CITY OF PHARR
PROJECT MANUAL
CONTRACT DOCUMENTS

SPECIFICATION, FORMS OF CONTRACT, BONDS, PROPOSALS, AND TECHNICAL SPECIFICATIONS,
FOR

PROJECT NO. 1819-01-522-C005-297

CITY-WIDE HVAC REPLACEMENT

Dr. Ambrosio "Amos" Hernandez	Mayor
Eleazar Guajardo	Commissioner
Roberto "Bobby" Carrillo	Commissioner
Ramiro Caballero	Commissioner
Daniel Chavez	Commissioner
Ricardo Medina	Commissioner
Mario A. Bracamontes	Commissioner

Edward M. Wylie, Interim City Manager
Omar Anzaldua, Jr., PE, CFM, PMP, CCM, City Engineer
Sandra Zamora, CPM, Purchasing Director

		DESIGN ENGINEER/PROJECT MANAGER  11/28/18
ISSUED FOR BID		

CITY OF PHARR

CITY WIDE HVAC REPLACEMENT
PROJECT #1819-01-522-C005-297

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PROCUREMENT AND CONTRACTING REQUIREMENTS

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SECTION 00110
NOTICE TO BIDDERS

PART 1 - G E N E R A L

1.01 NOTICE TO BIDDERS

NOTICE TO BIDDERS

Formal Sealed bids addressed to Mr. Edward M. Wylie, Interim City Manager, City of Pharr, will be received "electronically" and in "hard-copy" format on **December 20, 2018** at **3:00 p.m.,** at the Purchasing Department (2nd floor) of Pharr City Hall, at which time they will be taken to the City Commission Room and publicly opened and read aloud. All "electronic" bid submittals must be uploaded on the City of Pharr's bidding portal https://pharr.procureware.com. "Hard-copy" bids must be in the City of Pharr's possession on or before the aforementioned date and time (No late bids will be accepted.) City of Pharr normal business working days are Monday through Friday between the hours of 8:00 a.m. and 5:00 p.m. and closed on Saturdays, Sundays and City recognized holidays. (Typed Bid Tabulation shall be posted on our bidding portal.)

CITY OF PHARR
CITY WIDE HVAC REPLACEMENT

This work is for the furnishing and installation of all equipment and material necessary and required to form a complete and functioning system at various City Building as per the requirements of drawings and specification. This is a turnkey project.

A Bidder's Bond from a reliable surety company licensed to operate in the State of Texas or certified Cashier's Check, payable without recourse to the City of Pharr, for the amount of not less than five (5) percent (%) of the total bid shall accompany the bid as a guaranty that, if awarded the contract, the bidder will enter into a contract with the City of Pharr within the time specified. Payment and Performance Bonds shall be executed except in the event that the total amount bid is $50,000 or less, the successful contractor has the option to enter into a single payment contract with the City of Pharr in lieu of a Performance Bond. In the event that the total amount bid is $25,000 or less, the successful contractor has the option to enter into a single payment contract with the City of Pharr in lieu of a Payment and Performance Bond. Failure to execute contracts within the time specified shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security (bid bond) deposited with his bid.

Bidders receiving a **"NOTICE TO BIDDERS"** and/or **"REQUEST FOR BIDS"** notice via e-mail, fax, or reading same in the newspaper are advised that they shall be required to go online to our Bidding Portal: https://pharr.procureware.com to obtain solicitation documents (Plans, Specifications, Proposal Forms, and Contract Documents). Potential bidders are expected to inspect the site of work and to inform themselves regarding all local conditions, which may affect their bid.

Bids are to be submitted in both **"electronic and hard-copy"** form**.** Any and all related Addendums issued shall be posted on our Bidding Portal.

Potential Bidders are asked to post their questions on our bidding portal under the tab labeled "Clarifications/Questions" under the relative project number.

The City of Pharr reserves the right to refuse and reject any or all bids, to waive any or all formalities, or technicalities, and to accept the bid to be the best and most advantageous to the City and hold the bids for a period of **ninety (90) days** without taking action.

Conditional bids will not be accepted. Bids sent via facsimile shall not be accepted

Hand-deliver BIDS:	118 S. Cage Blvd, Purchasing Department (2nd Floor)
If using Land Courier (i.e., FedEx, UPS):	118 S. Cage Blvd, Purchasing Department (2nd Floor) Pharr, Texas 78577
Mail BIDS:	P.O. Box 1729, Pharr, TX 78577
Electronic BIDS:	https://pharr.procureware.com

A Pre-Bid Conference will be held **December 6, 2018 at 10:00 a.m.** in the City Commission Room (2nd floor) of Pharr City Hall. All prospective bidders are encouraged to be in attendance.

Bids shall be sealed and clearly marked: **Project No. 1819-01-522-C005-297**
CITY WIDE HVAC REPLACEMENT

SECTION 00180
BIDDER'S QUALIFICATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section contains the bidder's qualifications for the project.

1.02 DEFINITIONS

A. Refer to Section 0700

1.03 BIDDER'S EXPERIENCE

A. Bidder shall have experience, human resources and access to the equipment necessary for performing the project work. In addition, it is required that a minimum of 60% of the project be completed by the bidders' own workforce.

B. Bidder shall have performed substantially the same type of work as is required in the project in its prior work experience.

C. The successful bidder shall appoint a "competent person" of the company to be full time supervisor or superintendent at the site. The competent person must be available at all times during the pendency of the project and must be available during "off-hours.

1.04 STATEMENT OF QUALIFICATIONS AND OWNER'S REVIEW

Bidder shall submit on the form furnished in this section for that purpose, a Statement of Bidder's Qualifications. The Owner shall have the right to take such steps or perform such investigations as it deems necessary to determine the ability of the bidder to perform the obligations under this Contract, and the bidder shall furnish any and all information or data requested for this purpose. The Owner reserves the right to reject any bid if the evidence submitted by or investigation of such bidder fails to satisfy the owner that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein. Conditional bids will not be accepted.

Bidders must fill-in this form and attach supporting documents to bid form.

1.05 STATEMENT OF QUALIFICATIONS FORM.

Date: _____, 201__.

Proposal of _____ (hereinafter called "Bidder") a _____ (Corporation, Partnership, LLC, LLP, etc.) organized and existing under the laws of the State of Texas.

To the City of Pharr (hereinafter called "Owner").

Gentlemen:

The Bidder is in compliance with the Bidder's Qualifications Section(s) of the specifications for the **CITY-WIDE HVAC REPLACEMENT**, having examined the plans and specifications with related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project, hereby submits the following:

1.06 STATEMENT OF QUALIFICATIONS:

A. Years of experience in similar type of projects:

B. Work on similar type projects: Provide a minimum of four (6) similar type projects with the following information: Project Name, Location, Type or Description of Work, Construction Cost, Reference Name and Phone Number.

C. Name of full time superintendent and experience resume:

D. Number of employees of the bidder that will be working on the project:

E. Names of Subcontractors: Provide names of subcontractors for this project with the following information: Name, Location and Experience. The subcontractors shall have a minimum of three (3) years of experience.

F. Provide information of available equipment:

PART 2 - P R O D U C T S - NOT USED

PART 3 - E X E C U T I O N – NOT USED

END OF SECTION

SECTION 00210
INSTRUCTION TO BIDDERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section contains the instructions to bidders for the project.

1.02 DEFINITIONS

A. Refer to Section 0700

1.03 DOCUMENTS

A. Contract Documents, including Drawings and Technical Specifications are on file online, at the City Engineer's Office located on the (4th Floor) and at the City's Purchasing Department's Office located on the (2nd Floor) at 118 S. Cage Blvd., Pharr, TX 78577.

B. Potential Bidders are asked to post their questions on our bidding portal (https://pharr.procureware.com) under the tab labeled "Clarifications/Questions" under the relative project number.

C. Bidders, suppliers, or sub-contractors may obtain electronic copies of the Bid Solicitation documents, Proposal Forms, and Contract Documents, at no cost, by visiting our bidding portal at https://pharr.procureware.com.

D. Bidder should thoroughly examine and become familiar with the Bid Solicitation/Contract Documents, including, but not limited to, the plans, specifications, and any issued addendum(s). By execution of the Contract, the Bidder (Contractor) shall be responsible for any and all obligations under the Contract and failure by Contractor to become acquainted with the Contract Documents will not relieve Contractor from such obligations.

1.04 ADDENDA AND INTERPRETATIONS:

A. No interpretations of the meaning of the plans, specifications, or other bid solicitation documents will be made orally to any bidder. Every request for such interpretation should be posted on our bidding portal and must be received at least five (5) days prior to the date fixed for the opening of bids to be given consideration. Any and all such interpretations and any supplemental instruction will be in the form of written addenda to the specifications which, if issued, will be sent via facsimile, mailed by regular mail, e-mailed, and/or posted on our bidding portal at https://pharr.procureware.com. All prospective bidders are advised to visit our bidding portal for the most current information. All addenda shall be posted on our bidding portal not later than two (2) days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addenda or interpretation shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the contract documents.

1.05 NOTICES

A. The City of Pharr (Owner) reserves the right to accept or reject bids submitted waive formalities in bidding; accept the bid deemed most advantageous to the City of Pharr.

B. Bids may be held by the Owner for a period not to exceed **ninety (90) days** from the date of the bid opening for the purpose of reviewing the bids and investigating the bidder's qualifications prior to the contract award.

C. The Owner is an Affirmative Action and Equal Opportunity Employer.

D. Small and minority firms are encouraged to submit bids for this project.

1.06 PREPARATION OF BID AND USE OF SEPARATE BID FORMS:

A. These Contract and Specifications includes a complete set of bidding forms which are for the convenience of the bidders. Bid forms furnished in this document shall be copied by the bidder and should be filled in and submitted with all values completed in ink.

B. One (1) Original bid and two (2) copies (labeled Copy 1 & Copy 2) must be submitted in a sealed envelope bearing on the outside the name of the bidder, his address, City, State, Zip code, Project Number, and the name of the project for which the bid is submitted. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified in the bid form.

C. The use of subcontractors is allowed; however, the bidder is specifically advised that any person, firm, or other party to whom it is proposed to award a subcontract under this contract must be acceptable to the owner.

1.07 MODIFICATION:

A. Bidder shall not modify bid by fax or other method at any time prior to the schedule closing time for receipt of bids.

1.08 METHOD OF BIDDING (UNIT PRICES) WHERE APPLICABLE:

A. The unit prices for each of the several items in the proposal of each bidder shall include its pro-rata share of overhead so that the sum of the products obtained by multiplying the quantity shown for each item by the unit price bid represents the total bid. Any bid not conforming to the requirement may be rejected as informal. The special attention of all bidders is called to this provision, for should conditions make it necessary to revise the quantities, no limit will be fixed for such increases or decreases in quantities, nor extra compensation allowed, provided the net monetary value of all such additive and subtractive changes in quantities of such items of work (i.e., difference in cost) shall not increase or decrease the original contract price by more than twenty-five (25%) percent, except for work not covered in the drawings and technical specifications and the Standard General Conditions for Construction Contract of agreement.

1.09 AWARDING OF CONTRACT

A. THIS PROJECT WILL BE AWARDED TO BEST QUALIFIED CONTRACTOR THAT PROVIDES THE LOWEST RESPONSIVE RESPONSIBLE BID WITHIN BUDGET OR THE BEST VALUE TO THE CITY. THE CITY OF PHARR'S DECISION SHALL BE FINAL.

B. Bidders must include all allowances, deductive, add, and/or alternative bid pricing as specified.

C. Incomplete bids will not be considered.

If there is a discrepancy between prices quoted by written words or figures, the price quoted by words will govern.

1.10 BID SECURITY:

A. Each bid must be accompanied by cash, certified cashier's check or a bid bond prepared on the form of bid bond attached hereto, duly executed by the bidder as principal and having as surety thereon a surety company approved by the owner, in the amount of not less than five (5%) percent of the bid. Such cash, checks, or bid bonds will be returned to all except the three lowest bidders within five (5) days after the opening of bids, and the remaining cash, checks, or bid bonds will be returned promptly after the Owner and the accepted bidder have executed the contract or if no award has been made, within ninety (90) days after the date of the opening of bids, upon demand of the bidder at any time thereafter, so long as he has not been notified of the acceptance of his bid.

B. Liquidated damages for failure to enter into contract: The successful bidder, upon his failure or refusal to execute and deliver the contract and insurance certificates required within ten (10) days after he has received notice of the acceptance of his bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with his bid.

1.11 PROJECT BONDING

A. On all contracts that will equal to or exceed $100,000.00, the performance bond and the payment bond must be provided from a surety that is licensed in the State of Texas.

B. In the event that the contract amount total(s) $50,000 or less, the successful contractor has the option to enter into a single payment contract with the City of Pharr in lieu of a Performance Bond, provided that no money shall be paid to the contractor until completion of the work by the contractor and acceptance of same by the City of Pharr. In the event that the total amount bid is $25,000 or less, the successful contractor has the option to enter into a single payment contract with the City of Pharr in lieu of a Payment and Performance Bond(s).

C. Required performance bond must be written in the amount of 100% of the Contract amount.

D. Required payment bond must be written in the amount of 100% of the Contract amount.

E. All project(s) stemming from this contract will require a warranty on maintenance and defects to begin at acceptance of the project(s) and for the duration of one (1) year unless otherwise noted.

1.12 TIME OF COMPLETION AND LIQUIDATED DAMAGES:

A. Bidder must agree to commence work within **ten (10)** days of the written "Notice to Proceed" from the Owner and to complete the project within **one hundred and twenty (120)** calendar days thereafter.

B. Bidder must agree also to pay as liquidated damages the sum of **two hundred dollars and fifty ($250)** per day for each consecutive calendar day thereafter as provided in the general conditions.

1.13 CONDITIONS OF WORK:

Each bidder must inform himself fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of his obligation to furnish all material and labor necessary to carry out the provisions of his contract. Insofar as possible, the Contractor, in carrying out his work, must employ such methods or means as will not cause any interruption of, or interference with, the work of any other Contractor.

1.14 INSPECTION OF SITE:

A. Bidder should visit the site(s) of the proposed work and become fully acquainted with the existing conditions of the site and with the facilities involved, with a special consideration to the difficulties and restrictions attending the performance of the Contract.

1.15 PAYMENT REQUESTS

A. Contractor shall be expected to invoice the City of Pharr, at the awarded unit price(s), on a per project basis for completed items. All invoices shall reflect appropriate Purchase Order Number(s) as designated by the Purchasing Department.

1. Contractor shall be expected to state on the request for payment (invoice) the Purchase Order Number, Project Number, Title of Project, the date(s) work was performed, the proper address where the work was performed, the type of work performed (line item descriptions), the quantity of work as per the unit of measure, the unit price, and the extended cost.

1.16 AUDIT

The City of Pharr reserves the right to audit the bidder's books and records relating to the performance of this contract. The City of Pharr, at its own expense, shall have the right at all reasonable times during normal business hours and upon at least twenty-four (24) hours' advance notice, to audit, to examine, and to make copies of or extracts from the books of account and records maintained by the vendor(s) with respect to the Supply/Service and/or Purchase Contract. If such audit shall disclose overpayment by City to vendor, written notice of such overpayment shall be provided to the vendor and the amount of overpayment shall be promptly reimbursed by vendor to the City. In the event any such overpayment is not paid within ten (10) business working days after receipt of such notice, the unpaid amount of such overpayment shall bear interest at the rate of one percent (1%) per month from the date of such notice until paid.

1.17 WORKING DAYS

Working Days - working days, except Saturdays, Sundays and City recognized holidays, if weather or other conditions permit the performance of the principle unit of work underway, as determined by the Engineer, for a continuous period of at least 7 hours between 7:00 a.m. and 6:00 p.m

1.18 CALENDAR DAYS

Calendar Days - Every day shown on the calendar. When the Contract Time is stated in Calendar Days, every day will be charged toward the Contract Time.

1.19 CHAPTER 2252.152 TEXAS GOVERNMENT CODE

TEXAS GOVERNMENT CODE CHAPTER 2252.152 CONTRACTS WITH COMPANIES ENGAGED IN BUSINESS WITH IRAN, SUDAN, OR FOREIGN TERRORIST ORGANIZATION PROHIBITED

A. In accordance with Chapter 2252.152 of the Texas Government Code, Bidder is to acknowledge that Bidder does not engage in business with Iran, Sudan or any foreign terrorist organization and Bidder is not listed by the Texas Comptroller as a terrorist organization.

1.20 CHAPTER 2270 TEXAS GOVERNMENT CODE

TEXAS GOVERNMENT CODE CHAPTER 2270 PROHIBITION ON CONTRACTS WITH COMPANIES BOYCOTTING ISRAEL

A. “In accordance with Chapter 2270, Texas Government Code, a government entity may not enter into a contract with a company for goods and services unless the contract contains a written verification from the company that it: (1) does not boycott Israel; and (2) will not boycott Israel during the term of this contract.

Sample Wording: “Bidder hereby Acknowledges the Prohibition of Contracts with Foreign Terrorist Organizations and with the Boycotting of Israel. The signatory executing this contract on behalf of company hereby verifies that the company is not on the Texas Comptroller’s list of terrorist organizations, is not engaged in business with Iran, Sudan or any foreign terrorist organization and will

not boycott Israel throughout the term of this contract." (to be submitted on company letterhead with authorized signor(s) signature(s)).

1.21 CHAPTER 2253 TEXAS GOVERNMENT CODE – RETAINAGE

All Contract pay applications shall bear a retainage of five (5) percent (%) on each partial disbursement.

1.22 CONDITIONS OF WORK

A. Each bidder must inform himself fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of his obligation to furnish all material and labor necessary to carry out the provisions of his contract. Insofar as possible, the Contractor, in carrying out his work, must employ such methods or means as will not cause any interruption of, or interference with, the work of any other Contractor.

1.23 INSPECTION OF SITE

A. Bidder should visit the site of the proposed work and become fully acquainted with the existing conditions of the site and with the facilities involved, with a special consideration to the difficulties and restrictions attending the performance of the Contract.

1.24 EXPERIENCE AND WORKFORCE

A. Bidder shall have experience, human resources and access to the equipment necessary for performing the project work. In addition, it is required that a minimum of 60% of the project be completed by the bidders' own workforce.

1.25 HOUSE BILL (H.B.) 1295 – "DISCLOSURE OF INTERESTED PARTIES"

In 2015, the Texas Legislature adopted House Bill 1295 (H.B. 1295) has been revised. *Portions of the text of subsection as amended by Acts 2017, 85th R.S., Ch. 526 (SB 255).*

(Changes identified by italicized text apply only to a contract entered into or amended on or after January 1, 2018).

(a) In this section:

(1) "Business entity" means any entity recognized by law through which business is conducted, including a sole proprietorship, partnership, or corporation.

(2) "Governmental entity" means a municipality, county, public school district, or special-purpose district or authority.

(3) "Interested party" means a person who has a controlling interest in a business entity with whom a governmental entity or state agency contracts or who actively participates in facilitating the contract or negotiating the terms of the contract, including a broker, intermediary, adviser, or attorney for the business entity.

1.25 HOUSE BILL (H.B.) 1295 SEC. 2252.908. DISCLOSURE OF INTERESTED PARTIES CONTINUED:

(4) "State agency" means a board, commission, office, department, or other agency in the executive, judicial, or legislative branch of state government. The term includes an institution of higher education as defined by Section 61.003, Education Code.

(b) This section applies only to a contract of a governmental entity or state agency that:

(1) requires an action or vote by the governing body of the entity or agency before the contract may be signed; or

(2) has a value of at least $1 million.

(c) Notwithstanding Subsection (b), this section does not apply to:

(1) a sponsored research contract of an institution of higher education;

(2) an interagency contract of a state agency or an institution of higher education;

(3) a contract related to health and human services if:

(A) the value of the contract cannot be determined at the time the contract is executed; and

(B) any qualified vendor is eligible for the contract;

(4) a contract with a publicly traded business entity, including a wholly owned subsidiary of the business entity;

(5) a contract with an electric utility, as that term is defined by Section 31.002, Utilities Code; or

(6) a contract with a gas utility, as that term is defined by Section 121.001, Utilities Code.

(d) A governmental entity or state agency may not enter into a contract described by Subsection (b) with a business entity unless the business entity, in accordance with this section and rules adopted under this section, submits a disclosure of interested parties to the governmental entity or state agency at the time the business entity submits the signed contract to the governmental entity or state agency.

(e) The disclosure of interested parties must be submitted on a form prescribed by the Texas Ethics Commission that includes:

(1) a list of each interested party for the contract of which the contracting business entity is aware; and

(2) a written, unsworn declaration subscribed by the authorized agent of the contracting business entity as true under penalty of perjury that is in substantially the following form:

"My name is _____, my date of birth is _____, and my address is

_____, _____, _____, _____,
(Street) (City) (State) (Zip Code)

_____.
(Country)

I declare under penalty of perjury that the foregoing is true and correct. Executed in _____ County, State of _____, on the _____ day of _____, _____.
(Month) (Year)

_____
Declarant".

(f) Not later than the 30th day after the date the governmental entity or state agency receives a disclosure of interested parties required under this section, the governmental entity or state agency shall submit a copy of the disclosure to the Texas Ethics Commission.

(g) The Texas Ethics Commission shall adopt rules necessary to implement this section, prescribe the disclosure of interested parties form, and post a copy of the form on the commission's Internet website.

Added by Acts 2015, 84th Leg., R.S., Ch. 1024 (H.B. 1295), Sec. 3, eff. September 1, 2015. Amended by Acts 2017, 85th Leg., R.S., Ch. 526 (SB 255, Sec. 5, eff. September 1, 2017).

https://www.ethics.state.tx.us/tec/1295-Info.htm
https://www.ethics.state.tx.us/whatsnew/FAQ_Form1295.html
https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm

As a business entity under this law, it is your firm's responsibility to comply with all disclosure laws including Chapter 2252. The City of Pharr as the governmental entity must ensure compliance of the same.

Note: You will be required to register and create an account. Once registered, you will receive an email containing a password setup link. Click on the link to set your password. After you have established an account, you will use your email address, password, and user type (Business Entity) to log in to the filing application to enter the required information on Form 1295. Print a copy of the completed form which includes a unique certification of filing number assigned by the application. An authorized agent of the business must sign the form and have the form notarized. The completed Form 1295 with an "unsworn declaration" certification with signature must be submitted at the time the signed contract is submitted to the City of Pharr. Failure to comply may result in contract revocation and award to the next compliant contractor/vendor.

END OF SECTION

SECTION 00300

BID PROPOSAL FORM

CITY WIDE HVAC REPLACEMENT

PROJECT NO. #1819-01-522-C005-297

BID OPENING: December 20, 2018 at 3:00 p.m.

TO: OWNER (CITY OF PHARR)

The undersigned, as bidders, declares that the only person or parties interested in this proposal as principals are those named herein, that this proposal is made without collusion with any other person, firm or corporation; that he has carefully examined the form of contract, Notice to Contractors, specifications and the plans thereon referred to, and has carefully examined the plans, specification, locations, and conditions and classes of materials of the proposed work; and agrees that he will provide all the necessary labor, machinery, tools, and apparatus, and other items incidental to construction, and will do all the work and furnish all the materials called for in the contract and specifications in the manner prescribed therein and according to the requirements of the Engineer/Architect as therein set forth.

