 277V with sustained variations of +/- 10% (voltage and frequency) with no damage to the driver.

J. Driver output shall be regulated to +/- 5% across published load range.

K. Driver input current shall have Total Harmonic Distortion (THD) of less than 20%

L. Driver shall reduce output power to LEDs if its case temperature exceeds 85C - thermal protection.

M. Driver shall tolerate sustained open circuit and short circuit output conditions without damage and without need for external fuses or trip devices

N. Driver shall be IP64 rated except as indicated.

O. Driver shall not contain PCBs.

P. Driver shall comply with ANSI C62.41 Category A for Transient protection.

Q. Driver shall comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 15, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).

R. Driver shall be manufactured in a factory certified to ISO 9002 Quality System Standards.

S. Driver shall carry a five-year manufacturer's warranty from date of manufacture against defects in material or workmanship, including replacement, for operation at a maximum case temperature of 90C.

T. Driver manufacturer shall have a fifteen year history of producing electronic drivers for the North American market.

U. Battery backup shall be manufactured to provide a minimum of 1400 lumens per fixture for 1½ hours operation during the emergency mode. Fixture shall contain an

integral manual test button for testing purposes to provide a visual and audible alarm. A test button remotely installed from the fixture is not acceptable.

2.5 LED (LIGHT EMITTING DIODE) MODULES

A. LED Modules shall be of the type, color, and optical distribution indicated, as shown, and scheduled

B. LEDs shall be handled and soldered to printed circuit boards (PCBs) according to the manufacturer's specifications.

C. LEDs shall produce a white light of the color temperature shown on the Fixture Schedule located on the drawings and not less than 75CRI value on the color rendering index.

D. LEDs shall be high brightness and high output.

E. LED performance and lumen maintenance testing shall be performed in accordance with IES LM-79-08 and LM-80-08.

F. LEDs shall provide approximately 50,000 hours of lighting at a level not less than 70% of initial lumen output. LEDs shall operate from 60 Hz input source of constant 350mA with sustained variations of +/- 10% (current and frequency) with no damage to the LEDs.

G. LED lumen output shall be regulated to meet or exceed the published standard minimum Luminous flux.

H. Unless stated otherwise, LEDs shall be 3500K in color and shall be within +/- 200K of specified color temperature and shall be from the same bin.

I. LED manufacturer shall utilize strict binning and labeling techniques to ensure consistent brightness within +6 lm of published standard luminous flux and consistent chromaticity within +/-200K of specified color temperature per bin. Each bin shall be labeled with appropriate bin code relative to luminous flux and chromaticity.

J. LEDs shall have a minimum operating temperature of -40C.

K. LEDs shall be environmentally friendly, contain no mercury, lead or other heavy metals, and manufactured in compliance with RoHS and REACH.

L. LEDs and associated components of the LED Modules shall be manufactured in a factory certified to ISO 9002 Quality System Standards.

M. LEDs and associated components of the LED Modules shall carry a five-year manufacturer's warranty from date of manufacture against defects in material or workmanship, including replacement, for operation within specified system design parameters.

N. LED manufacturer shall have a fifteen year history of producing LEDs for the North American market.

PART 3 - EXECUTION

3.1 SUPPORTS

A. For any type ceiling which itself does not provide sufficient support for fixtures, either arrange with other subcontractors to strengthen ceiling or support fixtures from structure above independently of ceiling.

B. Suspended linear fixtures in continuous rows shall have one stem at the beginning of the row, one stem at each channel joint, and one stem at the end of the row.

C. Linear fixtures mounted individually on stems shall each have two single stem hangers. Linear fixtures individually surface mounted shall be supported at both ends.

D. Linear fixtures surface mounted in continuous rows shall have one support at the beginning of the row, one support at each channel joint, and one support at the end of the row.

E. Recessed fixtures installed in plaster ceilings and gypsum board ceilings (including ceilings with glue-on acoustical tiles) shall be furnished with metal plaster frames or other suitable mounting frames.

F. Recessed fixtures shall be so adjusted to their supports that their trim flanges fit tightly and evenly against the surface of the ceiling.

G. In acoustical tile ceilings with exposed mechanical suspension systems, recessed linear fixtures (fluorescent and LED) shall be lay-in type. Fixtures so supported shall be securely fastened to the ceiling's framing members by approved fixture support clips (4 required per fixture). Metal fixture appendages that simply fold down over the ceiling's framing members are not acceptable. Arrange with other subcontractors to support ceilings at each corner of each of these fixtures (not more than 6 inches from each corner) in order to assure that the ceiling will not sag (or fail) during construction or in the future due to the weight of the fixtures. Providing independent fixture support tie-wires from the structure in lieu of proper ceiling support is not acceptable.

H. Large fixtures (generally, those required by manufacturer) shall be supported from the structure above ceiling with $\frac{3}{8}$ " diameter threaded galvanized rods and necessary Unistrut or angles, in addition to the support furnished by ceiling.