It is further agreed that the quantities of work to be done at unit prices and materials to be furnished may be increased or diminished as may be considered necessary, in the opinion of the Engineer, to complete the work fully as planned and contemplated, and that quantities of work, whether increased or decreased are to be performed at the unit prices set forth below or as provided in the Specifications.

It is further agreed that the lump sum prices may be increased to cover additional work ordered by the Engineer and approved by the OWNER, but not shown on the Plans or required by the Specifications, in accordance with the provisions of the General Conditions. Similarly, they may be decreased to cover deletion of work so ordered.

It is understood that the OWNER reserves the right to reject any and all bids.

BID PROPOSAL FORM MUST BE SUBMITTED IN TRIPLICATE FORM

Bidders are advised that a **formal Sealed Bid (hard-copy)** submittal **is required** and **an "Electronic" Bid Submittal**. As previously instructed via Invitation, Notice to Bidders, Instructions to Bidders, and at the Pre-Bid conference, Bidders must go online to the City's website to download any and all related project documents. Kindly submit your **Sealed Bid** and accompanying documents on or before the Bid Opening date & time. Kindly submit your **"Electronic" Bid** submittal through our bidding portal http://pharr.procureware.com uploading required documents on or before the Bid Opening date & time.

Accompanying this proposal is a certified or cashier's check or bid bond payable to the City of Pharr.

Bidders must enter unit prices in Bidding portal, then print and attach to hard-copy formal bid submittal, along with required supporting documents (refer to check-list and Instructions to Bidders)

The bid security accompanying this proposal shall be returned to the bidder, unless in case of the acceptance of the proposal, the bidder shall fail to execute a Contract and file a performance and payment bond within ten (10) days after its acceptance, in which case the bid security shall become the property of City of Pharr and shall be considered as payment for damages due to delay and other inconveniences suffered by the OWNER on account of such failure of the bidder.

ENGINEER'S/ARCHITECT'S ESTIMATE OF QUANTITIES - APPROXIMATE ONLY

Bidder agrees to perform all work described in the specifications and shown on the plans, for the following price or prices:

ITEM NO.	ADDRESS	DESCRIPTION	UOM	UNIT QTY
1	Police Department 1900 S. Cage Blvd, Pharr TX 78577	Police Department HVAC Unit Replacement	LS	1
2		Police Department Building Automation System	LS	1
3	Pharr Bridge 9900 S. Cage Blvd. Pharr, TX 78577	Pharr Bridge HVAC Unit Replacement	LS	1
4		Pharr Bridge Building Automation System	LS	1
5	Memorial Library 121 E. Cherokee Ave., Pharr TX 78577	Memorial Library HVAC Unit Replacement	LS	1
6		Memorial Library Building Automation System	LS	1
7	Tierra Del Sol 700 E. Hall Acres Rd., Pharr TX, 78577	Tierra Del Sol HVAC Unit Replacement	LS	1
8		Tierra Del Sol Building Automation System	LS	1

TOTAL AMOUNT OF BID (ITEMS 1-8): $_____

_____

TOTAL AMOUNT BID (ITEMS 1-8) (Written in Words)

NAMED MATERIAL MANUFACTURERS

Contractor shall indicate one manufacturer selected for the material of the items tabulated below and include the completed table with the bid-documents. Failure to select a manufacturer may render the bid non-responsive.

SECTION	DESCRIPTION
23 62 13-AIR COOLED CONDENSING UNITS	A. Basis of Design: Trane
	B. Lennox
	C. Carrier
	D. York

Bidders must enter unit prices in Bidding portal, then print and attach to hard-copy formal bid submittal, along with required supporting documents (refer to check-list and Instructions to Bidders)

23 81 36- ROOFTOP HEATING AND COOLING UNITS ELECTRIC COOLING-ELECTRIC HEATING	A. Basis of Design: Trane
	B. Lennox
	C. Carrier
	D. Daiken
23 82 19-FAN COIL UNIT	A. Basis of Design: Trane
	B. Lennox
	C. Carrier
	D. York

In the event of the award of a Contract to the undersigned, the undersigned will furnish a performance and payment bond for the full amount of the Contract, to secure proper compliance with the terms and provisions of the Contract, to insure and guarantee payment of all lawful claims for labor performed and materials furnished in the fulfillment of the Contract.

The proposed work to be done shall be accepted when fully completed and finished in accordance with the Plan and Specifications to the satisfaction of the Engineer.

The undersigned certifies that the bid prices contained in this Proposal have been carefully checked and are submitted as correct and final. The Bidder agrees that this bid shall be good and may not be withdrawn for a period of ninety (90) days after the scheduled closing for receiving bids.

Unit and lump sum prices must be shown in figures for each item listed in the Bid Proposal form. Should bid prices on any item be omitted, the right is reserved to apply the lowest prices submitted by and other bidders for the omitted items in payment for work done under this Proposal. In the event of discrepancies, the Owner reserves the right to accept or reject in formalities.

The undersigned agrees, unless hereinafter stated otherwise to furnish all materials as shown on the Specifications and Detail sheets.

Bidder hereby agrees to commence work under this contract within **ten (10) days** after notice to PROCEED is issued and complete the work within **120 Calendar days**.

Receipt is hereby acknowledged of the following addenda to the Contract Document:

Addendum No. 1 Dated:_____ Received:_____

Addendum No. 2 Dated:_____ Received:_____

Addendum No. 3 Dated:_____ Received:_____

Addendum No. 4 Dated:_____ Received:_____

Bidder agrees that the Owner has the right to accept or reject any or all bids and to waive any or all formalities.

Date:_____

Respectfully Submitted:

_____
Authorized Signor

_____
Type/Print Name (Authorized Signor)

_____
Title

_____
Legal Company Name

(Seal - If bidder is a Corporation)

_____
Address

_____
City, State, Zip

_____
Business Phone

_____
Cell Number

_____
E-Mail Address

END OF SECTION

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SECTION 00310

BID SUBMITTAL CHECKLIST

PART 1 - GENERAL

1.01 BID INFORMATION

A. Bidder: _____

B. Prime Contract: _____

C. Project Name: **CITY-WIDE HVAC REPLACEMENT**

D. Project Location: **Pharr TX, 78577**

E. Owner: City of Pharr, Mr. Edward M. Wylie, Interim City Manager

F. Owner Project Number: **1819-01-522-C005-297**

G. Consultant: **RO Engineering, PLLC**

H. Consultant Project Number**: N/A**

1.02 BIDDER'S CHECKLIST

A. In an effort to assist the Bidder in properly completing all documentation required, the following checklist is provided for the Bidder's convenience. The Bidder is solely responsible for verifying compliance with bid submittal requirements.

B. Attach this completed checklist to the outside of the Submittal envelope.

- ☐ Used the Bid Proposal Form provided in the Project Manual.
- ☐ Prepared the Bid Form as required by the Instructions to Bidders. (Section 00210)
- ☐ Attached to the Bid Form: Bid Bond OR a certified cashier's check in the amount of five percent (5%) as required. (Section 00300 P. 2)
- ☐ Indicated on all pricing as required, to include Sub-totals & Totals. (Section 00300 P. 1-4)
- ☐ Attached to the Bid Form: Bid Supplement Form - Allowances. (Not Applicable)
- ☐ Attached to the Bid Form: Bid Supplement Form – Extra Unit Prices. (Not Applicable)
- ☐ Attached to the Bid Form: Proposed Schedule of Manufacturers/Suppliers. (Not Applicable)
- ☐ Attached to the Bid Form: Bidder Qualifications. (Section 00180 P. 1 & 2)
- ☐ Indicated on the Bid Form the Addenda received. (Section 00300 P. 3)
- ☐ Signature Page (signed). (Section 0300 P. 4)
- ☐ Bid envelope shows name and address of the Bidder.
- ☐ Bid envelope shows the Bidder's Contractor's License Number.
- ☐ Bid envelope shows name of Project Number and Project name being bid.
- ☐ Bid envelope shows time and day of Bid Opening.
- ☐ Verified that the Bidder can provide executed Performance Bond and Payment Bond (Labor and Material Bond).
- ☐ Verified that the Bidder can provide Certificates of Insurance in the amounts indicated.

END OF DOCUMENT

SECTION 00410

AGREEMENT

STATE OF TEXAS
COUNTY OF HIDALGO

THIS AGREEMENT, made and entered into this the ____ day of _____A.D., 201_, by and between **THE CITY OF PHARR** of the State of Texas, acting through Mayor of the City of Pharr thereunto duly authorized so to do, Party of the First Part, hereinafter called OWNER, and _____, Party of the Second Part hereinafter termed CONTRACTOR.

WITNESSETH, that the Contractor and the Owner for the consideration hereinafter named agree as follows:

ARTICLE 1. SCOPE OF WORK:

The contractor shall under the terms stated in the general conditions furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, and other accessories shown on addendum's, drawings as described in the specifications for the following project.

PROJECT NO. #1819-01-522-C005-297
CITY WIDE HVAC REPLACEMENT

ARTICLE 2. INSURANCE AND BONDS:
The contractor shall according to the specifications shall provide Performance and Payment Bonds and Insurance during the duration of the project.

ARTICLE 3. TIME OF COMPLETION:
The Owner shall provide a Notice to Proceed in which a date for commencement of the work shall be stated; such commencement date shall be **ten (10) days** after the date of the notice. The Contractor shall achieve substantial completion of the work within **One Hundred and Twenty (120) calendar days** for initial task order after such commencement date (future task orders shall express commencement date & completion date "as needed") and completion within **Thirty (30) calendar days** after the substantial completion. The completion date may be extended by approved Change Orders.

If the contractor fails to complete this contract in the calendar days specified, the time charge will be made for each calendar day thereafter.

The time set forth in the proposal for the completion of the work is an essential element of the contract. For each calendar day in addition to the calendar days herein before stated as extended by the Owner, the amount per day given in the following schedule will be deducted from the money due or to become due to the Contractor not as a penalty, but as added expense for Engineering/Architectural supervision.

ARTICLE 4. SCOPE OF THE WORK AND CONTRACT SUM:

The Contractor hereby agrees to furnish all of the materials and all of the equipment and labor necessary and to perform all of the work shown on the drawings and described in the specifications for the **Project No. 1819-01-522-C005-297** entitled **CITY-WIDE HVAC REPLACEMENT** for the contract amount of **$_____ (**Amount Written in words) Dollars.

(a) Drawings prepared for same by **Rene R. Olivarez , P.E., RO Engineering PLLC.**

(b) Specifications consisting of:

1. "Standard General Specifications" issued by the CITY OF PHARR and as issued in the contract documents.
2. The "General Conditions for Engineering/Architectural Construction".
3. Addenda

   NO. _____ DATED _____

   NO _____ DATED _____

ARTICLE 5. AWARD OF CONTRACT:

This Agreement is a contract for the services of Construction, and Contractor's interest in this Agreement, duties hereunder and/or fees due hereunder may not be assigned or delegated to a third party.

This Agreement supersedes all prior agreements, written or oral, between Contractor and Owner and shall constitute the entire Agreement and understanding between parties with respect to the project. This Agreement and each of its provisions shall be binding upon the parties and may not be waived, modified, amended or altered except by a writing signed by Contractor and Owner.

BY SIGNING BELOW, the parties have executed and bound themselves to this Agreement as of the day and year first above written.

CONTRACTOR	**CITY OF PHARR**
By: _____	By: _____
Authorized Signor	Authorized Signor
_____	Edward M. Wylie, Interim City Manager
(name) – (title)	*(name) – (title)*
Date: _____	Date: _____
ATTEST:	
By: _____	By: _____
Signature	Signature
_____	_____
(name) – (title)	*(name) – (title)*

END OF SECTION

SECTION 00450
BID BOND

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section describes the standardized bid bond form to be submitted with the bid on the project.

1.02 DEFINTIONS

A. Refer to Section 0700

1.03 BID BOND FORMS

A. Bidder is to inset an original bid bond or a copy of cashier's check provided for bid bond Purposes. Original check is to be submitted along with bid.

PART 2 - PRODUCT – NOT USED

PART 3 - EXECUTION

3.01 GENERAL

A. Standardized forms follow

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned *(Contractor)* _____ as Principal, and *(Surety)* _____ as Surety, are hereby held and firmly bound unto the CITY OF PHARR as OWNER in the penal sum of *five percent (5% of bid amount)* for the payment of which sum, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of _____, 201_.
(Day) (Month)

The Condition of the above obligation is such that whereas the Principal has submitted to **CITY OF PHARR** a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing for the construction

PROJECT NO. #1819-01-522-C005-297

CITY-WIDE HVAC REPLACEMENT

NOW, THEREFORE,

(A. If said BID shall be rejected, or in the alternate

(B. If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith and shall in all other respects perform the agreement created by the acceptance of said BID then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____ _____
Principal Witness

_____
Title

_____ _____
Surety Witness

_____
By: Attorney-in-Fact

IMPORTANT - Surety companies executing BONDS must be authorized to transact business in the State where the project is located.

END OF SECTION

SECTION 00510
NOTICE OF AWARD

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section describes the standardized Notice of Award form for use in the project.

1.02 DEFINTIONS

A. Refer to Section 0700

PART 2 - NOT USED

PART 3 - EXECUTION (FORMS ON FOLLOWING PAGES)

3.01 GENERAL

A. Standardized form follows

NOTICE OF AWARD

MONTH DAY, 2018

******Company Name** **E-Mail Address: *******
*****Contact, Title**
*****Address**
****City, TX ZIP**

RE: **PROJECT NO. #1819-01-522-C005-297**
CITY-WIDE HVAC REPLACEMENT

Mr. ******,

This letter serves to officially inform you that the City Commission, at their meeting of Month Day, 2018, Item: ### awarded your company the above referenced Construction Contract in the amount of $_____. The contract shall commence upon issuance of NTP dated and completed within ____ number of calendar days.

Attached please find Five (5) sets of contracts for execution. Signed contract documents, and insurances must be submitted to the undersigned within ten (10) days of notification/receipt of this letter. Required insurance(s) shall remain active for the duration of the contract period.

Properly executed Payment and Performance Bonds shall be required and in strict accordance as outlined in the Instructions to Bidders.

Contract documents must be as follows:

1. **Five (5)** original construction contracts must be submitted with the correct contractor's legal name as registered with the Texas Secretary of State.
2. The parties to the construction contract must be the City of Pharr acting through its City Commission and the contractor's legal name.
3. Performance and Payment Bonds must be provided in the amount of 100% of the contract award amount (correct contractor's legal name as registered with the Texas Secretary of State).
4. Insurance certificate must be provided and kept up-to-date with the City of Pharr named as the additional insured to include a waiver of subrogation, in favor of the City of Pharr.
5. Form 1295 Disclosure https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm
6. List of subcontractors with proper certificates of insurance must be provided.

Kindly coordinate these services with Omar Anzaldua or his designated representative by calling (956) 402-4221. If any additional information is needed, please call the undersigned at **(956) 402-4231.** I would like to take this opportunity to thank you for your participation on this project and for your interest in our great City of Pharr.

Respectfully,

Sandra Zamora, CPM,
Purchasing Director
City of Pharr, 118 S. Cage Blvd., Pharr, TX 78577

APPROVAL OF SUB-CONTRACTORS

PROJECT NO. #1819-01-522-C005-297
CITY-WIDE HVAC REPLACEMENT

Prime contractors will not permit any Sub-contractor to start work on the project until the Sub-contractor has been approved by the project owner.

NAME AND ADDRESS OF PRIME CONTRACTOR:

_____ _____

_____ _____

SUB-CONTRACT DATA

NUMBER	TYPE OF WORK	SUB-CONTRACTORS NAME & ADDRESS	CONTRACT AMOUNT	ANTICIPATED START DATE	ANTICIPATED END DATE

CERTIFICATION BY PRIME CONTRACTOR

Each Sub-contractor listed above has established his/her ability and responsibility to perform the work to which the sub-contract relates. The applicable provisions of the contract, including labor and equal opportunity provisions, shall govern the work to which the subcontract relates, and each subcontractor has been advised as to the necessary contract provisions and the requirement to incorporate them in each subcontract.

_____ _____

CONTRACTOR DATE

APPROVED:	CONCUR:

END OF SECTION

SECTION 00550
NOTICE TO PROCEED

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section describes the standardized Notice to Proceed form for use in the project.

1.02 DEFINTIONS

A. Refer to Section 0700

PART 2 - PRODUCT – NOT USED

PART 3 - EXECUTION (FORMS ON FOLLOWING PAGES)

3.01 GENERAL

A. Standardized form follows

NOTICE TO PROCEED

Date

Contractor
Attn: Owner
Address
City, State Zip Code

RE: **PROJECT NO. #1819-01-522-C005-297**
CITY-WIDE HVAC REPLACEMENT

Project Location: Pharr, TX

Contract Amount: $xxxxxxxxxx

This is to inform you that **(contractor)** may proceed with the construction of the above referenced project as of **(date).** The construction period for this project will be **(word) (number)** consecutive calendar days. The construction time will expire on **(date)**. Please review and abide by the construction plans and specifications throughout the execution of the work. Please submit a proposed construction schedule to the **Omar Anzaldua Jr., P.E.** for concurrence as soon as possible. Failure to submit the proposed construction schedule may delay payments. If there are any questions, please call (956) 402-4221.

Edward M. Wylie,
Interim City Manager

CC: Sandra Zamora, CPM, Purchasing Director
Omar Anzaldua Jr., P.E., City Engineer

END OF SECTION

SECTION 00620
PERFORMANCE AND PAYMENT BOND

PART 1 - GENERAL

1.01 SECTION INCLUDESDEFINTIONS

A. Refer to Section 0700

1.02 PERFORMANCE AND PAYMENT BOND (OR BONDS)

A. Following the current Section, Contractor shall insert the approved form of the statutory surety bond or bonds to ensure the performance of the Contract and payment of labor and materials. In addition to the corporation signatures of the surety company (ies) on the bond(s), each bond should be countersigned by the surety company's attorney-in-fact, authorize to act within the State in which the Project is situated.

B. The following form is provided for sample purposes only. Contracts and agreements have important legal consequences. It is imperative that you consult with your attorney concerning the proper drafting, completion, or modification of such documents.

1.03 PERFORMANCE AND PAYMENT BONDING REQUIREMENTS

A. Pursuant to the Texas Uniform Grant and Contract Management Act of 1981, the following minimum requirements apply to all contracts exceeding $25,000 in total value:

1. Performance bond on the part of the contractor for 100% percent of the contract price. A "performance bond" is one executed in connection with a contract to secure fulfillment of all the contractor's obligations under the contract. Only if specifically noted in the Instructions to Bidders (Section 00210), for contracts under $50,000, Owner may exercise an option of withholding payment to construction contractors until completion of construction and acceptance of work by the Owner in lieu of such performance bonds.

2. A payment bond on the part of the contractor for 100% percent of the contract price. A "payment bond" is one executed in connection with a contract to assure payment as required by law of all persons supplying labor and material in the execution of the work provided for in the contract.

PART 2 - PRODUCT – NOT USED

PART 3 - EXECUTION (FORMS ON FOLLOWING PAGES)

3.01 GENERAL

A. Standardized forms follow

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, THAT _____

_____
(Name of Contractor or Company)

_____
(Address)

a _____ hereinafter called Principal, and _____
(Corporation/Partnership)

_____
(Name of Surety Company)

_____
(Address)

hereinafter called Surety, are held and firmly bound unto _____

_____
(Name of Recipient)

_____
(Recipient's Address)

hereinafter called OWNER, in the penal sum of _____**(_____),** dollars in lawful money of the United States, for the payment of which sum we bind ourselves, our successors, and assigns, jointly and severally, by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER dated the _____ day of _____, 201__ , a copy of which is hereto attached and made part thereof for the construction of:

PROJECT NO. #1819-01-522-C005-297
CITY-WIDE HVAC REPLACEMENT

PERFORMANCE BOND

NOW THEREFORE, if the Principal shall well, truly and faithfully perform its duties in all the undertakings, covenants, terms, conditions, and agreement of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if it shall satisfy all claim and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in four counterparts, each one of which shall be deemed an original, this the _____ day of _____ A.D., 20____.

	_____ Principal
ATTEST:	
_____ (Principal) Secretary (SEAL)	_____ Signature
_____ Witness as to Principal	_____ (Print/Type Name)
_____ (Address)	_____ (Address)
ATTEST:	_____ Surety
_____ (Surety) Secretary (SEAL)	_____ Attorney-in-Fact (Signature)
_____ Witness as to Surety	_____ (Print/Type Name)
_____ (Address)	_____ (Address)

NOTE: Date of Bond must not be prior to date of Contract (1) Correct name of Contractor; (2) A Corporation, a Partnership or an Individual, as case may be; (3) Correct name of Surety; (4) Correct name of Owner; (5) County or Parish and State; (6) Owner; (7) If Contractor is Partnership, all partners should execute bond.

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PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, THAT _____

_____
(Name of Contractor or Company)

_____
(Address)

a _____ hereinafter called Principal, and
(Corporation/Partnership)

_____
(Name of Surety Company)

_____
(Address)

hereinafter called Surety, are held and firmly bound unto _____

_____
(Name of Recipient)

_____
(Recipient's Address)

hereinafter called OWNER, in the penal sum of **(_____) (_____),** dollars in lawful money of the United States, for the payment of which sum we bind ourselves, our successors, and assigns, jointly and severally, by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER dated the _____ day of _____, 201___, a copy of which is hereto attached and made part thereof for the construction of:

PROJECT NO. #1819-01-522-C005-297
CITY-WIDE HVAC REPLACEMENT

NOW THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUB-CONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUB-CONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PAYMENT BOND

PROVIDED FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in four counterparts, each one of which shall be deemed an original, this the _____ day of _____ A.D., 20____.

_____
Principal

ATTEST:

_____ _____
(Principal) Secretary Signature
(SEAL)

_____ _____
Witness as to Principal (Print/Type Name)

_____ _____
(Address) (Address)

ATTEST:

_____
Surety

_____ _____
(Surety) Secretary Attorney-in-Fact (Signature)
(SEAL)

_____ _____
Witness as to Surety (Print/Type Name)

_____ _____
(Address) (Address)

NOTE: Date of Bond must not be prior to date of Contract (1) Correct name of Contractor; (2) A Corporation, a Partnership or an Individual, as case may be; (3) Correct name of Surety; (4) Correct name of Owner; (5) County or Parish and State; (6) Owner; (7) If Contractor is Partnership, all partners should execute bond.

END OF SECTION

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SECTION 00700
TERMS AND DEFINITIONS

PART 1 - GENERAL

Whenever the following terms, titles, or abbreviations are used in these Specifications or in any document or instrument where these Specifications govern, the intent and meaning shall be as herein defined. Working titles having a masculine gender, such as "workman" and "journeyman" and the pronoun "he", are utilized in the specifications for the sake of brevity, and are intended to refer to persons of either gender.