3.2 LOCATION OF FIXTURES

A. Work of this Section includes advising other trades of exact location of recessed fixtures so that ceiling construction and/or spacing may be coordinated as necessary to permit symmetrical positioning of fixtures in room.

B. Locations for lighting fixtures shall be per Architectural reflected ceiling plans.

C. For acoustical tile ceilings, surface and/or suspended fixtures shall be centered on a tile or a tile joint, unless indicated otherwise.

D. The locations of fixtures in Mechanical Equipment Rooms and Boiler Rooms are approximate. The Contractor shall determine exact locations based on exact locations of mechanical equipment.

E. Where installed under metal-corrugated sheet roof decking, lighting fixtures shall be installed and supported so there is no less than 1 1/2 " between the lowest surface of roof decking and the top of any part of the lighting fixtures.

3.3 INSTALLATION AFTER PAINTING

Fixtures to be installed in or on painted ceilings and/or walls shall not be installed until painting is completed. Fixtures installed with paint applied over factory finishes will be rejected.

3.4 CLEARANCE

Thermal or acoustic insulation shall not be installed over the top or within 3 inches of the sides of a recessed (incandescent, HID, compact fluorescent, or LED) fixture enclosure, wiring compartment, or ballast unless the equipment is labelled for the purpose. Thermal or acoustic insulation shall not be installed over the top of a recessed fluorescent fixture. Work of this Section includes advising other trades of this requirement, so that proper clearances are maintained.

3.5 FIXTURE COORDINATION

Lighting fixture submittal shall include data on each type of ceiling suspension system and associated acoustical tile. Information on the ceiling suspension systems shall include types of recessed fixture suitable for use with each type as well as recommended installation details.

3.6 FIXTURE ADJUSTMENT

Aim adjustable fixtures at night as directed by [Architect] [Engineer] or his designated representative. Furnish any equipment necessary for aiming fixtures. Equipment shall include but not be limited to bucket trucks, aerial booms, ladders, tools, meters and personnel. Use a factory prepared aiming diagram.

- END OF SECTION -

SECTION 16600 - ELECTRICAL SPECIAL SYSTEMS

PART 1 - GENERAL

1.1 SCOPE

Work described in this Section includes providing all labor, materials, and equipment indicated, specified, and necessary for complete and operating systems in accordance with SECTION 16010 - ELECTRICAL GENERAL PROVISIONS.

1.2 APPLICABLE PARAGRAPHS

Applicable paragraphs of SECTION 16100 - ELECTRICAL BASIC MATERIALS AND METHODS, shall apply to this Section as though repeated herein.

1.3 SYSTEMS INVOLVED

- A. Systems involved include the following:
 - 1. Fire Alarm System

1.4 FIRE ALARM SYSTEM SUBMITTALS

A. Contractor shall have a certified fire alarm installer prepare the submittal (consisting of equipment brochure booklet and shop drawings with plan view and one line schematic drawings for the work of this contract.) The submittal may also require showing locations of existing devices for proper Fire Marshal review.

B. Equipment brochures shall consist of items specified hereinafter and items that are pertinent to the work. The brochures shall include a sequence of operation, battery calculations, and statement identifying "type of system". These brochures shall be submitted for review per Paragraph 16010.2.3. Where remote station monitoring is required, brochures shall provide the name of the monitoring company (which must be Fire Marshal approved). Where system is high-rise type, submittal shall include type of signaling system, type of evacuation system ("zoned" or "general"), and methods of protection for panels, circuits, etc.

C. Shop drawings shall indicate sizes, quantities, and types of conductors, cables and details necessary to install the work, to include strobe candela ratings.

D. A PDF file of the submittal shall be provided to the Architect for review. In addition, a PDF file and one full-sized printed (hard) copy of the submittal shall be provided to the Electrical Engineer for review,

E. After the A/E completes their review and the Contractor has incorporated the comments, Contractor shall make his online application and payment to the Fire Marshal and attach the final reviewed submittal containing the A/E review stamp. He shall select the option “STAMPED SHOP DRAWINGS ATTACHED”, which will allow Fire Marshal review without further involvement by Professional of Record.

F. If additional clarifying details and/or components are required by the Fire Marshal, Contractor shall prepare the details, provide components, and secure approval at no additional cost to the Owner. Installation shall not begin until the Fire Marshal's review is complete.

G. Operating instructions provided to the Owner shall include submittal brochure, shop drawings, and booklet including device addresses to match shop drawings, and control commands for doors, HVAC, elevators, etc.

H. If the work is of limited scope, the Fire Marshal may consider an exemption from full plan review. In this instance, sufficient information shall be provided to the A/E for review relative to compliance with scope of work.

1.5 SURGE PROTECTION

A. Surge protection equipment shall be provided for each system where wiring enters building. This shall be in compliance with NEC Chapters 7 and 8.