1.01 ABBREVIATIONS

AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
AC	Asphalt Concrete
ACI	American Concrete Institute
AI	Asphalt Institute
AIA	American Institute of Architects
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction AISI American Iron and Steel Institute
ANSI	American National Standards Institute, Inc. APA American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
ARA	American Railway Association
AREA	American Railway Engineering Association
ASA	American Standards Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWG	American Wire Gage
AWS	American Welding Society
AWWA	American Water Works Association
CRSI	Concrete Reinforcement Steel Institute
CSI	Construction Specifications Institute
CY	Cubic
EA	Each
EP	Edge of Pavement
FS	Federal Specifications

IEEE	The Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
INV	Invert
ISA	International Society of Arboriculture
LB	Pound
LF	Linear Feet
LS	Lump Sum
MSS	Manufacturer's Standardization Society of the Valve and Fitting Industry Standards
MUTCD	Manual Uniform Traffic Control Devices
NBFU	National Board of Fire Underwriters
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation OSHA Occupational Safety and Health Act
PCA	Portland Cement Association
PCC	Portland Cement Concrete
PG	Performance Grade
SD	Storm Drain
SF	Square Foot/Feet
SS	Sanitary Sewer
SSPWC	Standard Specifications for Public Works Construction
STA	Station
TOC	Top of Curb
Typ.	Typical
TxDOT	Texas Department of Transportation
UL	Underwriters' Laboratories, Inc.

1.02 DEFINITIONS

Acceptance -- The formal written acceptance by the City of the entire Contract which has been completed in all respects in accordance with the Specifications and any approved modifications.

Addenda -- Any written change, clarification or supplement to documents issued for bidding, issued by the City or its Engineer prior to bid.

Agency -- Shall mean the City of Pharr, or another agency or district that may adopt these Specifications, acting through its authorized representatives.

Allowance -- An amount of money set aside under the Contract for a special purpose identified in the Contract.

Architect and/or Consulting Engineer -- A person or persons, firm, partnership, joint venture, corporation, or combination thereof or authorized representative thereof, acting in the capacity of consultant to the City of Pharr. The Architect or Consulting Engineer shall issue directions to the Contractor only through the City of Pharr . When the Specifications require that approval be obtained from the Architect or Consulting Engineer, such approval shall be requested from and be given by the City of Pharr.

As-Builts -- See “Record Drawings”.

As Shown, Etc. -- Where "as shown", "as latest indicated", "as detailed", or words of similar import are used, the reference is to the Contract unless specifically stated otherwise. Where "as directed", "as permitted", "approved", or words of similar import are used, they shall mean the direction, permission, or approval of the City of Pharr.

Award -- The decision to accept the proposal by the city council of the lowest responsible bidder for the Work, subject to the execution and approval of a satisfactory contract therefore and bond to secure the performance thereof, and to such other conditions as may be specified or required by law.

Bid -- When submitted on the prescribed bid form, properly signed and guaranteed, the Bid constitutes the offer of the Bidder to complete the Work at the price shown on the Bidder’s bid form.

Bid Bond -- The cash, cashier’s check, certified check, or bidder’s bond accompanying the bid submitted by the bidder, as a guarantee that the bidder will enter into a Contract with the City for the performance of Work herein described.

Bidder -- Any person, persons, firm, partnership, joint venture, corporation, or combination thereof, submitting a Bid for the Work, acting directly or through a duly authorized representative.

Bid Documents -- The sum of the documents that comprise the Bid by a Bidder to perform the Work.

Bid Opening -- The event conducted by the City of Pharr during which the sealed Proposals submitted by Bidders to perform the Work are opened and publicly read.

Bid Security -- The cash, cashier’s check, certified check, or bidder’s bond accompanying the bid submitted by the bidder, as a guarantee that the bidder will enter into a Contract with the City for the performance of Work herein described.

Calendar Day -- Every day shown on the calendar. When the Contract Time is stated in Calendar Days, every day will be charged toward the Contract Time.

City -- The City of Pharr, a political sub-division of the County of Hidalgo and the State of Texas.

Claim – A separate demand by the contractor for (i) a time extension, (ii) payment of money or damages arising from work done by or on behalf of the contractor pursuant to the contract for a public work and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or (iii) an amount the payment of which is disputed by the City.

Contract -- The written agreement signed by the City of Pharr and the Contractor covering the Work and the furnishing of labor, materials, tools, and equipment in the construction of the Work. The Contract shall include the Notice to Contractors, Bid, Plans, Specifications, Special Provisions, contract bonds, and any project-specific specifications or documents; also any and all supplemental agreements amending or extending the Work contemplated and which may be required to complete the Work in a substantial and acceptable manner. Supplemental agreements are written agreements covering alterations, amendments, or extensions to the Contract and include Contract Change Orders.

Contract Change Order -- A Contract amendment approved by the City of Pharr that includes, but is not limited to, alterations, deviations, additions to, or deletions from, the Contract which are required for the proper completion of the Work.

Contract Documents -- The Contract Documents are the collective term for all of the documents listed in Article I of the Contract.

Contracting Officer -- The City Manager of the City of Pharr or the City Manager's representative authorized to enter into a contract on behalf of the City of Pharr.

Contractor -- The person or persons firm, partnership, joint venture, corporation, or combination thereof, private or municipal, who (that) has (have) entered into a Contract, as defined in these Specifications, with the City of Pharr.

Contract Time -- The time stated in the Contract for completion of the Work. The Contract Time may be a single allotment of time, a group of times specific to portions of the Work, or a combination of the two.

Council Member -- A member of the City of Pharr City Council.

Datum -- The Figures given in the Specifications or upon the drawings after the word "Elevation" or an abbreviation of it, shall mean U.S.G.S datum, unless otherwise noted.

Days -- Unless otherwise designated, days as used in the Contract Documents shall mean calendar days.

Elevation -- The figures given on the Plans or in the other Contract Documents after the word "Elevation" or abbreviation of it shall mean the distance in feet above the standard datum used by the City.

Engineer -- The City Engineer for which work will be done under these Specifications, acting personally or through agents or assistants duly authorized by the Director.

Estimated Quantities -- The list of items of work and the estimated quantities associated with the Work. The Estimated Quantities provide the basis for the Bid.

Extra Work -- Work other than that required either expressly or implied by the Contract in its executed form.

Field Instructions -- Direction given, in writing, by a City representative.

Haul Route -- Route for ingress and egress of materials hauled to and from a project site within the City limits.

Inspector -- The person or persons authorized to act as agent(s) for the City of Pharr in the inspection of the Work.

Major Bid Item -- Five percent (5%) of the total contract bid price.

Notice To Contractors -- The written notice whereby interested parties are informed of the date, location, and time of the Bid Opening of a proposed City of Pharr Project and the terms and conditions of submitting Bids to perform the Work.

Notice To Proceed -- The written authorization by the City of Pharr to the Contractor specifying the date the Work may begin and any conditions regarding the beginning of the Work.

Or Equal -- The term "or equal" shall be understood to indicate that the "equal" product be the equivalent or better than the product named in function, performance, reliability, quality, and general configuration. Determination of equality in reference to the project design requirements will be made by the Engineer.

Plans -- The plans, drawings, profiles, cross sections, Working Drawings, and Supplemental Drawings, or reproductions thereof, approved by the City of Pharr, which show the locations, character, dimensions, and details of the Work.

Plant -- All physical, resources, facilities, machinery, equipment, staging, tools, work and storage space other than provided by the Contract, together with subsidiary essentials and necessary maintenance for proper construction and acceptable completion of the project.

Project -- Shall mean the Work.

Project Manager -- The person designated by the City as its project management representative during the course of construction, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

Proposal -- Shall mean "Bid".

Record Drawings -- Drawings prepared by the Engineer that document changes to, additions to, or deductions from the Plans, and which represent the Work as constructed.

Schedule of Values -- A statement furnished by the Contractor to the City of Pharr reflecting the portions of the Total Contract Price allotted for the various parts of the Work for each work activity contained on the project schedule. Unless otherwise indicated in the Specifications, the total of the Schedule of Values shall equal the full cost of the Work, including all labor, material, equipment, overhead, and profit. For lump sum contracts, the Schedule of Values is the basis for reviewing the Contractor's application for progress payments.

Shop Drawings -- Drawings prepared by the fabricator or supplier showing the layout and details of components fabricated in a shop for inclusion in the permanent facility (e.g., structural steel, reinforcing steel, railings).

Site – The area upon or in which the Contractor's operations are carried on and such other areas adjacent thereto as may be designated by the Engineer.

Special Provisions -- The Special Provisions are specific clauses setting forth conditions or requirements peculiar to the Work and supplementary to these Standard Construction Specifications.

Standard Construction Specifications -- The directions, provisions, and requirements contained herein. When the term "Standard Specifications" or "these Specifications" is used, it means the provisions as set forth herein, together with any amendments or revisions that may be set forth in the Special Provisions. The Standard Specifications are comprised of "General Provisions" and "Technical Provisions".

Standard Drawings -- The Standard Drawings of the City of Pharr, which are incorporated into the Standard Construction Specifications, and made a part of the Plans by reference to one or more specific Standard Drawings.

State -- The State of Texas.

State Specifications -- The version of the Standard Specifications of the State of Texas, Department of Transportation, in effect at the time of Notice to Contractors.

Subcontractor -- A properly licensed party under contract to and responsible to the Contractor for performing a specified part of the Work; or a properly licensed party under contract and responsible to a Subcontractor of the Contractor.

Supplemental Conditions – Additions, revisions, special directions, and requirements peculiar to a project site and not otherwise thoroughly set forth in General and/or Specifications.

Supplemental Drawing -- Supplemental Drawings define the Plans or Specifications in greater detail by providing additional information that may have not been specifically or clearly shown or called out on the Plans or in the specifications.

Technical Provisions -- The provisions of the Standard Construction Specifications that describe the technical aspects of the Work.

Total Contract Price -- The total price for the Work as bid by the Contractor, including any additions or subtractions made via Contract Change Orders.

Work -- All actions which the Contractor is contractually required to do as specified, indicated, shown, contemplated, or implied in the Contract to construct the Work, including all alterations, amendments, or extensions made by Contract Change Order or other written orders or directives of the City of Pharr. Unless specified otherwise in the Contract, the Work includes furnishing all materials, supplies, equipment, tools, labor, transportation, supervision, and all incidentals necessary to complete the Work.

Working Day -- Any day except: (a) Saturdays, Sundays, and legal holidays; (b) days on which the Contractor is specifically required by the Special Provisions or by law to suspend construction operations; or (c) days on which the Contractor is prevented from proceeding with the current controlling operation or operations of the Work for at least five (5) hours per day due to inclement weather, or conditions resulting immediately therefrom; or (d) as defined in the executed contract.

Working Drawing -- Working Drawings detail a particular item of work and the manner in which it is to be accomplished or performed. Working Drawings are prepared by the Contractor as a submittal or a portion of a submittal and may be specifically requested by the City of Pharr or required in the Contract or a Field Instruction or other written directive.

Written Notice -- "Written Notice" shall be deemed to have been duly served when delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by U.S. mail to the last business address known to him who gives the notice.

END OF SECTION

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

SECTION 00710

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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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. §§5501 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.H 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 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 11.01.C.2.a and 11.01.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, expediters, 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 special 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.

SECTION 00810
SUPPLEMENTARY CONDITIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section describes the supplementary conditions of the project and contract agreement. The conditions contained in this Section are specific administrative and policy requirements in addition to the general conditions and other requirements listed in the contract documents.

1.02 REFERENCES – NOT USED

1.03 DEFINITIONS - SECTION 0700

1.04 INDEMNIFICATION

A. The Contractor agrees to indemnify and to hold the Owner and the *(Architect or Engineer)* harmless from and against any and all damages, claims, demands, suits, judgments and costs including attorney's fees and expenses for or on account of damage to property of any person, firm corporation, or Government agency, or death of or injury to any person or persons (including property and employees of the Owner, the Contractor, and employees of the Contractor) directly or indirectly arising out of, or caused by or in connection with the performance of or failure to perform any work provided for hereunder by the Contractor, his subcontractors, or their or the Contractor's agents, servants, or employees.

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, Engineer, Engineer’s Consultants and the officers, directors, partners, employees, agents, other 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: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Section shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual’s or entity’s own negligence.

C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, *(Architect or Engineer)*, *(Architect's or Engineer's)* Consultants, and the officers, directors, partners, employees, agents, other 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 created by Contractor or by anyone for whom Contractor is responsible. Nothing in this paragraph shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

1.05 INSURANCE

A. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance this Section and the Contract Documents, shall contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner, Construction Manager and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with this Section and the Contract Documents.

B. The Contractor will shall require the subcontractors to provide to the Owner all the below insurance limits by the use of a certificate of insurance.

C. The Contractor shall not commence work under this contract until he has obtained all the insurance required under this paragraph and such insurance has been approved by the Owner.

1. Worker's Compensation Insurance: The Contractor shall procure and shall maintain during the life of this Contract, Worker's Compensation Insurance as required by the State of Texas for all of employees to be engaged in work at the site of the project under this contract and, in case of any such work sublet, the Contractor shall require the subcontractor similarly to provide Worker's Compensation Insurance for all employees to be engaged in such work unless such employees are covered by the protection afforded by the Contractor's Worker's Compensation Insurance.

2. Contractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance: The Contractor shall procure and shall maintain during the life of this contract Contractor's Public Liability Insurance, Contractor's Property Damage Insurance and Vehicle Liability Insurance in the following amounts shown in Insurance Limits in Paragraph 1.06 below.

D. Proof of Insurance: The Contractor and Subcontractors shall furnish the Owner with certificates showing the type, amount, class of operations covered, effective dates and date of expiration of policies. Such certificates shall also contain substantially the following statement: "The insurance covered by this certificate will not be canceled or materially altered, except after ten (10) days written notice has been received by the Owner."

1.06 INSURANCE LIMITS

The Contractor and Subcontractors, at his expense, shall take out and keep in force throughout the term of this Contract, the following insurance coverage in the amounts specified below to cover all of his operations in connection with the work to be performed under the Technical Specifications. The insurance certificates shall be submitted to the Owner for acceptance prior to move in and beginning work.

MINIMUM INSURANCE REQUIREMENTS

INSURANCE TYPE	LIMITS OF LIABILITY
A. Workman's Compensation	$1,000,000 per occurrence
B. General Liability Comprehensive Form Premises - Operations Products/Completed Operations Hazard Contractual Insurance Independent Contractors Personal Injury	$1,000,000
C. Automobile Liability Comprehensive Owned Hired Non-owned	$1,000,000
D. Excess Liability Umbrella Form	$1,000,000
E. Property Damage	$1,000,000

The remaining term of all policies shall extend at least to the completion date of this Contract; if the expiration date shall occur prior to final completion of all operations hereunder, Contractor shall, not less than fifteen (15) days prior to expiration date, furnish evidence of renewal of or extension of such insurance. All such evidence of insurance shall provide for ten (10) days prior notice to be given to Owner in the event of cancellation.

1.07 EQUAL EMPLOYMENT OPPORTUNITY AND AFFIRMATIVE ACTION PROGRAM

A. Equal Employment Opportunity

1. The Contractor will not discriminate against any employee or the applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: employment, promotion, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the owner.

2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

3. The Contractor will cause the foregoing provisions to be inserted in all subcontracts for any work covered by this contract so that such provisions will be binding upon each subcontractor, provided that the foregoing provisions shall not apply to contracts or subcontracts for standard commercial supplies or raw materials.

4. The Contractor shall take affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions.

5. Contractors are encouraged to participate in voluntary associations which assist in fulfilling their affirmative action obligations.

6. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority.

7. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

8. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts.

9. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents.

B. Affirmative Action for Handicapped Workers

1. The Contractor will not discriminate against any employee or applicant for employment because of physical or mental handicap in regard to any position for which the employee or applicant for employment is qualified. The Contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices such as the following: employment, promotion, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

C. Non Segregated Facilities

1. The Contractor certifies that he does not and will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not and will not permit his employees any segregated facilities at any of his establishments, or permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. As used in this paragraph the term "segregated facilities" means any waiting rooms, work areas, rest rooms and washrooms, restaurants and other eating areas, time clocks, 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, creed, color, or national origin, because of habit, local custom, or otherwise.

PART 2 - PRODUCT – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 00830
WARRANTY AND FINAL PAYMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section describes the warranty and final payment. The conditions contained in this Section are specific administrative and policy requirements in addition to the general conditions and other requirements listed in the contract documents.

1.02 REFERENCES – NOT USED

1.03 DEFINTIONS – SECTION 0700

1.04 CONTRACTOR'S WARRANTY OF TITLE

A. CONTRACTOR warrants and guarantees that all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment free and clear of all Liens.

1.05 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 (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Promptly thereafter, OWNER, CON- TRACTOR 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 therefore. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. OWNER shall have seven days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within 14 days after submission of the tentative certificate to OWNER notify CONTRACTOR in writing, stating the reasons therefore. If, after consideration of OWNER's objections, ENGINEER considers the Work substantially complete, ENGINEER will within said 14 days execute and deliver to OWNER and CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER's issuing the definitive certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

B. OWNER shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

1.06 PARTIAL UTILIZATION

A. Use by OWNER at OWNER's option of 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, may be accomplished prior to Substantial Completion of all the Work subject to the following conditions.

B. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CON- TRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. 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 therefore. If ENGINEER considers that part of the Work to be substantially complete, the above provisions 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. No occupancy or separate operation of part of the Work may occur prior to compliance with the requirement of regarding property insurance.

1.07 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 is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

1.08 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, marked-up record documents and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required (ii) consent of the surety, if any, to final payment; and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified above and as approved by OWNER, the CONTRACTOR may furnish receipts or releases in full and an affidavit of CONTRACTOR that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible 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.

4. 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, ENGI- NEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will, within ten days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application for Payment to OWNER. At the same time ENGINEER will also give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the above provisions. 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.

5. Payment becomes due within thirty days after approval, the amount recommended by ENGINEER will become due and, when due, will be paid by OWNER to CONTRACTOR.

6. If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed, and if ENGINEER so confirms, OWNER shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required above, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

1.09 WAIVER OF CLAIMS

A. The making and acceptance of final payment will constitute:

1. A waiver of all Claims by OWNER against CONTRACTOR, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to the above, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

2. A waiver of all Claims by CONTRACTOR against OWNER other than those previously made in writing which are still unsettled.

PART 2 - PRODUCTS- NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

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SECTION 00910
MODIFICATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section contains information pertaining to modifications and changes of the Contract Documents for the Project.

1.02 REFERENCES – NOT USED

1.03 DEFINTIONS - SECTION 0700

1.04 MODIFICATIONS OF CONTRACT DOCUMENTS

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways: (i) a Written Amendment; (ii) a Change Order; or (iii) a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented and minor variations and deviations in the Work may be authorized, by one or more of the following ways: (i) a Field Order; (ii) Engineer's approval of a Shop Drawing or Sample; or (iii) Engineer's written interpretation or clarification.

C. Contractor and any Subcontractor or Supplier or other individual or entity performing or furnishing any of the Work under a direct or indirect contract with Owner: (i) shall not 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 Engineer's Consultant, including electronic media editions; and (ii) shall not reuse any of 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 adoption by Engineer. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

PART 2 - PRODUCT – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

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SECTION 00930

PREVAILING WAGE LEGAL REQUIREMENTS

The Contractor's attention is called to Articles 5159A and 5160 of the Revised Civil statutes of Texas which Statutes must be complied with. These articles are as follows:

ARTICLE 5159A:

SECTION 1. Not less than the general prevailing rate of per diem wages for work of a similar character in the locality which the work is performed, and not less than the general prevailing rate of per diem wages for legal holiday and overtime work, shall be paid to all laborers, workmen and mechanics employed by or on behalf of any County, City and County, City, Town, District or other political subdivision of the State, engaged in the construction of public works, exclusive of maintenance work. Laborers, workmen and mechanics employed by contractors or subcontractors in the execution of any contract or contracts for public works with the State, or any officer or public body thereof, or in the execution of any contract or contracts for public works, with any County, City and County, City, Town, District or other political subdivision of this State, or any officer or public body thereof, shall be deemed to be employed upon public work.

SECTION 2. The public body awarding any contract for public work on behalf of the State, or on behalf of any County, City and County, City, Town, District or other political subdivision thereof, or otherwise undertaking any public work, shall ascertain the general prevailing rate of per diem wages in the locality in which the work is to be performed for each craft or type of workmen or mechanic needed to execute the contract, and shall specify in the call for bids for said contract, and in the contract itself, what the general prevailing rate of per diem wages in the said locality is for each craft or type of workmen needed to execute the contract, also the prevailing rate for legal holiday and overtime work, and it shall be needed to execute the contract, also the prevailing rate for legal holiday and overtime work, and it shall be mandatory upon the Contractor to whom the contract is awarded, and upon any subcontractor under him, to pay not less than the said specified rates to all laborers, workmen and mechanics employed by them in the execution of the contract. The Contractor shall forfeit as a penalty to the State, County, City and County, City, Town, District or other political subdivision on whose behalf the contract is made or awarded, Ten Dollars ($10.00) for each laborer, workman or mechanic employed for each calendar day, or portion thereof, such laborer, workman or mechanic is paid less than the stipulated rates for any work done under said contract, by him, or by any subcontractor under him, and the said public body awarding the contract shall cause to be inserted in the contract a stipulation to this effect. It shall be the duty of such public body awarding the contract, and its agents and officers to take cognizance of complaints of all violations of the provisions of this Act committed in the course of the execution of the contract, and when making payments to the contractor of monies becoming due under said contract to withhold and retain therefrom all sums and amounts which shall have been forfeited pursuant to the herein said stipulation and the terms of this Act; provided, however, that no sum shall be so withheld, retained or forfeited, except from the final payment, without a full investigation by the awarding body. It shall be lawful for any contractor to withhold from any subcontractor under him sufficient sums to cover any penalties withheld from him by the awarding body on account of said subcontractor's failure to comply with the terms of this Act, and if payment has already been made to him the contractor may recover from him the amount of the penalty or forfeiture in a suit at law.

PREVAILING WAGE LEGAL REQUIREMENTS Continued:

SECTION 3. The contractor and each subcontractor shall keep, or cause to be kept, an accurate record showing the names and occupations of all laborers, workmen and mechanics employed by him, in connection with the said public work, and showing the actual per diem wages paid to each of such workers, which record shall be open at all reasonable hours to the inspection of the public body awarding the contract, its officers and agents.

SECTION 4. Any construction or repair work done under contract, and paid for in whole or in part out of public funds, other than work done directly by any public utility company pursuant to order of the Railroad Commission or other public authority, whether or not done under public supervision or direction or paid for wholly or in part out of public funds, shall be held to be "public works" within the meaning of political subdivision of this State in which the building, highway, road, excavation, or other structures, project, development or improvement is situated in all cases in which the contract is awarded by the State, or any public body thereof, and shall be held to mean the limits of the County, City and County, City, Town, District or other political subdivision on whose behalf the contract is awarded in all other cases. The term "general prevailing rate of per diem wages" shall be the rate determined upon as such rate by the public body awarding the contract, or authorizing the work, whose decision in the matter shall be final. Nothing in this act, however, shall be construed to prohibit the payment to any laborer, workman or mechanic employed on any public work as aforesaid of more than the said general prevailing rate of wages.

ARTICLE 5160. Bond for Wages:

Any person or persons, firm or corporation, entering into a formal contract with this State or its counties or school districts or other subdivisions thereof or any municipality therein for the construction of any public building, or the prosecution and completion of any public work shall be required, before, commencing such work, to execute the usual Penal Bond, with additional obligation that such contractor shall promptly make payments to all persons supplying him or them with labor and materials in the prosecution of the work provided for in such contract. Any person, company, or corporation who has furnished labor or materials used in the construction or repair or any public building or public work, and payment for which has not been made, shall have the right to intervene and be made a party to any action instituted by the State or any adjudicated in such action and judgment rendered thereon, subject, however, to the priority of the claims and judgment of the State or municipality.

If the full amount of the liability of the surety on said bond is insufficient to pay the full amount of said claims and demands, then, after paying the full amount due to the State or municipality, the remainder shall be distributed pro-rata among said interveners. Provided, further, that all claims for labor and materials furnished to said Contractor, and all claims for labor and material furnished to any contractor shall be itemized and sworn to as required by Statutes as to mechanic's lien claims, and such claims shall be filed with the County Clerk of the County, in which said work is being prosecuted, within ninety days from the date of the delivery of said material and the performance of said work. The County Clerk shall note on the mechanic's lien record, the name of the claimant, the amount claimed, the name of the contractor and the name of the county, School District, other subdivisions, or municipality with which the contract was made; and the County Clerk shall index the claim under the name of the contractor and under the name of the County, School District, other subdivision or municipality; with which the contract was made.

PREVAILING WAGE LEGAL REQUIREMENTS Continued:

ARTICLE 5160. **Bond for Wages Continued:**

Provided further, that after completion and acceptance of completed project all moneys due contractor under said contract shall be held by the state or its counties or school districts or other subdivision, thereof or an affidavit made by Contractor that all just bills for labor and material under this contract has been paid in full by the Contractor.
Acts 1913, P. 185; Acts 1929, 41st leg., P.4881. Ch. 22 paragraph 1.

General Decision Number: TX180305 09/14/2018 TX305

Superseded General Decision Number: TX20170305

State: Texas

Construction Type: Building

County: Hidalgo County in Texas.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.35 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2018
1	09/14/2018

BOIL0074-003 01/01/2017

	Rates	Fringes
BOILERMAKER	$ 28.00	22.35

ENGI0178-005 06/01/2014

PREVAILING WAGE LEGAL REQUIREMENTS Continued:

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
(1) Tower Crane	$ 29.00	10.60
(2) Cranes with Pile Driving or Caisson Attachment and Hydraulic Crane 60 tons and above	$ 28.75	10.60
(3) Hydraulic cranes 59 Tons and under	$ 27.50	10.60

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* IRON0084-011 06/01/2018

	Rates	Fringes
IRONWORKER, ORNAMENTAL	$ 23.77	7.12

PLUM0412-004 04/01/2013

	Rates	Fringes
PLUMBER	$ 31.14	12.43

SUTX2014-031 07/21/2014

	Rates	Fringes
BRICKLAYER	$ 16.17	0.00
CARPENTER	$ 14.21	2.22
CEMENT MASON/CONCRETE FINISHER	$ 12.46	0.00
ELECTRICIAN	$ 18.44	4.53
INSULATOR - MECHANICAL (Duct, Pipe & Mechanical System Insulation)	$ 11.54	2.17
IRONWORKER, REINFORCING	$ 12.01	0.00
IRONWORKER, STRUCTURAL	$ 15.04	4.34
LABORER: Common or General	$ 8.00	0.00
LABORER: Mason Tender - Brick	$ 10.00	0.00
LABORER: Mason Tender - Cement/Concrete	$ 10.89	0.96
LABORER: Pipelayer	$ 11.00	3.47
LABORER: Roof Tearoff	$ 10.06	0.00

PREVAILING WAGE LEGAL REQUIREMENTS Continued:

OPERATOR: Backhoe/Excavator/Trackhoe	$ 14.04	1.01
OPERATOR: Bobcat/Skid Steer/Skid Loader	$ 13.93	0.00
OPERATOR: Bulldozer	$ 18.29	1.31
OPERATOR: Drill	$ 16.22	0.34
OPERATOR: Forklift	$ 14.83	0.00
OPERATOR: Grader/Blade	$ 10.00	0.00
OPERATOR: Loader	$ 12.87	0.70
OPERATOR: Mechanic	$ 17.00	0.00
OPERATOR: Paver (Asphalt, Aggregate, and Concrete)	$ 16.03	0.00
OPERATOR: Roller	$ 12.70	0.00
PAINTER (Brush, Roller, and Spray)	$ 11.27	0.00
PIPEFITTER	$ 15.22	3.16
ROOFER	$ 11.42	0.00
SHEET METAL WORKER (HVAC Duct Installation Only)	$ 18.40	2.12
SHEET METAL WORKER, Excludes HVAC Duct Installation	$ 21.13	6.53
TILE FINISHER	$ 11.22	0.00
TILE SETTER	$ 12.15	0.00
TRUCK DRIVER: Dump Truck	$ 12.39	1.18
TRUCK DRIVER: Flatbed Truck	$ 19.65	8.57
TRUCK DRIVER: Semi-Trailer Truck	$ 12.50	0.00
TRUCK DRIVER: Water Truck	$ 12.00	4.11

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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PREVAILING WAGE LEGAL REQUIREMENTS Continued:

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO
is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

PREVAILING WAGE LEGAL REQUIREMENTS Continued:

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

PREVAILING WAGE LEGAL REQUIREMENTS Continued:

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION 01005

PROJECT PROCEDURAL DEFINITIONS AND TERMINOLOGY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section defines and explains certain terms in order to minimize potential misunderstandings between the Owner, the Owner's designated representative, Contractor, and Engineer.

1.02 TERMS, DEFINITIONS, AND EXPLANATIONS

A. Drawing/Plan Clarification: An answer from the Owner's designated representative or Engineer, in response to an inquiry from the Contractor, intended to make some requirement(s) of the Drawings or Plans clearly understood. Drawing/Plan clarifications may be sketches, drawings, or in narrative form and will not change any requirements of the Drawings or Plans. Responses to Contractor inquires shall be outlined in Section 01151.

B. Notice of Defects: A notice issued by the Engineer documenting that the work or some portion thereof has not been performed in accordance with the requirements of the Contract Documents. Payment shall not be made on any portion of the work for which a Notice of Defect has been issued and the work not corrected to the satisfaction of the Engineer. Upon receipt of a Notice of Defect, the Contractor shall provide a written Response to Notice of Defect within ten (10) working days after receipt of the Notice. The Contractor's response shall be in accordance with the Conditions of the Contract.

1. If the Contractor disputes issuance of the Notice of Defect, the Owner's designated representative has ten (10) working days in which to respond by either:

   a. withdrawing the Notice of Defect, or

   b. directing the Contractor to correct the work. Such determination by the Owner's designated representative shall be final and conclusive of the matter.

2. If directed to correct the work, the Contractor shall do so within ten (10) working days after receipt of such direction from the Resident Project Representative, or such other time as may be agreed to with the Resident Project Representative.

C. Project Communications: Routine written communications between the Owner, Engineer, and the Contractor shall be in letter or field memo format. Such communications shall not be identified as Requests for Information or Request for Technical Instructions nor shall they substitute for any other written requirement pursuant to the provisions of these Contract Documents.

D. Request for Information/Request for Technical Instructions: A request from the Contractor, to the Resident Project Representative or Engineer, seeking an interpretation or a clarification of some requirement of the Contract Documents. The Contractor shall clearly and concisely set forth the issue for which it seeks clarification or interpretation and why a response is needed from the Resident Project Representative or Engineer. The Contractor shall, in the written request, set forth its interpretation or understanding of the Contract's requirements along with reasons why it has reached such an understanding. Responses from the Resident Project Representative or Engineer will not change any requirements of the Contract Documents.

1. Responses to Contractor inquiries shall be as outlined in Section 01151.

E. Substitution/Or-Equal Submittals: A written request from the Contractor to substitute a material, article, device, product, fixture, form, type of construction, or process called for in the Contract Documents with another item that shall be substantially equal in all respects to that so indicated or supplied.

F. Schedule Submittals: When required, the Contractor shall submit schedules, schedule updates, schedule revisions, time impact analysis, etc., for review and acceptance.

G. "Certified" used in context with materials and equipment means the material and equipment has been tested and found by a nationally recognized testing laboratory to meet specification requirements, or nationally recognized standards if requirements are not specified, and is safe for use in the specified manner. A nationally recognized testing laboratory must periodically inspect production of the equipment and the equipment must bear a label, tag, or other record of certification.

H. "Certified" used in context with labor performance or ability to install materials and equipment means that the abilities of the proposed installer have been tested by a representative of the specified testing agency authorized to issue certificates of competency and has met the prescribed standards for certification.

I. "Certified" used in context with test reports, payment requests or other statements of fact means that the statements made on the document are a true statement as attested to by the certifying entity.

J. "Engineer" shall mean the City of Pharr Engineering Department, City Engineer or their designated representative.

K. 'Furnish" means to supply, deliver and unload materials and equipment at the project site ready to install.

L. "Indicated" means graphic representations, notes, or schedules on drawings, or other requirements in Contract Documents. Words such as "shown', "noted', "scheduled", are used to help locate the reference. No limitation on the location is intended unless specifically noted.

M. "Install" means the operations at the project site including unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, training and similar operations required to prepare the materials and equipment for use, verify conformance with Contract Documents and prepare for acceptance and operation by the Owner.

N. "Installer" means an entity engaged by Contractor, either as an employee, subcontractor, or sub-subcontractor to install materials and/or equipment. Installers are to have successfully completed a minimum of five projects similar in size and scope to this project, have a minimum of five years of experience in the installation of similar materials and equipment, and comply with the requirements of the authority having jurisdiction.

O. "Labeled" means equipment that embodies a valid label, symbol, or other identifying mark of a nationally recognized testing laboratory such as Underwriters Laboratories, Inc. and production is periodically inspected in accordance with nationally recognized standards or tests to determine safe use in a specified manner.

P. "Listed" means equipment is included in a list published by a nationally recognized laboratory which makes periodic inspection of production of such equipment and states that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner.

Q. "Manufacturer" means an entity engaged by Contractor, as a subcontractor, or sub-subcontractor to furnish materials and/or equipment. Manufacturers are to have a minimum of five years experience in the manufacture of materials and equipment similar in size, capacity and scope to the specified materials and equipment.

R. "Perform" means to complete the operations necessary to comply with the Contract Documents.

S. "Owner" means the City of Pharr.

T. "Project site" means the space available to perform the work, either exclusively or in conjunction with others performing construction at the project site.

U. "Provide" means to furnish and install materials and equipment.

V. "Regulations" means laws, statutes, ordinances, and lawful orders issued by authorities having jurisdiction, as well as, rules, conventions, and agreements within the construction industry that control performance of work, whether they are lawfully imposed by authorities having jurisdiction or not.

W. "Specified" means written representations in the bid documents or the technical specifications.

1.03 SPECIFICATION SENTENCE STRUCTURE

A. Specifications are written in modified brief style. Requirements apply to all work of the same kind, class, and type even though the word "all" is not stated.

B. Simple imperative sentence structure is used which places a verb as the first word in the sentence. It is understood that the words "furnish", "install", "provide", or similar words include the meaning of the phrase "The Contractor shall.' before these words.

C. It is understood that the words "directed", 'designated", requested", 'authorized", "approved", "selected', or similar words include the meaning of the phrase "by the Engineer" after these words unless otherwise stated. Use of these words does not extend the Engineers responsibility for construction supervision or responsibilities beyond those defined in the General Conditions.

D. "At no additional cost to Owner", "with no extra compensation to Contractor", "At Contractor's own expense", or similar words mean that the Contractor will perform or provide specified operation of work without any increase in the Contract Amount. It is understood that the cost for performing all work is included in the amount bid and will be performed at no additional cost to the Owner unless specifically stated otherwise.

1.04 DOCUMENT ORGANIZATION

A. Organization of Contract Documents is not intended to control or to lessen the responsibility of the Contractor when dividing work among subcontractors, or to establish the extent of work to be performed by any trade, subcontractor or vendor. Specification or details do not need to be indicated or specified in each specification or drawing. Items shown in the contract documents are applicable regardless of location in the Contract Documents.

B. Standard paragraph titles and other identifications of subject matter in the specifications are intended to aid in locating and recognizing various requirements of the specifications. Titles do not define, limit, or otherwise restrict specification text.

C. Capitalizing words in the text does not mean that these words convey special or unique meanings or have precedence over other parts of the Contract Documents. Specification text governs over titling and it is understood that the specification is to be interpreted as a whole.

D. Drawings and specifications do not indicate or describe all of the work required to complete the project. Additional details required for the correct installation of selected products are to be provided by the Contractor and coordinated with the Engineer. Provide any work, materials or equipment required for a complete and functional system even if they are not detailed or specified.

1.05 INTERPRETATIONS OF DOCUMENTS

A. Comply with the most stringent requirements where compliance with two (2) or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, unless Contract Documents indicate otherwise.

1. Quantity or quality level shown or indicated shall be minimum to be provided or performed in every instance.
2. Actual installation may comply exactly with minimum quality indicated, or it may exceed that minimum within reasonable limits.
3. In complying with these requirements, indicated numeric values are minimum or maximum values, as noted, or appropriate for context of requirements.
4. Refer instances of uncertainty to the Engineer for a decision before proceeding.

B. Provide materials and equipment comparable in quality to similar materials and equipment incorporated in the project or as required to meet the minimum requirements of the application if the materials and equipment are shown in the drawings but are not included in the specifications.

1.06 REFERENCE STANDARDS

A. Comply with applicable construction industry standards as if bound or copied directly into the Contract Documents regardless of lack of reference in the Contract Documents. Apply provisions of the Contract, Documents where Contract Documents include more stringent requirements than the referenced standards.

1. Standards referenced directly in the Contract Documents take precedence over standards that are not referenced but recognized in the construction industry as applicable.

2. Comply with standards not referenced but recognized in the construction industry as applicable for performance of the work except as otherwise limited by the Contract Documents. The Engineer determines whether code or standard is applicable, or which of several are applicable.

B. Consider a referenced standard to be the latest edition with supplements or amendments when a standard is referred to in an individual specification section but is not listed by title and date.

C. Trade association names and title of general standards are frequently abbreviated. Acronyms or abbreviations used in the Contract Documents mean the recognized name of trade association, standards generating organization, authority having jurisdiction, or other entity applicable in the context of the Contract Documents.

D. Make copies of reference standards available as requested by Engineer or Owner.

1.07 SUBSTITUTIONS AND EQUAL PRODUCTS

A. Provide materials and equipment manufactured by the entities specifically listed in each technical specification section. Submit a Contractors Modification Request per Section 01330, SUBMITTAL PROCEDURES for substitution of materials and equipment of manufacturers not specifically listed or for materials and equipment that does not strictly comply with the Contract Documents. Contractor may provide “equal” products manufactured by manufacturers other than those specifically listed in the technical specification section unless it is specifically stated that only the materials and equipment of the specified manufacturers shall be provided. Provide a request for approval of proposed equals per Section 01330 SUBMITTAL PROCEDURES for any materials or equipment not specifically listed. Submit a Contractors Modification Request for substitution of materials and equipment of other manufacturers or for materials and equipment that does not strictly comply with the Contract Documents. A Field Order or Change Order will be issued if the contract modification is approved.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION

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SECTION 01040
PROJECT ADMINISTRATION

PART 1 - PART 1- GENERAL

1.01 WORK INCLUDED

A. Administer contract requirements to construct the project. Provide documentation per the requirements of this Section. Provide information as requested by the Engineer/Architect or Owner concerning this project.

1.02 SUBMITTALS

A. Submittals shall be in accordance with Section 01330, SUBMITTAL PROCEDURES.

1.03 COMMUNICATION DURING THE PROJECT

A. The Engineer is to be the first point of contact for all parties on matters concerning this project.

B. The Engineer will coordinate correspondence concerning:

1. Submittals, including requests for payment
2. Clarification and interpretation of the Contract Documents
3. Contract modifications
4. Observation of work and testing
5. Claims

C. The Engineer will normally communicate only with the Contractor. Any required communication with suppliers or subcontractors shall only be with the direct involvement of the Contractor.

D. Written communications are to be directed to the Engineer at the address indicated in the Pre-construction Conference. Communications should include as a minimum:

1. Name of the Owner
2. Project name
3. Contract title
4. Project number
5. Date
6. A reference statement

E. Submit communications on the forms referenced in this Section or in Section 01300. SUBMITTALS.

1.04 PROJECT MEETINGS

A. Pre-construction Conference

1. Attend a pre-construction meeting.
2. The location of the conference will be determined by the Owner.

3. The time of the meeting will be determined by the Owner but will be after the Notice of Award is issued and not later than fifteen (15) days after the Notice to Proceed is issued or can be issued at the Pre-Construction Conference.
4. Meeting will be attended by the Owner, Engineer and the Contractors project manager and superintendent. Meeting may be attended by representative of utility companies and representatives from major subcontractors and suppliers.
5. Contractor should provide and be prepared to discuss:
    a. Preliminary construction schedule per Section 01310, PROJECT CONTROL SCHEDULE
    b. Preliminary Submittal Schedule.
    c. Schedule of values and anticipated schedule of payments.
    d. List of Suppliers and Subcontractors.
    e. Contractor's organizational chart as it relates to this project.
    f. Letter indicating the agents of authority for the Contractor and the limit of that authority with respect to the execution of legal documents.

B. Periodical Progress Meetings
1. 1. Attend meetings with the Engineer and Owner.
    a. Meet on a Monthly basis or as requested by the Engineer to discuss the project.
    b. Meet at the project site or other location as designated by the Engineer.
    c. Contractors superintendent and other key personnel are to attend the meeting. Other individuals may be requested to attend to discuss specific matters.
2. Provide information as requested by the Engineer or Owner concerning this project.
    a. Prepare to discuss:
        1) Status of overall project schedule.
        2) Contractors detailed schedule for the next month.
        3) Anticipated delivery dates for equipment.
        4) Coordination with the Owner.
        5) Status of submittals.
        6) Information or clarification of the Contract Documents.
        7) Claims and proposed modifications to the contract.
        8) Field observations, problems, or conflicts.
        9) Maintenance of quality standards.
    b. Notify the Engineer of any specific items to be discussed a minimum of one (1) week prior to the meeting.
3. Review minutes of meetings and notify the Engineer of any discrepancies within ten (10) days of the date of the memorandum.
    a. Following that date, the minutes will stand as shown or as corrected.
    b. Corrections will be reflected in the minutes of the following meeting.
    c. Each item of business shall be numbered to indicate the meeting number and the item number. Items discussed will be documented and old business items will remain on minutes of subsequent meetings until the item is resolved.

1.05 REQUESTS FOR INFORMATION

A. Submit Request for Information (RFI) to the Engineer to obtain additional information or clarification of the Contract Documents.

1. Submit a separate RFI for each item.
2. Attach adequate information to permit a written response without further clarification. Engineer will return requests which do not have adequate information for additional information.
3. A response will be made when adequate information is provided. Response will be made on the RFI form or in attached information.
4. Assign a number to the RFI and sequence number in chronological order.

B. If the RFI indicates that a contract modification is required, the Engineer will initiate a Proposed Contract Modification (PCM) per Section 1.07.

1.06 NOTIFICATION BY CONTRACTOR

A. Notify the Engineer of:

1. Need for testing.
2. Intent to work outside regular working hours.
3. Request to shut down facilities or utilities.
4. Proposed utility connections.
5. Required observation by Owner or inspection agencies prior to covering work.

B. Notification must be provided in time for Owner and Engineer to respond appropriately to the notification.

C. Use “Notification By Contractor” form. Form can be requested from Owner or Engineer.

1.07 REQUESTS FOR MODIFICATIONS

A. Submit a request to the Engineer for any change in the Contract Documents or approval of any deviations from the Contract Documents.

1. Use the “Contractors Modification Request” (CMR) form. Contractor’s own form can also be submitted pending completeness of required information.
   a. Assign a number to the CMR when issued and sequence number in chronological order.
   b. Include with the CMR:
      1) A complete description of the proposed modification.
      2) The reason the modification is requested.
      3) A detailed breakdown of the cost of the change (necessary only if the modification requires a change in contract amount). The itemized breakdown is to include:
         a) list of materials and equipment to be installed,
         b) man hours for labor by classification,
         c) equipment used in construction,
         d) consumable supplies, fuels, and materials,
         e) royalties and patent fees,
         f) bonds and insurance,
         g) overhead and profit,
         h) field office costs,

i) home office cost,
j) and other items of cost.

4) A revised schedule indicating the effect on the critical path for the project and a statement of the number of days the project may be delayed by the modification.

2. A CMR is required for field changes.

   a. Request must be made a minimum of two (2) weeks in advance of performing the work affected.

   b. Request for field changes will be submitted to the Engineer.

3. A CMR is required for all substitutes or deviations from the Contract Documents.

4. Engineer will evaluate the request for a contract modification.

B. Owner will initiate changes through the Engineer.

1. 1. Engineer will prepare a description of the proposed modifications to the Contract Documents.

2. 2. Engineer will use the "Proposed Contract Modification' form or own form. Engineer will assign a number to the PCM when issued and keep in numerical order throughout project.

3. 3. Return request with a proposal to incorporate the requested change. Include a breakdown of costs into materials and labor in sufficient detail to allow evaluation by the Engineer.

C. If a contract modification is required, the Engineer will issue a Field Order or a Change Order.

1. 1. Modifications to the contract can only be made by a Field Order or a Change Order.

2. 2. Changes in the project will be documented by Field Order or by a Change Order.

3. 3. Field Orders may be issued by the Engineer for contract modifications that do not change the contract amount or contract time.

4. 4. Any modifications that require a change in contract amount or contract time can only be approved by Change Order.

   a. CMR's and proposals issued by the Contractor in response to a PCM will be evaluated by the Engineer.

   b. If change order is recommended, the Engineer will prepare the change order.

   c. The Change Order will be sent to the Contractor for execution with a copy to the Owner recommending approval.

   d. Change Orders can only be approved by the Owner.

      1) Work performed on the proposed contract modifications prior to the approval of the Change Order will be performed at the Contractor's risk.
      2) No payment will be made for work on Change Orders until approved by the Owner.

D. The Contractor may be informed that the proposed modification is not approved and construction is to proceed in accordance with the Contract Documents.

1.08 EMERGENCY WORK

A. Notify the Owner and Engineer immediately of any additional work that must be performed to prevent injury or damage to existing structures, facilities, utilities, or work in place.