PART 2 - PRODUCTS

2.1 FIRE ALARM SYSTEM

A. There is an existing fire alarm system that shall be reused and expanded as required. Contractor shall furnish and install air-stream smoke detectors, control modules with relays, wiring and raceways, and all other equipment, whether specifically indicated or not, to provide a complete and operating addressable analog, non-coded, supervised fire alarm system expansion to meet the requirements of NFPA 72 and all other applicable Life Safety Codes.

B. Contractor shall provide wiring as recommended by the manufacturer and it shall be indicated in the point-to-point interconnection drawings that shall be included with the submittals. The completed installation is to conform to applicable sections of NFPA 72, local and state code requirements and the National Electrical Code. Entire system shall have battery backup to meet NFPA and local codes plus 20% spare capacity.

C. Wiring for initiation devices shall be arranged per NFPA 72, to limit the quantity of devices connected to each addressable interface point in control panel. Wiring

for voice notification systems shall be provided in separate zones to accommodate the voice zone selector switches.

D. Air-stream smoke detectors shall be addressable analog detectors. Performance shall be as described for smoke detectors. A remote test station (with indicator light and keyed test switch on a single-gang plate to be engraved with associated air unit designation) shall be provided for each air-stream smoke detector. Each remote test station shall be in a flush outlet box at a location as directed (generally in corridor wall near the detector), or at a readily accessible place in the associated mechanical room, unless a location is indicated on the drawings. Provide wiring in raceways from detector(s) to remote test station. Test station shall not be addressable device with a different address than the detector. For each air-stream smoke detector, provide an addressable control module with relay at either the air handling system associated with the air-stream smoke detector or the damper associated with the air-stream smoke detector and program the control module for fan shutdown and/or damper closing control resulting from activation of the associated air-stream smoke detector. However, in accordance with IBC and NFPA, when multiple air handling systems are associated with a common air plenum, fan/damper shutdown shall occur for all of these air handling systems upon activation of any air stream smoke detector associated with these air handling systems. Provide wiring and raceways from control module relays to the mechanical control equipment (starters, control panels, dampers, etc.) for this control unless it is being done by the mechanical controls contractor. Air-stream smoke detectors shall be as follows:

1. Where air-stream to be sensed passes through a duct, the air-stream smoke detector shall be a duct type smoke detector with housing and air sampling tubes. These shall be located in accordance with NFPA 72 requirements with exact location to be coordinated with the Division 15 contractor. Multiple duct smoke detectors shall be provided at each location where ducts split into multiple ducts that cannot be monitored by a single detector. However, where an air-stream smoke detector is indicated to be installed in either the supply of an unconditioned outside air duct or located outside exposed to ambient air, a smoke detector shall be pendant-mounted inside the duct. The smoke detector shall be air-handling system rated (UL 268A) and shall be suited for high humidity and high velocity (minimum 2,000 feet-per-minute) environments. Coordinate with other trades to provide an access panel in duct to allow access to the smoke detector.

2. Where air-stream to be sensed does not pass through a duct (or the detector type indicated above is impractical), the air-stream smoke detector(s) shall be located in accordance with NFPA 72 Paragraphs 17.7.5.4.2 and A17.7.5.4.2 and shall be of the type (and quantity) suitable and UL listed for the application (including air velocity). Opening sizes may require a large quantity of detectors.

E. Provide a small permanent label on each addressable device to indicate the address.

F. Provide addressable control modules (with relays as needed) at air handling systems (as hereinbefore indicated), at dampers (as hereinbefore indicated), at door control panels (quantity as required), at elevator controllers (two at each for recall), at elevator shunt trip circuit breakers (one for each), [at fire extinguishers,] [at elevator hoistway smoke relief dampers,] and for other equipment as required by Code. Each control module (or associated relay to be provided) shall have rating (voltage, amperage, etc.) to suit associated equipment to be controlled and each control module shall be both located within 2'-0" of the equipment. Provide wiring in raceways from control modules to the equipment to be controlled. Provide custom programming as required.

G. Power supply panels shall be provided (in closets) as necessary and shall be provided with batteries and 120V circuits (emergency circuits, when emergency circuits are used for control panel). A smoke detector shall be provided at each power supply panel.

H. Programming shall be provided as required and shall include programming for off-site maintenance through the modem.

PART 3 - EXECUTION

3.1 FIRE ALARM SYSTEM INSTALLATION

A. Wiring shall be provided as necessary for proper system operation and shall be of the type as recommended by system manufacturer. Wiring shall be contained in concealed raceways unless noted otherwise.

B. System shall be installed by a qualified fire alarm technician licensed by the State of Louisiana. Devices shall be individually tested. A final operational test shall be conducted on the entire system. After wiring and construction is completed, system shall be certified by equipment supplier in writing as being complete and properly operating. The certification letter shall include NFPA 72 forms.

C. Contractor shall meet with the Owner to establish name for each device address.

D. Contractor shall meet with the Owner (or security contractor) to properly program as required.

E. Contractor shall demonstrate proper operation of system to the Fire Marshal and demonstrate system to him, as many times as required.

F. The completed systems shall be guaranteed free from electrical, mechanical, software, and/or operational defects for a period of one year.

-END OF SECTION -