B. When possible, obtain authorization from the Owner before proceeding.

1.09 CLAIMS

A. Do not perform any work which is considered to be outside the scope of the Contract Documents without an approved Change Order.

B. File notice of claims with the Engineer within 10 days of the event giving rise to the claim.

C. Provide full documentation within 30 days of the notice.

D. Items not reported within the stipulated time will not be considered.

1. Failure to notify the Owner of potential claims does not allow the Owner to take alternative action to prevent the Contractor from incurring the cost for the item or to perform the work in a different manner.

2. Failure to notify the Owner does not allow operations to be monitored for the actual cost of performing the work.

E. When full documentation has been received by the Engineer, the claim will be reviewed in the context of the Contract Documents.

1. If the claim is valid, a Change Order will be prepared and payment of the Change Order will be recommended.

2. If the claim is not valid, then the claim will be denied with an explanation of the reasons.

3. Should the Contractor disagree with the decision of the Engineer, the Contractor may refuse to do the work.

a. If the Owner insists that the work be done, proceed with the work on a time and materials basis.

b. The validity of the claim will be resolved at a later time in accordance with the Contract Documents.

1.10 RECORD DOCUMENTS

A. Maintain at the site one (1) complete record copy of:

1. Drawings

2. Specifications

3. Addenda

4. Contract modifications

5. Approved shop drawings and record data

6. One (I) set of construction photographs

7. Test records

8. Clarifications and other information provided in RFI responses.

B. Marking Drawings

1. Label each document as “Project Record” in large printed letters.

2. Record information as construction is being performed.

a. Do not conceal any work until the required information is recorded.

b. Mark drawings to record actual construction, including the following:

1) Depths of various elements of the foundation in relation to finished first floor datum or the top of walls.
2) Horizontal and vertical locations of underground utilities and appurtenances constructed and existing utilities encountered during construction.
3) Location of internal utilities and appurtenances concealed in the construction. Make reference to permanent structure on the surface. Include the following equipment:
    a) Piping
    b) Ductwork
    c) Equipment and control devices requiring periodic maintenance or repair
    d) Valves, unions, traps, and tanks
    e) Services entrance
    f) Feeders
    g) Outlets
4) Changes of dimension and detail.
5) Changes made by Field Order and Change Order.
6) Details not on the original Contract Drawings.

c. Mark specifications and addenda to record materials and the equipment provided.

1) Record manufacturer name, trade name, catalog number, and each supplier (with address and phone number) of each product and item of equipment actually installed.
2) Record changes made by Field Order and Change Order.

d. Mark additional work or information in erasable pencil.

1) Use red for new or revised indication.
2) Use purple for work deleted or not installed (lines to be removed).
3) Highlight in yellow the items constructed per the plans.

e. Submit record documents to Engineer for review and acceptance 30 days prior to final completion of the project.

1) Provide one (1) set of marked up drawings.
2) Provide one (1) set of specifications.

f. Partial Payment Requests will not be recommended for payment if record documents are found to be: incomplete or not in order. Final payment will not be recommended without record documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01145
USE OF PREMISES

PART 1 - G E N E R A L

1.01 SECTION INCLUDES

A. Section includes general use of the site including properties inside and outside of rights-of-way, work affecting road and notification to adjacent occupants.

1.02 BOUNDARIES

A. Confine access and operations and storage areas to boundaries provided by Owner as stipulated in the Conditions of the Contract; trespassing on abutting lands or other lands in the area is not allowed.

B. Contractor may make arrangements, at Contractor's cost, for temporary use of private properties, in which case Contractor and Contractor's surety shall indemnify and hold harmless the Owner against claims or demands arising from such use of properties outside of boundaries. Submit notarized copy of agreement between private property owner and Contractor prior to use of the area.

1.03 PROPERTIES OUTSIDE OF BOUNDARIES

A. Altering the condition of properties adjacent to and along the boundaries will not be permitted.

B. Means, methods, techniques, sequences, or procedures which will result in damage to properties or improvements in the vicinity outside of boundaries will not be permitted.

C. Any damage to properties outside of boundaries shall be repaired or replaced to the satisfaction of the Engineer and at no cost to the Owner.

1.04 USE OF SITE

A. Obtain approvals of governing authorities prior to impeding or closing public roads or streets. Do not close more than two consecutive intersections at one time.

B. Notify Owner and Engineer at least 48 hours prior to closing a street or a street crossing. Permits for street closures are required in advance and are the responsibility of the Contractor.

C. Maintain access for emergency vehicles including access to fire hydrants.

D. Avoid obstructing drainage ditches or inlets; when obstruction is unavoidable due to requirements of the Work, provide grading and temporary drainage structures to maintain unimpeded flow.

E. Perform daily clean-up of dirt outside the construction zone, and debris, scrap materials, and other disposable items. Keep streets and driveways clean of dirt, debris and scrap materials. Do not leave building, roads, streets or other construction areas unclean overnight.

1.05 PUBLIC, TEMPORARY, AND CONSTRUCTION ROADS AND RAMPS

A. Construct and maintain temporary detours, ramps, and roads to provide for normal public traffic flow when use of public roads or streets is closed by necessities of the Work.

B. Provide mats or other means to prevent overloading or damage to existing roadways from tracked equipment or large or heavy trucks or equipment.

C. Construct and maintain access roads and parking areas.

1.06 SURFACE RESTORATION

A. Restore existing site to condition before construction to satisfaction of Engineer.

B. Grade and drain expanded site according to plans and Specifications.

PART 2 - P R O D U C T S – NOT USED

PART 3 - E X E C U T I O N – NOT USED

END OF SECTION

SECTION 01151

REQUESTS FOR INFORMATION / REQUESTS FOR TECHNICAL INSTRUCTIONS (RFI'S/RFTI'S)

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Section includes mandatory procedures and sets forth policies to be followed in requesting technical information or clarification.

1.02 PROCEDURES AND POLICIES

A. In the event that the Contractor or Subcontractor, at any tier, determines that some portions of the Drawings, Specifications, or other Contract Documents require clarification or interpretation by the Owner or Engineer, the Contractor shall submit a Request for Information or a Request for Technical Instructions in writing to the Resident Project Representative. RFI's/RFTI's may only be submitted by the Contractor. The Contractor shall clearly and concisely set forth the issue for which clarification or interpretation is sought and why a response is needed. In the RFI/RFTI, the Contractor shall set forth an interpretation or understanding of the requirement along with reasons why such an understanding was reached.

B. The Owner acknowledges that this is a complex project and its successful completion will be a cooperative effort between all parties. The Owner does not intend to limit or restrict communications between any of the parties.

C. The Resident Project Representative will review all RFI's/RFTI's to determine whether they are Requests for Information or Request for Technical Instructions within the meaning of this term. If the Resident Project Representative determines that the document is not an RFI/RFTI, it will be returned to the Contractor, unreviewed as to content, for resubmittal in the proper manner.

D. Responses to Requests for Information/Request for Technical Instructions shall be issued within ten (10) working days of receipt of the request from the Contractor unless the Resident Project Representative or Engineer determines that a longer time is necessary to provide an adequate response. If a longer time is determined necessary by the Resident Project Representative or Engineer, they will, within ten (10) working days of the receipt of the request, notify the Contractor of the anticipated response time. If the Contractor submits a Request for Information /Request for Technical Instructions on an activity within ten (10) working days or less of float on the current project schedule, the Contractor shall not be entitled to any time extension due to the time it takes the Resident Project Representative or Engineer to respond to the request provided that the Resident Project Representative or Engineer responds within ten (10) working days set forth above.

E. Responses from the Resident Project Representative or Engineer will not change any requirement of the Contract Documents. In the event the Contractor believes that a response to a Request for Information / Request for Technical Instructions will cause a change to the requirements of the Contract Document, the Contractor shall immediately give written notice to the Engineer stating that the Contractor considers that the response warrants a Change Order. Failure to give such written notice within ten (10) working days shall waive the Contractor's right to seek additional time or cost under the General Conditions.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 01255

CHANGE ORDER PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Procedures for processing Change Orders, including:

1. Assignment of a responsible individual for approval and communication of changes in the Work;

2. Documentation of change in Contract Price and Contract Time;

3. Change procedures, using proposals and construction contract modifications, work change directive, stipulated price change order, unit price change order, time and materials change order;

4. Execution of Change Orders;

5. 5. Correlation of Contractor submittals.

1.02 REFERENCES

A. Rental Rate Blue Book for Construction Equipment (Data Quest Blue Book). Rental Rate is defined as the full, unadjusted base rental rate for the appropriate item of construction equipment.

1.03 RESPONSIBLE INDIVIDUAL

A. Contractor shall provide a letter indicating the name and address of the individual authorized to execute change documents, and who shall also be responsible for informing others in Contractor's employ and Subcontractors of changes to the Work. The information shall be provided at the Pre-construction Conference.

1.04 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

A. Contractor shall maintain detailed records of changes in the Work. Provide full information required for identification and evaluation of proposed changes, and to substantiate costs of changes in the Work.

B. Contractor shall document each proposal for a change in cost or time with sufficient data to allow evaluation of the proposal.

C. Proposals shall include, as a minimum, the following information as applicable:

1. Quantities of items in the original Section A-5 Bid Proposal with additions, reductions, deletions, and substitutions.

2. When Work items were not included in the Section A-5 Bid Proposal, Contractor shall provide unit prices for the new items, with supporting information as required by the Engineer.

3. Justification for any change in Contract Time.

4. Additional data upon request.

D. For changes in the Work performed on a time-and-material basis, the following additional information may be required:

1. Quantities and description of products and equipment.

2. Taxes, insurance and bonds.

3. Overhead and profit.

4. Dates and times work was performed, and by whom.

5. Time records and certified copies of applicable payrolls.

6. Invoices and receipts for products, rented equipment, and subcontracts, similarly documented.

E. For changes in the work performed on a time-and-materials basis, rental equipment will be paid as follows:

1. Rented equipment will be paid by actual invoice cost for the duration of time required to complete the extra work without markup for overhead and profit. If the extra work comprises only a portion of the rental invoice where the equipment would otherwise be on the site, the Contractor shall compute the hourly equipment rate by dividing the actual monthly invoice by 176. (One day equals 8 hours and one week equals 40 hours.)

2. Operating costs shall not exceed the estimated operating costs given in the Blue Book for the item of equipment. Overhead and profit will be allowed on operating cost.

F. For changes in the work performed on a time-and-materials basis using Contractor-owned equipment, use Blue Book rates as follows:

1. Contractor-owned equipment will be paid at the Blue Book Rental Rate for the duration of time required to complete the extra work without markup for overhead and profit. The Rental Rate utilized shall be the lowest cost combination of hourly, daily, weekly or monthly rates. Use 150 percent of the Rental Rate for double shifts (one extra shift per day) and 200 percent of the Rental Rate for more than two shifts per day. Standby rates shall be 50 percent of the appropriate Rental Rate shown in the Blue Book. No other rate adjustments shall apply.

2. Operating costs shall not exceed the estimated operating costs given in the Blue Book for the item of equipment. Overhead and profit will be allowed on operating cost. Operating costs will not be allowed for equipment on standby.

1.05 CHANGE PROCEDURES

A. Changes to Contract Price or Contract Time can only be made by issuance of a Change Order. Issuance of a Work Change Directive will be formalized into a Change Order. All changes will be in accordance with the requirements of the Contract Document.

B. The Engineer will advise of minor changes in the Work not involving an adjustment to Contract Price or Contract Time as authorized by the General Conditions by issuing supplemental instructions.

C. Contractor may request clarification of Drawings, Specifications or Contract Documents or other information by using a Request for Information. Response by the Engineer to a Request for Information does not authorize the Contractor to perform tasks outside the scope of the Work. All changes must be authorized as described in this section.

D. Change Orders for work not specified in Section A-5 Bid Proposal – shall be accompanied with a Cost and Price Summary plus justification of overhead rate.

1.06 PROPOSALS AND CONTRACT MODIFICATIONS

A. The Engineer may issue a Request for Proposal, which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications. The Engineer may also request a proposal in the response to a Request for Information. Contractor shall prepare and submit a proposal within 7 days or as specified in the request.

B. The Contractor may propose an unsolicited change by submitting a proposal to the Engineer describing the proposed change and its full effect on the Work, with a statement describing the reason for the change and the effect on the Contract Price and Contract Time including full documentation.

1.07 WORK CHANGE DIRECTIVE

A. Engineer may issue a signed Work Change Directive instructing the Contractor to proceed with a change in the Work. A Work Change Directive will subsequently be incorporated in a Change Order.

B. The document will describe changes in the Work and will designate a method of determining any change in Contract Price or Contract Time.

C. Contractor shall proceed promptly to execute the changes in the Work in accordance with the Work Change Directive.

1.08 STIPULATED PRICE CHANGE ORDER

A. A stipulated price Change Order will be based on an accepted proposal including the Contractor's lump sum price quotation with Schedule of Values.

1.09 UNIT PRICE CHANGE ORDER

A. Where Unit Prices for the affected items of Work are included in Section A-5 Bid Proposal, the unit price Change Order will be based on the unit prices.

B. Where unit prices of Work are not pre-determined in the Section A-5 Bid Proposal, the Work Change Directive or accepted proposal will specify the unit prices to be used.

1.10 TIME-AND-MATERIAL CHANGE ORDER

A. Contractor shall provide an itemized account and supporting data after completion of change.

B. Engineer will determine the change allowable in Contract Price and Contract Time as provided in Contract Documents.

C. Contractor shall maintain detailed records of work done on time-and-material basis as specified in Contract Documents.

D. Contractor shall provide full information required for evaluation of changes and shall substantiate costs for changes in the Work.

1.11 EXECUTION OF CHANGE DOCUMENTATION

A. Engineer will issue Change Orders, Work Change Directives, or accepted proposal for signatures of parties as described in the Contract Documents.

1.12 CORRELATION OF CONTRACTOR SUBMITTALS

A. For Stipulated Price Contracts, Contractor shall promptly revise the Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item.

B. For Unit Price Contracts, the next monthly estimate of work after acceptance of a Change Order will be revised to include any new items not previously included and the appropriate unit rates.

C. Contractor shall promptly revise progress schedules to reflect any change in Contract Time, and shall revise schedules to adjust time for other items of work affected by the change, and resubmit for review.

D. Contractor shall promptly enter changes to the on-site and record copies of the Drawings, Specifications or Contract Documents as required in Section 01785 - Project Record Documents.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01270
MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Procedures for measurement and payment plus conditions for nonconformance assessment and nonpayment for rejected products.

1.02 AUTHORITY

A. Measurement methods delineated in Specification sections are intended to complement the criteria of this section. In the event of conflict, the requirements of the Specification section shall govern.

B. Resident Project Representative will take all measurements and compute quantities accordingly.

C. Contractor shall assist by providing necessary equipment, workers, and survey personnel as required by Resident Project Representative.

1.03 UNIT QUANTITIES SPECIFIED

A. Quantity and measurement estimates stated in the Agreement are for contract purposes only.

B. Quantities and measurements supplied or placed in the Work and verified by Resident Project Representative shall determine payment as stated in the Contract Documents.

C. If the actual Work requires greater or lesser quantities than those quantities indicated in the Bid Form, provide the required quantities at the unit prices contracted, except as otherwise stated in the Contract Documents.

1.04 MEASUREMENT OF QUANTITIES

A. Measurement by Weight:

1. Reinforcing steel, rolled or formed steel or other metal shapes will be measured by CRSI or AISC Manual of Steel Construction weights. Welded assemblies will be measured by CRSI or AISC Manual of Steel Construction or scale weights.

2. Transport materials measured for payment by weight or truck measure in approved hauling vehicles. Furnish certified measurements, tare weights, and legal gross weight calculations for all haul units. Affix a permanent, legible number on the truck and on the trailer to correspond with the certified information. Furnish certified weights of loaded haul units transporting material if requested.

3. The material will be measured at the point of delivery. The cost of supplying these volume and weight capacities is subsidiary to the pertinent Item

B. Measurement by Volume:

1. Stockpiles: Measured by cubic dimension using mean length, width, and height or thickness.

2. Excavation and Embankment Materials: Measured by cubic dimension using the average end area method.

C. Measurement by Area: Measured by square dimension using mean length and width or radius.

D. Linear Measurement: Measured by linear dimension, at the item centerline.

E. Stipulated Price Measurement: By unit designated in the agreement.

F. Other: (Including but not limited to, each and lump sum). Items measured by weight, volume, area, or lineal means or combination, as appropriate, as a completed item or unit of the Work.

1.05 PLANS QUANTITY MEASUREMENT

A. Plans quantities may or may not represent the exact quantity of work performed or material moved, handled, or placed during the execution of the Contract. The estimated bid quantities are designated as final payment quantities, unless revised by the governing specifications or this Article.

B. If the quantity measured as outlined under "Measurement" varies by more than 5% (or as stipulated under "Measurement" for specific Items) from the total estimated quantity for an individual Item originally shown in the Contract, an adjustment may be made to the quantity of authorized work done for payment purposes.

C. When quantities are revised by a change in design approved by the Department, by change order, or to correct an error on the plans, the plans quantity will be increased or decreased by the amount involved in the change, and the 5% variance will apply to the new plans quantity.

D. If the total Contract quantity multiplied by the unit bid price for an individual Item is less than $250 and the Item is not originally a plans quantity Item, then the Item may be paid as a plans quantity Item if the Engineer and Contractor agree in writing to fix the final quantity as a plans quantity.

E. For Contracts with callout work and work orders, plans quantity measurement requirements are not applicable.

1.06 PAYMENT

A. Payment Includes: Full compensation for all required supervision, labor, products, tools, equipment, plant, transportation, services, and incidentals; and erection, application or installation of an item of the Work; and Contractor's overhead and profit.

B. Total compensation for required Unit Price Work shall be included in Unit Price bid in Section 00300 Bid Proposal Form

C. Interim payments for stored materials will be made only for materials to be incorporated under items covered in unit prices, unless disallowed in Supplementary Conditions.

D. Progress payments will be based on the Resident Project Representative's observations and evaluations of quantities incorporated in the Work multiplied by the unit price.

E. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities determined by Engineer multiplied by the unit price for Work which is incorporated in or made necessary by the Work.

1.07 NONPAYMENT FOR REJECTED PRODUCTS

A. Payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable to Resident Project Representative.

2. Products determined as nonconforming before or after placement.

3. Products not completely unloaded from transporting vehicle.

4. Products placed beyond the lines and levels of the required Work.

5. Products remaining on hand after completion of the Work, unless specified otherwise.

6. Loading, hauling, and disposing of rejected products.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

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SECTION 01292
SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Preparation and submittal of a Schedule of Values for stipulated price contracts or for major lump sum items on unit price contracts for which the Contractor requests progress payments.

1.02 DEFINITION

A. The Schedule of Values is an itemized list that establishes the value of each part of the Work for a stipulated price contract and for major lump sum items in a unit price contract. The Schedule of Values is used as the basis for preparing applications for payments. Quantities and unit prices may be included in the schedule when designated by the Engineer.

1.03 PREPARATION

A. For stipulated price contracts, subdivide the Schedule of Values into logical portions of the Work, such as major work items or work in contiguous geographic areas. Use Section 01325- Construction Schedule to guide the subdivision of work items. The items in the Schedule of Values will correlate directly with the tasks enumerated in the Construction Schedule. Then organize each portion using the Table of Contents of this Project Manual as an outline for listing the value of work by Sections. A pro rata share of mobilization, bonds, and insurance may be listed as separate items for each portion of the work.

B. For unit price contracts, items should include a proportional share of Contractor's overhead and profit so that the total of all items will equal the Contract Price.

C. For lump sum equipment items where submittal of operation/maintenance data and testing are required, include a separate item for equipment operation and maintenance data submittal valued at 5 percent of the lump sum amount for each equipment item and a separate item for testing and adjusting valued at 5 percent of the lump sum amount for each equipment item.

D. Round off figures for each listed item to the nearest $100.00 except for the value of one item, if necessary, to make the total of all items in the Schedule of Values equal the Contract Price for stipulated price contracts or the lump sum amount in Section 03000 Bid Proposal Form.

E. Type the schedule of values on 8-1/2-inch by 11-inch white bond paper.

1.04 SUBMITTAL

A. Submit within 30 days of Notice to Proceed, or at the pre-construction meeting, whichever occurs sooner.

B. Revise the Schedule of Values and resubmit for items affected by contract modifications, change orders, and work change directives. After the changes are reviewed without exception by the Engineer, make the submittal at least 10 days prior to submitting the next application for progress payment.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01310
PROJECT CONTROL SCHEDULE

PART 1 - GENERAL

1.01 SCHEDULE REQUIREMENTS PROGRESS SCHEDULE

A. The work specified in this section includes planning, scheduling and reporting required by the CONTRACTOR. It is expressly understood and agreed that the time of beginning, the rate of progress, and the time of completion of the work are essential elements of this CONTRACT.

1. The Project Control Schedule (PCS) shall be prepared and maintained by the CONTRACTOR as described in this section.

2. The PCS shall be the CONTRACTOR'S working schedule and will be used by the CONTRACTOR to plan, organize, and execute the work, record and report actual performance and physical progress, and to show how the CONTRACTOR plans to complete all remaining work as of the beginning of each progress report period (data date).

3. In addition, the PCS shall provide the OWNER with a tool to monitor and follow the progress of all phases of the work. The PCS shall comply with the various limits imposed by the scope of the work, contractually specified milestones and completion dates included in the contract. The PCS shall be a Critical Path Method (CPM) schedule, utilizing the Precedence Diagramming Method (PDM).

4. The PCS must clearly show the sequence and interdependence of activities required for complete performance of the work, beginning with the Contract Start Date (CSD) and concluding with the Contract Completion Date (CCD). The maximum duration of any physical work activity shall not exceed twenty (20) working days unless approved by the OWNER.

5. The CONTRACTOR shall use a scheduling system capable of handling, processing, printing and plotting data to satisfy all requirements of this section. The scheduling system must be capable of producing project reports and other digital (electronic) data that can be directly read and interpreted by the OWNER.

1.02 SUBMITTAL PROCEDURES

A. The OWNER will schedule and conduct a Preconstruction Conference. At this meeting, the requirements of this section, as they apply to the contract, will be reviewed with the CONTRACTOR. The CONTRACTOR shall be prepared to review and discuss methodology for the schedule and sequence of operations and labor, equipment and material constraints.

B. .PROJECT CONTROL SCHEDULE (PCS)(PRELIMINARY) - within ten (10) working days after the Preconstruction Conference, the CONTRACTOR shall submit to the OWNER the Preliminary Project Schedule (PPS), which shall be the basis of the PROJECT CONTROL SCHEDULE (BASELINE), and which will be used to schedule early activities of the project. The PPS shall include a detailed plan of operations for the first sixty (60) calendar days from the Contract Start Date.

C. The PPS shall be a network diagram or bar chart, utilizing the CONTRACTOR'S WORK BREAKDOWN STRUCTURE showing in detail:

1. Notice of Acceptance of Proposal.
2. Pre-Construction Conference.
3. Contract start date.
4. Mobilization.
5. Submission and approval of key submittals.
6. Procurement of key materials and equipment.
7. All activities occurring or starting within the first sixty (60) calendar days.
8. Milestones and other contractual dates.
9. Contract completion date.

D. Submittal and acceptance of the Preliminary Project Schedule is a condition precedent to the issuance of any initial payment.

E. PROJECT CONTROL SCHEDULE (BASELINE) - within sixty (60) calendar days of the CSD, the CONTRACTOR shall submit, for acceptance by the OWNER, the Project Control Schedule (Baseline). The PCS-Baseline shall represent the CONTRACTOR'S complete plan for the execution of the CONTRACT in accordance with the BID and CONTRACT documents. Although limited technical assistance is available to the CONTRACTOR from the OWNER upon written request and prior to any formal review and/or finalization of the baseline schedule, it is the responsibility of the CONTRACTOR to employ or engage the services of a technically qualified scheduler on this project.

F. PROJECT CONTROL SCHEDULE (UPDATES) - Once each month, or more often if deemed necessary by the OWNER, the CONTRACTOR shall review and update the PCS to incorporate all current information, including progress, approved adjustments of time and logic, and proposed changes in sequence and logic. All copies of the updated PCS submitted to the OWNER, shall be signed and dated by the CONTRACTOR.

G. PROJECT CONTROL SCHEDULE (AS-BUILT) - The last PCS update submitted shall be identified as the "As-Built Schedule", and is a condition precedent to issuance of Final Acceptance of the CONTRACT by the OWNER.

1.03 DEFINITIONS

A. The principles and definitions of the terms used herein shall be as set forth in the Associated General Contractors of America (AGC) publication "The Use of CPM in Construction," copyright 1976. Additional definitions are set forth as follows:

1. Critical Path(s) - shall be defined as the longest path of activities from the Contract Start Date (CSD) to the Contract Completion Date (CCD).
2. Near Critical Path - shall be defined as those paths of activities having a total float value equal to the total float value of the defined critical path (longest path) plus ten (10) working days.
3. Activity Codes - are values assigned to schedule activities to organize the Schedule Activities into manageable groups for updating, analyzing, reporting, plotting, and summarizing.

4. WBS - (Work Breakdown Structure) is a definition of project related activity codes, to be used by the CONTRACTOR to organize the CONTRACTOR'S Project Control Schedule in a manner that facilitates the OWNER'S use of the PCS information.
5. Constraint - is a restriction imposed on the start, finish or duration of an activity. Project Control Schedule
6. Data Date - (DD) The date used as the starting point for schedule calculations. For Baselines, the DD is the first day of the project, the CSD date. For subsequent schedule updates, the DD is the first workday of the remainder of the schedule, normally the first calendar day after the schedule close-out date (usually month end).
7. Total Float - is the amount of time that the start or finish of an activity can be delayed without impacting the Contract Completion Date. Total float is a CALCULATED value.
8. Free Float - is the amount of time that the start or finish of an activity can be delayed without impacting the early start or finish of a successor activity. Free float is a CALCULATED value.
9. Lag - is an offset or delay from an activity to its' successor, or from its' predecessor. Lag is physically defined by the scheduler. Lag is NOT CALCULATED.
10. Open End - is an activity that has either no predecessor or no successor relationships.
11. Out of Sequence Progress - means that all or a portion of an activity has been completed before the predecessors to the activity are complete.
12. Percent Complete - the portion of an activity that is complete based on physical measurement of the scope of work included in the activity that has been completed by the CONTRACTOR and accepted by the OWNER.
13. Target (Baseline) - a different version of the project schedule that can be compared to as the basis for measuring differences between the versions of the project schedule.

1.04 PROJECT CONTROL SCHEDULE (BASELINE)

A. The CONTRACTOR shall be responsible for assuring that all work sequences are logical and the network shows a coordinated plan for the complete performance of the CONTRACT. Failure of the CONTRACTOR to include any element of the work required for the performance of the CONTRACT in the network shall not relieve the CONTRACTOR from completing all work within the time specified for the completion of the CONTRACT. In the event the CONTRACTOR fails to define any element of the work in the network, when the omission or error is discovered by either the CONTRACTOR or OWNER, it shall be corrected by the CONTRACTOR at the next scheduled update or submittal.

B. The PCS Baseline shall be organized to clearly define separate groups of activities detailing:

1. key submittals,
2. procurement of major materials and equipment,

3. delivery of OWNER furnished materials and equipment,
4. approvals required by regulatory agencies or other third parties,
5. plans for all major subcontract work,
6. access to and availability of all work areas,
7. identification of interfaces and dependencies with preceding, concurrent, and follow-on contractors,
8. tests and inspections,
9. identification of any manpower, material or equipment restrictions.

C. Relationships shall be defined between the CONTRACTOR'S activities based on the following criteria.

1. PHYSICAL - relationships occur when a successor activity cannot physically start (or finish) until a predecessor activity completes (or starts). example: forming before pouring
2. SAFETY - defined relationships exist when a successor activity cannot start until a predecessor activity (which may be creating a safety hazard for the successor activity), completes allowing for the start of the successor in a safe environment. example: completing overhead work before starting work underneath
3. RESOURCE - driven relationships occur when a successor activity cannot start until a predecessor activity completes and releases its' resources to work on the successor. example: form slab # 1 before forming slab # 2 when allocating one crew to a job
4. PREFERENTIAL - logic occurs when a contractor prefers to perform the work in a given sequence. example: completing painting before starting finished flooring
5. NOTE: The basis of Safety, Resource and Preferential logic requirements for all critical or near critical activities shall be documented in the Baseline Schedule Narrative or as requested by the OWNER.

D. The basis of constraints and lags utilized in the PCS-BASELINE and subsequent UPDATES must be documented in an accompanying schedule narrative.

E. The CONTRACTOR shall not utilize float suppression techniques or artificial restraints, constraints, lags or durations to lessen or control the amount of total or free float contained in the network.

F. Float shall not be considered as time for the exclusive use of or benefit of either the OWNER or the CONTRACTOR. Float shall be considered as a resource available to both parties for the benefit of the project.

G. Early Completion - An early completion schedule is one which anticipates completion of the work ahead of the corresponding Contract Time. Since Total Float is measured to the Contract Completion Date (CCD), and belongs to the Project, the CONTRACTOR shall not be entitled to any extension in Contract Time, or recovery for any delay incurred because of extensions in an early completion date, until all total float is used or consumed and performance or completion of the WORK extends beyond the corresponding Contract Time.

H. Project Schedule Reports shall be submitted to the OWNER as follows:

1. Graphics - 11" x 17" (Tabloid)
    a. Time Scaled Logic Diagram based on early dates, organized by OWNERWBS Codes with the longest (critical) path printed in red. (Attachment A.)
    b. Bar chart, organized by CONTRACTOR-WBS, indicating early and late date bars with critical path printed in red.
2. Graphics – 8½" x 11" (A size)
    a. Detailed Bar Chart, Grouped by CONTRACTOR-WBS
    b. Estimated Cash Flow Histogram (if cost loaded) with planned value per period (bar) and cumulative to date (curve).
3. Tabular Reports – 8½" x 11" (A size)
    a. Predecessor / Successor listing including relationship type and lag value, organized by Activity ID.
    b. Tabular activity listing, sorted by Activity ID, with Early and Late Dates, Total and Free Float values.
    c. Tabular activity listing, Grouped by Responsible party, sorted by Early Start, with Early Dates, Total and Free Float values.
    d. Listing of all schedule constraints and open ends with explanation of each.
    e. Identification of all lags contained in relationships and explanation of each.
    f. Narrative report explaining the key "basis and assumptions" of the Project Control Schedule Baseline schedule.
    g. Submittal / Procurement Status Report - A P3 Activity Matrix Report detailing for each submittal item, the Planned Dates for each step in the submittal/ procurement process.
    h. Bid Item Listing.

I. Submittal
1. Six (6) sets of all graphics
2. Six (6) sets of all tabular reports

J. Acceptance
1. The OWNER may accept the PCS-Baseline submittal and subsequent updates as having been submitted in accordance with the Contract Specifications. The OWNER will review and make comments on the PCS. Meetings may be held between the OWNER and the CONTRACTOR, and all SUBCONTRACTORS and SUPPLIERS whom the CONTRACTOR may desire to invite or whom the OWNER may request be present.
2. The PCS submittal must meet in all respects the time and order of work requirements of the contract. The work shall be executed in the sequence indicated in the accepted baseline and subsequent accepted updates and revisions. If the CONTRACTOR changes the sequence of work, a baseline revision submittal will be required in accordance with Section 1.4.

3. Comments made by the OWNER on the PCS or any subsequent updates and revisions, will not relieve the CONTRACTOR from compliance with requirements of the Contract Documents.
4. If requested by the OWNER at any time during the project, the CONTRACTOR shall provide detailed, short term schedules for specific items of the work.

K. Baseline Schedule Revisions

1. No change shall be made to the accepted Project Control Schedule Baseline without the prior written authorization of the OWNER.
2. If the CONTRACTOR desires or the OWNER requests that the PCS Baseline be revised to reflect specific ISSUES of the current project plan, the CONTRACTOR shall prepare a detailed analysis of the time related impacts of the specific ISSUE, demonstrating how the CONTRACTOR proposes to incorporate the ISSUE into the PCS Baseline.
3. Each time impact analysis shall be submitted prior to approval of any change in the contract to facilitate the incorporation of the impact in the next schedule submittal by the CONTRACTOR.
4. Time extensions will be granted only to the extent that equitable time adjustments for the activity or activities affected exceed the remaining total float along the path of activities impacted by the ISSUE.
5. When an authorized revision is made to the PCS Baseline, the revised baseline shall be identified by a Revision Number, giving the revised Baseline a distinct identification separate from all previous or subsequent Baseline Revisions.

L. Schedule Updates

1. The CONTRACTOR shall submit the Project Control Schedule - Update to the OWNER each month, on a date assigned by the OWNER. The Update submittal shall include all information available up to the Data Date established by the OWNER.
2. The PCS-Update submittal shall be reviewed jointly (if necessary) with the OWNER for the purpose of verifying update information. The OWNER may request key SUBCONTRACTORS or SUPPLIERS to participate in the review with the CONTRACTOR. Information to verify includes but is not limited to:
    a. Actual start / finish dates for activities started or finished in the current period.
    b. Activity Percent Complete for activities that are currently in progress.
    c. Remaining durations or expected finish dates for activities that are currently in progress.
    d. Revised logic (as-built and projected) and changes in activity durations.
    e. Impacts of Issues identified by the CONTRACTOR or OWNER.
    f. Incorporation of OWNER approved time extensions.
3. The CONTRACTOR may not make changes to any actual events previously entered in prior updates without written concurrence by the OWNER.
4. PCS-Update submittals shall be prepared as follows:
    a. Graphics - 11" x 17" (Tabloid size)

1) Time scaled Logic Diagram of early dates, organized by WBS Codes with the calculated critical path printed in red.
2) Bar chart, organized by WBS Codes, indicating early and late dates with critical path printed in red, with Target (Baseline) Bar.

b. Graphics - 8½” x 11" (A size)

1) Detailed Bar Chart , Grouped by OWNER-WBS, with Target (Baseline) Bar.

c. Tabular Reports - 8½" x 11" (A size)

1) Tabular activity listing, sorted by Activity ID, with Early and Late Dates, with Total and Free Float values.
2) Tabular activity listing, sorted by Early Start, with Current Early and Current Baseline dates and Variance between Current Early and Current Baseline Finish Dates.
3) Tabular activity listing, Grouped by Responsible party, sorted by Early Start, with Early Dates, Total and Free Float values.
4) Listing of any NEW or DELETED schedule constraints and open ends with explanation of each.
5) Identification of all NEW or DELETED lags contained in relationships and explanation of each.
6) Identification of all NEW or DELETED activities and an explanation of each.
7) Narrative report including description of problem areas, current and anticipated delaying factors, and their expected impact, and an explanation of current actions taken or proposed. In addition, alternative for possible schedule recovery to mitigate any potential delay and/or cost increases should be included in the monthly narrative by the CONTRACTOR.
8) Submittal/Procurement Status Report.
9) Bid Item Listing Report.
10) If the CONTRACTOR fails to submit any of the PCS update submittal deliverables, the OWNER may withhold approval of progress payment estimates until such time as the CONTRACTOR submits the required update submittal.

1.05 MEASUREMENT AND PAYMENT

A. Project Control Schedule will be considered incidental to the cost of the overall project. There shall be no separate pay for the Project Schedule.

END OF SECTION

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SECTION 01312
COORDINATION AND MEETINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Section includes general coordination including pre-construction conference, site mobilization conference, and progress meetings.

1.02 RELATED DOCUMENTS

A. Coordination is required throughout the documents. Refer to all of the Contract Documents and coordinate as necessary.

1.03 ENGINEER AND REPRESENTATIVES

A. The Engineer may act directly or through designated representatives as defined in the Conditions of the Contract and as identified by name at the preconstruction conference.

1.04 CONTRACTOR COORDINATION

A. Coordinate scheduling, submittals, and Work of the various Specifications sections to assure efficient and orderly sequence of installation of interdependent construction elements.

B. Verify that utility requirement characteristics of operating equipment are compatible with existing or planned utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. Conceal pipes, ducts, and wiring within the construction in finished areas, except as otherwise indicated. Coordinate locations of fixtures and outlets with finish elements.

E. Coordinate completion and clean up of Work for Substantial Completion and for portions of Work designated for Owner's partial occupancy.

F. Coordinate access to site for correction of nonconforming Work to minimize disruption of Owner's activities where Owner is in partial occupancy.

1.05 PRECONSTRUCTION CONFERENCE

A. Engineer will schedule a pre-construction conference.

B. Attendance Required: Owner's Representatives, Engineer's Representatives, Resident Project Representative, Contractor, major Subcontractors, and Funding Agency Representatives (if applicable).

C. Agenda:

1. Distribution of Contract Documents.

2. Designation of personnel representing the parties in Contract, and the Engineer.

3. Review of insurance.

4. Discussion formats proposed by the Contractor for schedule of values (if any), and construction schedule.

5. Procedures and processing of shop drawings and other submittals, substitutions, pay estimates or applications for payment, Requests for Information, Request for Proposal, Change Orders, and Contract closeout.

6. Scheduling of the Work and coordination with other contractors and utility service providers.

7. Review of Subcontractors.

8. Appropriate agenda items listed for Site Mobilization Conference, paragraph 1.06C, when pre-construction conference and site mobilization conference are combined.

9. Procedures for testing.

10. Procedures for maintaining record documents.

11. Other items as may be deemed appropriate.

1.06 SITE MOBILIZATION CONFERENCE

A. When required by the Contract Documents, Engineer will schedule a conference at the

B. Project site prior to Contractor occupancy.

C. Attendance Required: Engineer representatives, Resident Project Representative, Special Consultants, Contractor's Superintendent, and major Subcontractors.

D. Agenda:

1. Use of premises by Owner and Contractor.

2. Safety and first aid procedures.

3. Construction controls provided by Owner.

4. Temporary utilities.

5. Survey and layout.

6. Security and housekeeping procedures.

7. Field office requirements.

1.07 PROGRESS MEETINGS

A. Project meetings shall generally be held at Project field office or other location as designated by the Engineer. Meeting shall generally be held at monthly intervals, or more frequent intervals if directed by Engineer.

B. Attendance Required: Job superintendent, major Subcontractors and Suppliers, Owner's Representatives, Engineer's Representatives, Funding Agency Representatives (if any), and Resident Project Representative as appropriate to agenda topics for each meeting.

C. Engineer or his representative will make arrangements for meetings, and recording minutes.

D. Engineer or his representative will prepare the agenda and preside at meetings.

E. Contractor shall provide required information and be prepared to discuss each agenda item.

F. Agenda:

1. Review minutes of previous meetings.

2. Review of Record Documents.

3. Review of Work progress schedule submittal, and pay estimates, payroll and compliance submittals.

4. Field observations, problems, and decisions.

5. Identification of problems which may impede planned progress.

6. Review of submittals schedule and status of submittals.

7. Review of RFI and RFP status.

8. Change order status.

9. Review of off-site fabrication and delivery schedules.

10. Maintenance of progress schedule.

11. Corrective measures to regain projected schedules.

12. Planned progress during succeeding work period.

13. Coordination of projected progress.

14. Maintenance of quality and work standards.

15. Effect of proposed changes on progress schedule and coordination.

16. Other items relating to Work.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01321
CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Photographic requirements for construction photographs and submittals.

1.02 SUBMITTALS

A. Prints: Furnish 2 sets of 4-inch by 6-inch prints of each view and submit 1 print directly to the Engineer within 7 days of taking photographs. One print shall be retained by the Contractor in the field office at the Project site and available at all times for reference.

B. Extra Prints: When requested by the Engineer, the Contractor shall submit extra prints of photographs, with distribution directly to designated parties who will pay the costs for the extra prints directly to the photographer.

C. When required by individual sections, submit photographs taken prior to start of construction to show original site conditions.

D. When required by Contract Documents, submit photographs with monthly Pay Estimate.

E. Contractor shall submit digital photographs on a Computer Disc (CD) or Digital Versatile Disc (DVD) of digital photographs using a digital camera with a resolution of 3264x2448 - 8 Megapixel, but must comply with Parts 1 and 2 of this section.

1.03 QUALITY ASSURANCE

A. Contractor shall be responsible for the timely execution of the photographs, their vantage point, and quality.

B. Photographs: Two prints; color, matte finish; 4 x 6 -inch size, mounted on 8-1/2 x 11-inch soft card stock, with left edge binding margin for three hole punch. Digital photos shall not be distorted to fit card stock.

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PART 2 - PRODUCTS

2.01 PRECONSTRUCTION PHOTOGRAPHS

A. Prior to the commencement of any construction, take digital color photographs of the site of the project and present two sets of prints to the Engineer for their use in contract administration and inspection. Subject matter of the photographs to be determined by the Engineer.

B. The photographs shall show on a non-reflective chalkboard readable in the photograph:

1. Job number.

2. Date and time photographs were taken.

3. Location and compass direction of the photograph, along with the project number.

4. Date shall be on digital image.

5. Provide notation of vantage point marked for location and direction of shot, on a key plan of the site.

C. Sufficient number of photographs shall be taken to show the existence or non-existence of cracked paved surfaces and the condition of trees, shrubs, and grass.

D. Identify each photograph with an applied label or rubber stamp on the back with the following information:

1. Name of the Project.

2. Name and address of the photographer (if a professional photographer is used).

3. Name of the Contractor.

4. Date the photograph was taken.

5. Photographs shall be in plastic pockets and bound in three-ring notebook for easy access and viewing.

2.02 PROGRESS PHOTOGRAPHS

A. Take photographs of subject matter selected by Resident Project Representative at intervals, coinciding with the cutoff date associated with each application for payment. Select the vantage points for each shot each month to best show the status of construction and progress since the last photographs were taken.

1. Vantage Points: Follow direction by the Resident Project Representative to select vantage points. During each of the following construction phases take not less than 2 of the required shots from the same vantage point each time to create a time-lapse sequence.

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2. Photos shall be submitted according to Paragraphs 1.03 B. and 2.01 B and D.

PART 3 - EXECUTION - NOT USED

END OF SECTION

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SECTION 01330
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Submittal procedures for:

1. Schedule of Values.
2. Construction Schedules.
3. Shop Drawings, Product Data, and Samples
4. Operations and Maintenance Data.
5. Manufacturer's Certificates.
6. Construction Photographs.
7. Project Record Documents.
8. Video Tapes.
9. Design Mixes.

1.02 SUBMITTAL PROCEDURES

A. Scheduling and Handling:

1. Schedule submittals well in advance of the need for the material or equipment for construction. Allow time to make delivery of material or equipment after submittal has been approved.

2. Develop a submittal schedule that allows sufficient time for initial review, correction, resubmission and final review of all submittals. The Engineer will review and return

submittals to the Contractor as expeditiously as possible but the amount of time required for review will vary depending on the complexity and quantity of data submitted. In no case will a submittal schedule be acceptable which allows less than 30 days for initial review by the Engineer. This time for review shall in no way be justification for delays or additional compensation to the Contractor. Recognizing that time is of the essence, the Contractor is to stamp the top of each submittal with the words ROUTINE or CRITICAL. Routine submittals shall be processed in accordance with the timeframe set forth previously. Critical submittals are those that: were overlooked by the Contractor, involve complex coordination, or are crucial to the successful completion of a specific portion of the project. For critical submittals:

a. Contractor shall indicate on the submittal his realistically estimated date of when a review must be returned;

b. Upon return of critical submittals, Contractor shall date-stamp the transmittal page with date and time received;

c. Contractor is cautioned that the use of critical submittals is not a substitute for proper due diligence on his part. Review of critical submittals found to be routine shall be accompanied by an invoice for excess time and material expenditures that were required in order to complete the critical review as compared to a routine review. The Resident Project Representative shall make the determination as to whether a critical submittal was in fact routine.

3. The Engineer's review of submittals covers only general conformity to the Drawings, Specifications and dimensions which affect the layout. The Contractor is responsible for quantity determination. Quantities may be verified by the Engineer. The Contractor is responsible for any errors, omissions or deviations from the Contract requirements; review of submittals in no way relieves the Contractor from his obligation to furnish required items according to the Drawings and Specifications.

4. Submit sufficient copies of documents. Unless otherwise specified in the following paragraphs or in the Specifications, provide 6 copies in addition to the number the Contractor requires returned. For portions of the project involving electrical or signal components, provide one additional copy (7 copies in addition to the number the Contractor requires returned).

5. Revise and resubmit submittals as required. Identify all changes made since previous submittal.

6. A maximum of three (3) reviews will be conducted on any one submittal. Submittals requiring more than three (3) reviews will be considered inadequate and result in a recovery of review expenses from the Contractor.

7. The Contractor shall assume the risk for material or equipment which is fabricated or delivered prior to approval. No material or equipment shall be incorporated into the Work or included in periodic progress payments until approval has been obtained in the specified manner.

B. Transmittal Form and Numbering:

1. Transmit each submittal to the Engineer with a Transmittal Cover.

2. Sequentially number each transmittal including the Specification Section number followed by a area designation number and the sequential number beginning with the number 1. Re-submittals shall use the original number with an alphabetic suffix (i.e., 2A for first re-submittal of Submittal 2 or 15C for third re-submittal of Submittal 15). Each submittal shall only contain one type of work, material, or equipment. Mixed submittals will not be accepted.

3. Identify time nature of submittal, either ROUTINE or CRITICAL.

4. Identify variations from requirements of Contract Documents and identify product or system limitations.

5. For submittal numbering of video tapes, see paragraph 1.10 Video.

C. Transmittal Cover:

1. Transmittal Cover, certifying that the items have been reviewed in detail and are correct and in accordance with Contract Documents, except as noted by any requested variance. A stamp may be used to print the information on the Transmittal Cover except for the Contractor's signature. Regardless of whether the transmittal cover is typed or stamped, the transmittal cover text shall be a minimum of fourteen (14) point.

2. As a minimum, Transmittal Cover information shall include:

a. Contractor's name.

b. Job number.

c. Submittal number.

d. Certification statement that the Contractor has reviewed the submittal and it is in compliance with the Contract Documents.

e. Signature line for Contractor.

f. Submittal type – routine or critical

3. The bottom half of the Transmittal Cover shall be kept blank.

D. Electronic copy submittals:

1. Electronic copies of the approved paper copy Operation and Maintenance Manuals are to be produced in Adobe Acrobat's Portable Document Format (PDF) Version 9.0 or higher.

2. Do not password protect and/or lock the PDF document.

3. Create one (1) PDF document (PDF file) for each equipment O&M Manual.

4. Drawings or other graphics must be converted to PDF format and made part of the one (1) PDF document.

a. Scanning to be used only where actual file conversion is not possible.

5. Rotate pages that must be viewed in landscape to the appropriate position for easy reading.

6. Images only shall be scanned at a resolution of 300 dpi or greater.

a. Perform Optical Character Recognition (OCR) capture on all images.

b. Achieve OCR with the "original image with hidden text" option.

c. Word searches of the PDF document must operate successfully to demonstrate OCR compliance.

7. Create bookmarks in the navigation frame, for each entry in the Table of Contents/Index.

   a. Normally three (3) levels deep (i.e., "Chapter," "Section," "Sub-section").

8. Thumbnails must be generated for each PDF file.

9. Set the opening view for PDF files as follows:

   a. Initial view: Bookmarks and Page.

   b. Magnification: Fit in Window.

   c. Page layout: Single page.

   d. Set the file to open to the cover page of the manual with bookmarks to the left, and the first bookmark linked to the cover page.

   e. All PDF documents shall be set with the option "Fast Web View" 1 to open the first 2 pages of the document for the viewer while the rest of the document continues to load.

   f. File naming conventions:

      1) File names shall use a "ten dot three" convention (XXXXX-YYYY-Z.PDF) where XXXXX is the Specification Section number, YYYY is the area designation number and Z is the sequential submittal number.

10. Labeling:

    a. As a minimum, include the following labeling on all CD-ROM discs and jewel 19 cases:

       1) Project Name.
       2) Equipment Name and Project Tag Number.
       3) Project Specification Section.
       4) Manufacturer Name.
       5) Vendor Name.

11. Binding:

    a. Include labeled CD(s) in labeled jewel case(s). Bind jewel cases in standard three-ring binder Jewel Case Page(s), inserted at the front of the Final paper copy submittal.

    b. Jewel Case Page(s) to have means for securing Jewel Case(s) to prevent loss (e.g., flap and strap).

1.03 SCHEDULE OF VALUES

A. Submit a Schedule of Values in accordance with Section 01292 - Schedule of Values.

1.04 CONSTRUCTION SCHEDULE

A. Submit Construction Schedules in accordance with Section 01325 - Construction Schedule.

1.05 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

A. Submit shop drawings in accordance with Section 01340 - Shop Drawings, Product Data, and Samples.

1.06 OPERATIONS AND MAINTENANCE DATA

A. Submit Operations and Maintenance data in accordance with Section 01782 - Operations and Maintenance Data.

1.07 MANUFACTURER'S CERTIFICATES

A. When required in Specification sections, submit manufacturers' certificate of compliance for review by Engineer.

B. Transmittal Cover, as described in paragraph 1.02C, shall be placed on front page of the certification.

C. Submit supporting reference data, affidavits, and certifications as appropriate.

D. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.

1.08 CONSTRUCTION PHOTOGRAPHS

A. Submit Construction Photographs in accordance with Section 01321 – Construction Photographs.

1.09 PROJECT RECORD DOCUMENTS

A. Submit Project Record Documents in accordance with Section 01785 - Project Record Documents.

1.10 VIDEO

A. Submit television video tapes as required for Acceptance Testing for Sanitary Sewers.

B. Transmittal forms for video tapes shall be numbered sequentially beginning with TV01, TV02, etc.

1.11 DESIGN MIXES

A. When specified in Specifications, submit design mixes for review.

B. Transmittal Cover, as described in paragraph 1.02C, shall be placed on front page of each design mix.

C. Mark each design mix to identify proportions, gradations, and additives for each class and type of design mix submitted. Include applicable test results on samples for each mix.

D. Maintain a copy of approved design mixes at mixing plant.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 GENERAL

A. Submittals made as part of this project will become a vital portion of the project record and will be referenced by the Owner for the useful life of the project. All submittals shall be of high quality. To this end, the following requirements are made:

1. As much as possible, all catalog cuts and manufacturer's information shall be original.

2. Copies, when required, shall be clean and entirely legible.

3. Neither facsimiles nor copies of facsimiles are to be included as part of any submittal.

4. Binders, if used, shall be rugged, lock-ring type. Spine of binders shall be clearly labeled with the information outlined in items 1.02 C.2.a. through c.

B. Reviewed submittals shall be returned to Contractor for distribution to subcontractors and other trades as required. As a minimum, submittals returned to the Contractor will be marked with review comments indicating findings of the review and giving instruction as to necessity of a re-submittal. The Engineer may, at his option, use a stamp for this purpose. Detailed correspondence covering the review may also accompany returned submittals.

END OF SECTION

SECTION 01340
SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Methods, schedule, and process to be followed for shop drawings, product data, and sample submittals.

1.02 REQUIREMENT

A. Submit shop drawings, product data and samples as required by the General Conditions and as designated in the Specifications using the procedures specified in Section 01330 – Submittal Procedures and the requirements of this Section.

B. Shop drawings, product data and samples are not considered Contract Documents.

1.03 SHOP DRAWING/SUBMITTAL SCHEDULE

A. Submit a separate Shop Drawing/Submittal schedule at the same time the construction schedule is submitted. List products, materials and equipment for which Shop Drawings and other submittals are required in the order in which they appear in the Specifications. Including product data and sample submittals in schedule.

1.04 SHOP DRAWINGS

A. Submit shop drawings for review as required by the Specifications.

B. Place Contractor's Transmittal Cover on each drawing as described in Section 01330 – Submittal Procedures.

C. On the drawings, show accurately and distinctly, the following:

1. Field and erection dimensions clearly identified as such;

2. Arrangement and section views;

3. Relation to adjacent materials or structure, including complete information for making connections between work under this Contract and work under other contracts;

4. Kinds of materials and finishes;

5. Parts list and descriptions;

6. Assembly drawings of equipment components and accessories showing their respective positions and relationships to the complete equipment package;

7. Where necessary for clarity, identify details by reference to the Contract Drawings.

D. Make drawings to scale providing a true representation of the specific equipment or item to be furnished.

1.05 PRODUCT DATA

A. Submit product data for review as required in Specification sections.

B. Place Contractor's Transmittal Cover on each data item submitted, as described in Section 01330 – Submittal Procedures.

C. Mark each copy to identify applicable products, models, and options to be used in this Project. Supplement manufacturers' standard data to provide information unique to this Project, where required by the Specifications.

D. For products specified only by reference standard, give manufacturers, trade name, model or catalog designation and applicable reference standard.

1.06 SAMPLES

A. Submit samples for review as required by the Specifications.

B. Place Contractor's Transmittal Cover on each sample as described in Section 01330 – Submittal Procedures.

C. Submit the number of samples specified in Specifications.

D. Reviewed samples which may be used in the Work are identified in Specifications.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 01360
PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Options for making product or process selections.

B. Procedures for proposing equivalent construction products or processes.

1.02 DEFINITIONS

A. Product: Means materials, equipment, or systems incorporated into the Project. Product does not include machinery and equipment used for production, fabrication, conveying, and erection of the Work. Products may also include existing materials or components designated for reuse.

B. Process: Any proprietary system or method for installing system components resulting in an integral, functioning part of the Work. For this Section, the word Product includes Processes.

1.03 SELECTION OPTIONS

A. Approved Products: Construction products or processes of certain manufacturers or suppliers designated in the Specifications followed by the words "or approved equal." Approval of alternate products or processes not listed in the Specifications may be obtained through provisions for product options and substitutions in the Contract Documents, and by following the submittal procedures specified in 01330- Submittal Procedures.

B. Product Compatibility: To the maximum extent possible, provide products that are of the same type or function from a single manufacturer, make, or source. Where more than one choice is available as a Contractor's option, select a product which is compatible with other products already selected, specified, or in use by the Owner.

1.04 CONTRACTOR'S RESPONSIBILITY

A. The Contractor's responsibility related to product options and substitutions is defined in the Contract Documents.

B. Furnish information the Engineer deems necessary to judge equivalency of the alternate product.

C. Pay for laboratory testing, as well as any other review or examination costs, needed to establish the equivalency between products in order to obtain information upon which the Engineer can base a decision.

D. If the Engineer determines that an alternate product is not equal to that named in the Specifications, the Contractor shall furnish the specified products.

1.05 ENGINEER'S REVIEW

A. Alternate products or processes may be used only if approved in writing by the Engineer. The Engineer's determination regarding acceptance of a proposed alternate product is final.

B. Alternate products will be accepted if the product is judged by the Engineer to be equivalent to the specified product or to offer substantial benefit to the Owner.

C. The Owner retains the right to accept any product or process deemed advantageous to the Owner, and similarly, to reject any product or process deemed not beneficial to the Owner.

1.06 SUBSTITUTION PROCEDURE

A. Collect and assemble technical information applicable to the proposed product to aid in determining equivalency as related to the approved product specified.

B. Submit a written request for a construction product to be considered as an alternate product.

C. Submit the product information after the effective date of the Agreement.

D. Submit 5 copies of each request for alternate product approval. Include the following information:

1. Complete data substantiating compliance of proposed substitution with Contract Documents.

2. For products:

   a. Product identification, including manufacturer's name and address.

   b. Manufacturer's literature with product description, performance and test data, and reference standards.

   c. Samples, as applicable.

   d. Name and address of similar projects on which product was used and date of installation. Include the name of the Owner, Architect/Engineer, and installing contractor.

3. For construction methods:

   a. Detailed description of proposed method.

   b. Drawings illustrating methods.

4. Itemized comparison of proposed substitution with product or method specified.

5. Data relating to changes in construction schedule.

6. Relation to separate contracts, if any.

7. Accurate cost data on proposed substitution in comparison with product or method specified.

8. Other information requested by the Engineer.

E. Approved alternate products will be subject to the same review process as the specified product would have been for shop drawings, product data, and samples.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

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SECTION 01390
SAFETY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for safety,.

1.02 SAFETY REFERENCES

A. The Contractor shall comply with all applicable regulations of the Federal Occupational Safety and Health Administration (OSHA), 29CFR 1926, Construction Standards. The OSHA, 29CFR 1926, Construction Standards can be accessed at www.osha.gov .

1.03 NON-COMPLIANCE

A. The Contractor is responsible for being cognizant of and ensuring compliance with the requirements set forth in Section 1.2 above. Such responsibility shall apply to both the Contractor's operations and those of the Contractor's subcontractors. When violations of the safety and health requirements contained in these Contract Documents or standards referenced in Section 1.2 are called to the Contractor's attention by the Owner, the Contractor shall immediately correct the condition to which attention has been directed. Such notice, either oral or written, when served on the Contractor or the Contractor's representative(s), shall be deemed sufficient.

B. In the event the Contractor fails or refuses to promptly comply with the compliance directive issued under A. above, the Owner may issue an order to stop all or any part of the work. When satisfactory corrective action is taken, an order to resume work will be issued. The Contractor shall not be entitled to any extension of time nor to any claim for damage or to additional compensation by reason of either the directive or the stop order. Failure of the Owner to order discontinuance of any or all of the Contractor's operations shall not relieve the Contractor of the Contractor's responsibility for the safety of personnel and property:

1.04 ACTIVITY HAZARD ANALYSIS

A. The Contractor shall provide to the Owner's Representative a copy of the Material Safety Data Sheets for each hazardous chemical that the Contractor plans to use for any portion of the Work required by this Contract. Compliance-confirmation must be received from the Owner's Representative prior to bringing any hazardous chemicals to the jobsite.

1.05 REPORTING REQUIREMENTS

A. Reporting Reports. For OSHA recordable accidents, the Contractor shall conduct a suitable investigation, complete the OSHA Form 300, latest edition, and provide to the Owner's Representative within five (5) calendar days of the accident.

B. Notification. The Contractor shall notify the Owner's Representative within four (4) hours of any accident meeting the definition of OSHA recordable occupational injury of illness. The information shall include the Contractor's name; contract IBM number; name of activity; location of where mishap occurred; date and time of mishap; names of personnel injured; extent of property damage, if any; and brief description of mishap (to include type of construction equipment used, personal protective equipment used, etc.) In addition to OSHA reporting requirements, initial notification shall be made of any accident involving significant mishaps.

C. Monthly Exposure Report. Monthly exposure reporting to the Owner's Representative is required to be attached to the monthly billing request. This report is a compilation of employee hours worked for each month for all site workers, both prime and subcontractor.

D. OSHA Citation and Violations. The Contractor shall provide the Owner's Representative with a copy of each OSHA citation, OSHA report, and Contractor response. The Contractor shall correct violations and citations promptly and provide written corrective actions to the Owner's Representative.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 GENERAL

A. In general, the Contractor shall incorporate and install all safety measures in accordance with standard industry practice and applicable regulatory requirements.

END OF SECTION

SECTION 01411
ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The contractor shall perform the work minimizing environmental pollution and damage as the result of construction operations. Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the utility of the environment for aesthetic, cultural and/or historical purposes. The control of environmental pollution and damage requires consideration of land, water, and air, and includes management of visual aesthetics, noise, solid waste, as well as other pollutants. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected during the entire duration of this contract.

B. SUBCONTRACTORS

1. The Contractor shall ensure compliance with this section by subcontractors.

C. PERMITS

1. The Contractor shall obtain all needed permits or licenses. The Owner will not obtain any permits for this project. The Environmental Protection Agency (EPA), through the national pollutant discharge elimination system (NPDES), requires general permits, a notice of intent, and a notice of discontinuation. The Contractor shall be responsible for implementing the terms and requirements of the appropriate permits as needed and for payment of all fees.

D. PRECONSTRUCTION SURVEY

1. Prior to starting any onsite construction activities, the Contractor and Owner shall make a joint condition survey, after which the Contractor shall prepare a brief report indicating on a layout plan the condition of trees, shrubs, and grassed areas immediately adjacent to work sites and adjacent to the assigned storage area and access routes as applicable. This report will be signed by both the owner and the Contractor upon mutual agreement as to its accuracy and completeness.

E. MEETINGS

1. The Contractor shall meet with representatives of the Owner to change the environmental protection plan as needed for compliance with the environmental pollution control program.

F. NOTIFICATION

1. The Owner will notify the Contractor in writing of any observed noncompliance with the previously mentioned Federal, State or local laws or regulations, permits, and other elements of the Contractor's environmental protection plan. The Contractor shall, after receipt of such notice, inform the Owner of proposed corrective action and take such action when approved. If the Contractor fails to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted or costs or damages allowed to the Contractor for any such suspensions.

G. PREVIOUSLY USED EQUIPMENT

1. The Contractor shall thoroughly clean all construction equipment previously used at other sites before it is brought into the work areas, ensuring that soil residuals are removed.

H. PAYMENT

1. No separate payment will be made for work covered under this section; all costs associated with this section shall be included in the contract unit and/or lump sum prices in the Bidding Schedule.

1.02 LAND RESOURCES

A. The Contractor shall confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, the Contractor shall identify the land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, the Contractor shall not remove, cut , deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without permission. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. Where such emergency use in permitted, the Contractor shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Stone, earth or other material displaced into uncleared areas shall be removed.

B. WORK AREA LIMITS

1. Prior to any construction, the Contractor shall mark the areas that need not be disturbed under this contract. Isolated areas within the general work area which are to be saved and protected shall also be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, the markers shall be visible. The Contractor's personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

C. LANDSCAPE

1. Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. Fencing shall be erected at sufficient distance from a tree trunk (usually equal to the diameter of the tree crown) to prevent compaction of soil over the root spread.

D. UNPROTECTED ERODIBLE SOILS

1. Earthwork brought to final grade shall be finished as indicated. Side slopes and back slopes shall be protected as soon as practicable upon completion of rough grading. All earthwork shall be planned and conducted to minimize the duration of exposure of unprotected soils. Except in cases where the constructed feature obscures borrow areas, quarries, and waste material areas, these areas shall not initially be totally cleared. Clearing of such areas shall progress in reasonably sized increments as needed to use the developed areas as approved by the Owner.

E. DISTURBED AREAS

1. The Contractor shall effectively prevent erosion and control sedimentation through approved methods and Best Management Practices (BMP's) including, but not limited to, the following:

2. Retardation and control of runoff. Runoff from the construction site or from storms shall be controlled, retarded, and diverted to protected drainage courses by means of diversion ditches, benches, berms, and by any measures required by area wide plans under the Clean Water Act.

3. Erosion and sedimentation control devices. The Contractor shall construct or install temporary and permanent erosion and sedimentation control features as indicated on the drawings. Berms, dikes, drains, sedimentation basins, grassing, and mulching shall be maintained until permanent drainage and erosion control facilities are completed and operative.

4. Sediment basins. Sediment from construction areas maybe trapped in temporary or permanent sediment basins in accordance with the drawings. The basins shall accommodate the runoff of a local 5 year storm (6.1" in 24 hours). After each storm, the basins shall be pumped dry and accumulated sediment shall be removed to maintain basin effectiveness. Overflow shall be controlled by paved weirs or by vertical overflow pipes. The collected topsoil sediment shall be reused for fill on the construction site, and/or stockpiled for use at another site. The Contractor shall institute effluent quality monitoring programs as requested by State and local environmental agencies.

5. De-watering of site and control of water quality. All water discharged from any excavation will be deposited at approved locations only. The Contractor will monitor water quality and not dispose of any material illegally. De-watering methods will be included in the Contractor's SWPPP.

F. CONTRACTOR FACILITIES AND WORK AREAS

1. The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated on the drawings or as directed by the Owner. Temporary movement or relocation of Contractor facilities shall be made only when approved. Borrow areas shall be managed to minimize erosion and to prevent sediment from entering nearby waters. Spoil areas shall be managed and controlled to limit spoil intrusion into areas designated on the drawings and to prevent erosion of soil or sediment from entering nearby waters. Spoil areas shall be developed in accordance with the grading plan indicated on the drawings. Temporary excavation and embankments for plan and/or work areas shall be controlled to protect adjacent areas from despoilment.

1.03 WATER RESOURCES

A. GENERAL

1. The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters. Toxic or hazardous chemicals shall not be applied to soil or vegetation when such application may cause contamination of the fresh water reserve. Monitoring of water areas affected by construction shall be the Contractor's responsibility. All water areas affected by construction activities shall be monitored by the Contractor.

B. WASHING AND CURING WATER

1. Waste waters directly derived from construction activities shall not be allowed to enter stormwater or wastewater facilities.

C. FISH AND WILDLIFE

1. The Contractor shall minimize interference with, disturbance to, and damage of fish and wildlife.

1.04 AIR RESOURCES

A. Equipment operation and activities or processes performed by the Contractor in accomplishing the specified construction shall be in accordance with the State of Texas rules and all Federal emission and performance laws and standards. Ambient Air Quality Standards set by the Environmental Protection Agency shall be maintained. Monitoring of air quality, if required, shall be the Contractor's responsibility. All air areas affected by the construction activities shall be monitored by the Contractor. Monitoring results will be periodically reviewed by the Owner to ensure compliance.

B. PARTICULATES

1. particles, aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants; shall be controlled at all times, including weekends, holidays and hours when work is not in progress. The Contractor shall maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, light bituminous treatment baghouse, scrubbers, electrostatic precipitators or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. The Contractor mush have sufficient, competent equipment available to accomplish these tasks. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs.

C. HYDROCARBONS AND CARBON MONOXIDE

1. Hydrocarbons and carbon monoxide emissions from equipment shall be controlled to Federal and State allowable limits at all times.

D. ODORS

1. Odors shall be controlled at all times for all construction activities, processing and preparation of materials.

E. SOUND INTRUSIONS

1. The Contractor shall keep construction activities under surveillance and control to minimize environment damage by noise. The Contractor shall comply with the provisions of the City ordinances.

1.05 WASTE DISPOSAL

A. Disposal of wastes shall comply with all applicable City requirements and as specified below.

B. SOLID WASTES

1. wastes (excluding clearing debris) shall be placed in containers and emptied on a regular schedule. Handling and disposal shall be conducted to prevent contamination. Segregation measures shall be employed so that no hazardous or toxic waste will become co-mingled with solid waste. The Contractor shall transport solid waste and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. Contractor shall dispose of classified non-hazardous solid waste at disposal area. The Contractor shall comply with Federal, State, and local laws and regulations pertaining to the use of landfill areas.

C. HAZARDOUS WASTES

1. The Contractor shall take sufficient measures to prevent spillage of hazardous materials during dispensing and collect waste in suitable containers observing compatibility. Toxic materials shall not be used within the construction site.

   The Contractor shall immediately transport hazardous waste and dispose of it in compliance with Federal and local laws and regulations. Storage of hazardous waste on the construction site is prohibited. Spills of hazardous materials shall be immediately reported to the Owner. Cleanup and cleanup costs due to spills shall be the Contractor's responsibility.

D. BURNING

1. Burning will not be allowed.

1.06 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

A. Existing historical, archaeological, and cultural resources within the Contractor's work area will be so designated by the Owner, if any has been identified. The Contractor shall take precautions to preserve all such resources as they existed at the time they were first pointed out. The Contractor shall provide and install protection for these resources and be responsible for their preservation during the life of the contract. If during excavation or other construction activities any previously unidentified or unanticipated resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone charcoal, or other deposits; rocks or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, the Contractor shall immediately notify the Owner. While waiting for instructions the Contractor shall record, report, and preserve the finds in accordance with the requirements of the Texas State Historical Preservation Office.

1.07 POST CONSTRUCTION CLEANUP

A. The Contractor shall clean up all areas used for construction.

1.08 RESTORATION OF LANDSCAPE DAMAGE

A. The Contractor shall restore landscape features damaged or destroyed during construction operations outside the limits of the approved work areas at no costs to the OWNER.

1.09 MAINTENANCE OF ANTI-POLLUTION FACILITIES

A. The Contractor shall maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

1.10 TRAINING OF CONTRACTOR PERSONNEL

A. The Contractor's personnel shall be trained in all phases of environmental protection. The training shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, and installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental pollution control.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01422
REFERENCE STANDARDS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Section includes general quality assurance as related to Reference Standards and a list of references.

1.02 QUALITY ASSURANCE

A. For Products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on the date of the Contract.

C. Request clarification from Engineer before proceeding should specified reference standards conflict with Contract Documents.

1.03 SCHEDULE OF REFERENCES

AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W. Washington, DC 20001
ACI	American Concrete Institute P.O. Box 9094 Farmington Hills, MI 48333-9094
AGC	Associated General Contractors of America 1957 E Street, N.W. Washington, DC 20006
AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740
AITC	American Institute of Timber Construction 333 W. Hampden Avenue Englewood, CO 80110
AISC	American Institute of Steel Construction 400 North Michigan Avenue Eighth Floor Chicago, IL 60611
AISI	American Iron and Steel Institute

	1000 16th Street, N.W. Washington, DC 20036
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018
APA	American Plywood Association Box 11700 Tacoma, WA 98411
API	American Petroleum Institute 1220 L Street, N.W. Washington, DC 20005
AREA	American Railway Engineering Association 50 F Street, N.W. Washington, DC 20001
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWPA	American Wood-Preservers' Association 7735 Old Georgetown Road Bethesda, MD 20014
AWS	American Welding Society P.O. Box 35104 Miami, FL 33135
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
CFR	Code of Federal Regulations
CLFMI	Chain Link Fence Manufacturers Institute 1101 Connecticut Avenue, N.W. Washington, DC 20036
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60173-4758
DIPRA	Ductile Iron Pipe Research Association
EJMA	Expansion Joint Manufacturers Association 707 Westchester Avenue White Plains, NY 10604

FS	Federal Standardization Documents General Services Administration Specifications Unit (WFSIS) 7th and D Streets, S.W. Washington, DC 20406
ICEA	Insulated Cable Engineer Association P.O. Box 440 S. Yarmouth, MA 02664
IEEE	Institute of Electrical and Electronics Engineers 445 Hoes Lane P.O. Box 1331 Piscataway, NJ 0855-1331
ISA	International Society of Arboriculture 303 West University P.O. Box GG Savoy, IL 61874
MIL	Military Specifications General Services Administration Specifications Unit (WFSIS) 7th and D Streets, S.W. Washington, DC 20406
NACE	National Association of Corrosion Engineers 1440 South Creek Drive Houston, TX 71084
NEMA	National Electrical Manufacturers' Association 2101 L Street, N.W., Suite 300 Washington, DC 20037
NFPA	National Fire Protection Association Batterymarch Park P.O. Box 9101 Quincy, MA 02269-9101
NRMCA	National Ready Mix Concrete Association
NSF	National Sanitary Foundation
OSHA	Occupational Safety Health Administration U.S. Department of Labor Government Printing Office Washington, DC 20402
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077-1083
PCI	Prestressed Concrete Institute 201 North Wacker Drive Chicago, IL 60606

SDI	Steel Deck Institute Box 9506 Canton, OH 44711
SSPC	Steel Structures Painting Council 4400 Fifth Avenue Pittsburgh, PA 15213
TAC	Texas Administrative Code
TxDOT	Texas Department of Transportation 11th and Brazos Austin, TX 78701 2483
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062
UNI-BELL	UNI-BELL Pipe Association 2655 Villa Creek Drive, Suite 155 Dallas, TX 75234

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01450
CONTRACTOR'S QUALITY CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Quality assurance and control of installation and manufacturer's field services and reports.

1.02 MEASUREMENT AND PAYMENT

A. No payment will made for this item. Include the cost of Contractor's quality control in overhead cost for this project.

1.03 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' installation instructions, including each step in sequence.

C. Request clarification from Engineer before proceeding should manufacturers' instructions conflict with Contract Documents.

D. Comply with specified standards as minimum requirements for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform work by persons qualified to produce the specified level of workmanship.

1.04 REFERENCES

A. Obtain copies of standards and maintain at job site when required by individual Specification sections.

1.05 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual Specification sections, provide material or product suppliers' or manufacturers' technical representative to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, operator training, test, adjust, and balance of equipment as applicable, and to initiate operation, as required. Conform to minimum time requirements for start-up operations and operator training if defined in Specification sections.

B. Manufacturer's representative shall report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions. Submit report within 14 days of observation to Resident Project Representative for review.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01576
WASTE MATERIAL DISPOSAL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Disposal of waste material and salvageable material.

1.02 UNIT PRICES

A. No separate payment will be made for waste material disposal under this Section. Include payment in unit price for related sections.

1.03 SUBMITTALS

A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.

B. Obtain and submit disposal permits for proposed disposal sites if required by federal, state and local ordinances.

C. Submit a copy of written permission from property owner, along with description of property, prior to disposal of excess material.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 SALVAGEABLE MATERIAL

A. Excavated Material: When indicated on Drawings, load, haul, and deposit excavated material at a location or locations shown on Drawings outside the limits of Project.

B. Other Salvageable Materials: Conform to requirements of individual Specification Sections.

3.02 EXCESS MATERIAL

A. Vegetation, rubble, broken concrete, debris, asphaltic concrete pavement, excess soil, and other materials not designated for salvage, shall become the property of Contractor and shall be removed from the job site and legally disposed of.

B. Waste materials shall be removed from the site on a daily basis, such that the site is maintained in a neat and orderly condition.

END OF SECTION

SECTION 01610
BASIC PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements for transportation, delivery, handling, and storage of materials and equipment.

1.02 PRODUCTS

A. Products: Means material, equipment, or systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components designated for reuse.

B. Do not reuse materials and equipment, designated to be removed, except as specified by the Contract Documents.

C. Provide equipment and components from the fewest number of manufacturers as is practical,

D. in order to simplify spare parts inventory and to allow for maximum interchangeability of components. For multiple components of the same size, type or application, use the same make and model of component throughout the project.

1.03 TRANSPORTATION

A. Make arrangements for transportation, delivery, and handling of equipment and materials required for timely completion of the Work.

B. Transport and handle products in accordance with instructions.

C. Consign and address shipping documents to the proper party giving name of Project and street address. Shipments shall be delivered to the Contractor.

1.04 DELIVERY

A. Arrange deliveries of products to accommodate the short term site completion schedules and in ample time to facilitate inspection prior to installation. Avoid deliveries that cause unnecessarily lengthy use of limited storage space.

B. Coordinate deliveries to avoid conflict with Work and conditions at the site and to accommodate the following:

1. Work of other contractors or the Owner.

2. Limitations of storage space.

3. Availability of equipment and personnel for handling products.

4. Owner's use of premises.

C. Have products delivered to the site in manufacturer's original, unopened, labeled containers.

D. Immediately upon delivery, inspect shipment to assure:

1. Product complies with requirements of Contract Documents.

2. Quantities are correct.

3. Containers and packages are intact; labels are legible.

4. Products are properly protected and undamaged.

1.05 PRODUCT HANDLING

A. Coordinate the off-loading of materials and equipment delivered to the job site. If necessary to move stored materials and equipment during construction, Contractor shall relocate materials and equipment at no additional cost to the Owner.

B. Provide equipment and personnel necessary to handle products, including those provided by the Owner, by methods to prevent damage to products or packaging.

C. Provide additional protection during handling as necessary to prevent breaking, scraping, marring, or otherwise damaging products or surrounding areas.

D. Handle products by methods to prevent over bending or overstressing.

E. Lift heavy components only at designated lifting points.

F. Handle materials and equipment in accordance with Manufacturer's recommendations.

G. Do not drop, roll, or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

1.06 STORAGE OF MATERIAL

A. Store and protect materials in accordance with manufacturer's recommendations and requirements of these Specifications.

B. Make necessary provisions for safe storage of materials and equipment. Place loose soil materials, and materials to be incorporated into the Work to prevent damage to any part of the Work or existing facilities and to maintain free access at all times to all parts of the Work and to utility service company installations in the vicinity of the Work. Keep materials and equipment neatly and compactly stored in locations that will cause a minimum of inconvenience to other contractors, public travel, adjoining owners, tenants, and occupants. Arrange storage in a manner to provide easy access for inspection.

C. Restrict storage to areas available on the construction site for storage of material and equipment as shown on Drawings or approved by the Resident Project Representative.

D. Provide off-site storage and protection when on-site storage is not adequate.

E. Do not use lawns, grass plots, or other private property for storage purposes without written permission of the owner and other person in possession or control of such premises.

F. Protect stored materials and equipment against loss or damage.

G. Store in manufacturers' unopened containers.

H. Materials delivered and stored along the line of the Work shall be neatly, safely, and compactly stacked along the work site in such manner as to cause the least inconvenience and damage to property owners and the general public, and shall be not closer than 3 feet to any fire hydrant. Public and private drives and street crossings shall be kept open.

I. Damage to lawns, sidewalks, streets or other improvements shall be repaired or replaced to the satisfaction of the Resident Project Representative. The total length which materials may be distributed along the route of construction at any one time is 1000 lineal feet, unless otherwise approved in writing by the Resident Project Representative.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

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SECTION 01740
WARRANTIES

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This section specifies general administrative and procedural requirements for warranties required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

1.02 SUBMITTAL REQUIREMENTS

A. Submit written warranties to the OWNER prior to the date fixed by the Engineer for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the work, or a designated portion of the work, submit written warranties upon request of the Owner.

B. Assemble warranties, service, and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.

C. Number of original signed copies required: Two (2) each.

D. Table of Contents: Neatly types, in orderly sequence. Provide complete information for each item.

1. Product or work item.
2. Firm, with name of principal, address and telephone number.
3. Scope.
4. Date of beginning of warranty, service, or maintenance contract.
5. Duration of warranty, or service maintenance contract.
6. Provide information for Owner's personnel:
    a. Proper procedure in case of failure.
    b. Instances which might affect the validity of warranty.
7. Contractor, name of responsible principal, address and telephone number.

1.03 FORMS OF SUBMITTALS

A. Prepare in duplicate packets.

B. Format:

1. Size 8-1/2 inches x 11 inches, punch sheets for standard 3-post binder.
    a. Fold larger sheets to fit into binders.
2. Cover: Identify each packet with typed or printed title 'WARRANTIES". List:
    a. Title of Project.
    b. Name of Contractor.

3. Binders: Commercial quality, three-post binder, with durable and cleanable plastic covers and maximum post width of 2 inches.

1.04 WARRANTY SUBMITTAL REQUIREMENTS

A. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the Contractor's for two (2) years, unless otherwise specified, commencing at the time of final acceptance by the Owner.

B. The Contractor shall be responsible for obtaining certificates for equipment warranty for all major equipment specified under Divisions 11, 13, 14, 15 and 16 and which has a 1 HP motor or which lists for more than $1,000. The Engineer reserves the right to request warranties for equipment not classified as major. The Contractor shall still warrant equipment not considered to be "major" in the Contractor's once-year warranty period even though certificates of warranty may not be required.

C. For certain pieces of equipment, the OWNER may require a warranty greater than two (2) years. The requirement for a two-year warranty shall be specified in individual sections of the Specifications.

1.05 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted work that has failed, remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.

B. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected by replacement or rebuilding, 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, or rebuild the work to an acceptable condition complying with requirements of Contract Documents. The Contractor's is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of the work through 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.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. The Owner reserves the right to refuse to accept work for the project where a special warranty, certification, or similar commitment is required on such work or part of the work, until evidence is presented that entities required to countersign such commitments are willing to do so.

G. Disclaimers and Limitations: Manufacturer's disclaimers and limitation on product warranties do not relieve the Contractor of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers and subcontractors required to countersign special warranties with the Contractor.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01770
CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Closeout procedures including final submittals such as operation and maintenance data, warranties, and spare parts and maintenance materials.

1.2 CLOSEOUT PROCEDURES

A. Comply with the Contract Documents regarding Final Completion and Final Payment when Work is complete and ready for Engineer's final inspection.

B. Provide Project Record Documents in accordance with Section 01785.

C. Complete or correct items on punch list, with no new items added. Any new items will be addressed during warranty period.

D. The Owner will occupy portions of the Work as specified in other Sections.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final inspection.

B. For facilities, clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Clean equipment and fixtures to a sanitary condition.

D. Clean or replace filters of operating equipment.

E. Clean debris from roofs, gutters, downspouts, and drainage systems.

F. Clean site; sweep paved areas, rake clean landscaped surfaces.

G. Remove waste and surplus materials, rubbish, and temporary construction facilities from the site following the final test of utilities and completion of the work.

1.4 ADJUSTING

A. Adjust operating equipment to ensure smooth and unhindered operation.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit operations and maintenance data as noted in 01330 - Submittal Procedures.

1.6 WARRANTIES

A. Provide one original of each warranty from Subcontractors, suppliers, and manufacturers.

B. Provide Table of Contents and assemble warranties in 3-ring/D binder with durable plastic cover.

C. Submit warranties prior to final Application for Payment.

D. Warranties shall commence in accordance with the requirements in the Contract Documents.

1.7 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual Specification sections.

B. Deliver to location within the Owner's jurisdiction as directed by Resident Project Representative; obtain receipt prior to final Application for Payment.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01785
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Maintenance and Submittal of Project Record Documents and samples.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Maintain one record copy of documents at the site in accordance with the Contract Documents.

B. Store Record Documents and samples in field office if a field office is required by Contract Documents, or in a secure location. Provide files, racks, and secure storage for Record Documents and samples.

C. Label each document "PROJECT RECORD" in neat, large, printed letters.

D. Maintain Record Documents in a clean, dry, and legible condition. Do not use Record Documents for construction purposes.

E. Keep Record Documents and Samples available for inspection by Resident Project Representative.

1.03 RECORDING

A. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.

B. Contract Drawings and Shop Drawings: Legibly mark each item to record all actual construction, or "as built" conditions, including:

1. Measured depths of elements of foundation in relation to finish first floor datum.

2. Measured horizontal locations and elevations of underground utilities and appurtenances, referenced to permanent surface improvements.

3. Elevations of underground utilities referenced to bench mark utilized for project.

4. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction.

5. Field changes of dimension and detail.

6. Changes made by modifications.

7. Details not on original contract drawings.

8. References to related shop drawings and modifications.

C. Record information with a red felt-tip marking pen on a set of blue or black line opaque drawings, provided by Engineer.

1.04 SUBMITTALS

A. At contract closeout, deliver Project Record Documents to Engineer.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 23 02 00 - BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all Work herein.

B. The Contract Drawings indicate the extent and general arrangement of the systems. If any departure from the Contract Drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore, shall be submitted to the Architect for approval as soon as practicable. No such departures shall be made without the prior written approval of the Architect.

C. Notwithstanding any reference in the Specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, such reference shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgment of the Architect, expressed in writing, is equal to that specified.

1.02 SCOPE OF WORK

A. The Work included under this Contract consists of the furnishing and installation of all equipment and material necessary and required to form the complete and functioning systems in all of its various phases, all as shown on the accompanying Drawings and/or described in these Specifications. The contractor shall review all pertinent drawings, including those of other contracts prior to commencement of Work.

B. This Division requires the furnishing and installing of all items Specified herein, indicated on the Drawings or reasonably inferred as necessary for safe and proper operation; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include, but are not limited to, materials, labor, supervision, transportation, storage, equipment, utilities, all required permits, licenses and inspections. All work performed under this Section shall be in accordance with the Project Manual, Drawings and Specifications and is subject to the terms and conditions of the Contract.

C. The approximate locations of Mechanical (HVAC) items are indicated on the Drawings. These Drawings are not intended to give complete and accurate details in regard to location of outlets, apparatus, etc. Exact locations are to be determined by actual measurements at the building, and will in all cases be subject to the Review of the Owner or Engineer, who reserves the right to make any reasonable changes in the locations indicated without additional cost to the Owner.

D. Items specifically mentioned in the Specifications but not shown on the Drawings and/or items shown on Drawings but not specifically mentioned in the Specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.

E. All discrepancies between the Contract Documents and actual job-site conditions shall be reported to the Owner or Engineer so that they will be resolved prior to the bidding, where

this cannot be done at least 7 working days prior to bid; the greater or more costly of the discrepancy shall be bid. All labor and materials required to perform the work described shall be included as part of this Contract.

F. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and fully operating system in cooperation with other trades.

G. It is the intent of the above "Scope" to give the Contractor a general outline of the extent of the Work involved; however, it is not intended to include each and every item required for the Work. Anything omitted from the "Scope" but shown on the Drawings, or specified later, or necessary for a complete and functioning heating, ventilating and air conditioning system shall be considered a part of the overall "Scope".

H. The Contractor shall rough-in fixtures and equipment furnished by others from rough-in and placement drawings furnished by others. The Contractor shall make final connection to fixtures and equipment furnished by others.

1.03 SCHEMATIC NATURE OF CONTRACT DOCUMENTS

A. The contract documents are schematic in nature in that they are only to establish scope and a minimum level of quality. They are not to be used as actual working construction drawings. The actual working construction drawings shall be the approved shop drawings.

B. All duct or pipe or equipment locations as indicated on the documents do not indicate every transition, offset, or exact location. All transitions, offsets clearances and exact locations shall be established by actual field measurements, coordination with the structural, architectural and reflected ceiling plans, and other trades. Submit shop drawings for approval.

C. All transitions, offsets and relocations as required by actual field conditions shall be performed by the contractor at no additional cost to the owner.

D. Additional coordination with electrical contractor may be required to allow adequate clearances of electrical equipment, fixtures and associated appurtenances. Contractor to notify Architect and Engineer of unresolved clearances, conflicts or equipment locations.

1.04 SITE VISIT AND FAMILIARIZATION

A. Before submitting a bid, it will be necessary for each Contractor whose work is involved to visit the site and ascertain for himself the conditions to be met therein in installing his work and make due provision for same in his bid. It will be assumed that this Contractor in submitting his bid has visited the premises and that his bid covers all work necessary to properly install the equipment shown. Failure on the part of the Contractor to comply with this requirement shall not be considered justification for the omission or faulty installation of any work covered by these Specifications and Drawings.

B. Understand the existing utilities from which services will be supplied; verify locations of utility services, and determine requirements for connections.

C. Determine in advance that equipment and materials proposed for installation fit into the confines indicated.

1.05 WORK SPECIFIED IN OTHER SECTIONS

A. Finish painting is specified. Prime and protective painting are included in the work of this Division.

B. Owner and General Contractor furnished equipment shall be properly connected to Mechanical (HVAC) systems.

C. Furnishing and installing all required Mechanical (HVAC) equipment control relays and electrical interlock devices, conduit, wire and J-boxes are included in the Work of this Division.

1.06 PERMITS, TESTS, INSPECTIONS

A. Arrange and pay for all permits, fees, tests, and all inspections as required by governmental authorities.

1.07 DATE OF FINAL ACCEPTANCE

A. The date of final acceptance shall be the date of owner occupancy, or the date all punch list items have been completed or final payment has been received. Refer to Division One for additional requirements.

B. The date of final acceptance shall be documented in writing and signed by the architect, owner and contractor.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

B. Deliver products to the project at such time as the project is ready to receive the equipment, pipe or duct properly protected from incidental damage and weather damage.

C. Damaged equipment, duct or pipe shall be promptly removed from the site and new, undamaged equipment, pipe and duct shall be installed in its place promptly with no additional charge to the Owner.

1.09 NOISE AND VIBRATION

A. The heating, ventilating and air conditioning systems, and the component parts there of, shall be guaranteed to operate without objectionable noise and vibration.

B. Provide foundations, supports and isolators as specified or indicated, properly adjusted to prevent transmission of vibration to the Building structure, piping and other items.

C. Carefully fabricate ductwork and fittings with smooth interior finish to prevent turbulence and generation or regeneration of noise.

D. All equipment shall be selected to operate with minimum of noise and vibration. If, in the opinion of the Architect, objectionable noise or vibration is produced or transmitted to or through the building structure by equipment, piping, ducts or other parts of the Work, the Contractor shall rectify such conditions without extra cost to the Owner.

1.10 APPLICABLE CODES

A. Obtain all required permits and inspections for all work required by the Contract Documents and pay all required fees in connection thereof.

B. Arrange with the serving utility companies for the connection of all required utilities and pay all charges, meter charges, connection fees and inspection fees, if required.

C. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations and the applicable requirements which includes and is not limited to the following nationally accepted codes and standards:

1. Air Moving & Conditioning Association, AMCA.
2. American Standards Association, ASA.
3. American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., ASHRAE.
4. American Society of Mechanical Engineers, ASME.
5. American Society of Plumbing Engineers, ASPE.
6. American Society of Testing Materials, ASTM.
7. American Water Works Association, AWWA.
8. National Bureau of Standards, NBS.
9. National Fire Protection Association, NFPA.
10. Sheet Metal & Air Conditioning Contractors' National Association, SMACNA.
11. Underwriters' Laboratories, Inc., UL.
12. International Energy Conservation Code, IECC.
13. International Fire Code.
14. International Gas Code.

D. Where differences existing between the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the listed nationally accepted codes and standards, the more stringent or costly application shall govern. Promptly notify the Engineer in writing of all differences.

E. When directed in writing by the Engineer, remove all work installed that does not comply with the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the above listed nationally accepted codes and standards, correct the deficiencies, and complete the work at no additional cost to the Owner.

1.11 DEFINITIONS AND SYMBOLS

A. General Explanation: A substantial amount of construction and Specification language constitutes definitions for terms found in other Contract Documents, including Drawings which must be recognized as diagrammatic and schematic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article, unless defined otherwise in Division 1.

B. Definitions and explanations of this Section are not necessarily either complete or exclusive, but are general for work to the extent not stated more explicitly in another provision of the Contract Documents.

C. Indicated: The term "Indicated" is a cross-reference to details, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in Contract Documents. Where such terms as "Shown", "Noted", "Scheduled", "Specified" and "Detailed" are used in lieu of "Indicated", it is for the

purpose of helping the reader locate cross-reference material, and no limitation of location is intended except as specifically shown.

D. Directed: Where not otherwise explained, terms such as "Directed", "Requested", "Accepted", and "Permitted" mean by the Architect or Engineer. However, no such implied meaning will be interpreted to extend the Architect's or Engineer's responsibility into the Contractor's area of construction supervision.

E. Reviewed: Where used in conjunction with the Engineer's response to submittals, requests for information, applications, inquiries, reports and claims by the Contractor the meaning of the term "Reviewed" will be held to limitations of Architect's and Engineer's responsibilities and duties as specified in the General and Supplemental Conditions. In no case will "Reviewed" by Engineer be interpreted as a release of the Contractor from responsibility to fulfill the terms and requirements of the Contract Documents.

F. Furnish: Except as otherwise defined in greater detail, the term "Furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

G. Install: Except as otherwise defined in greater detail, the term "Install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance.

H. Provide: Except as otherwise defined in greater detail, the term "Provide" is used to mean "Furnish and Install", complete and ready for intended use, as applicable in each instance.

I. Installer: Entity (person or firm) engaged by the Contractor or its subcontractor or Sub-contractor for performance of a particular unit of work at the project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.

J. Imperative Language: Used generally in Specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or when so noted by other identified installers or entities.

K. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended as minimum quality level or quantity of work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable tolerance limits. In complying with requirements, indicated or scheduled numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to Owner or Engineer via a request for information (RFI) for decision before proceeding.

L. Abbreviations and Symbols: The language of Specifications and other Contract Documents including Drawings is of an abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self explanatory nature have been included in text of Specifications and Drawings. Specific abbreviations and symbols have been established, principally for lengthy

technical terminology and primarily in conjunction with coordination of Specification requirements with notations on Drawings and in Schedules. These are frequently defined in Section at first instance of use or on a Legend and Symbol Drawing. Trade and industry association names and titles of generally recognized industry standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicate. Except as otherwise indicated, graphic symbols and abbreviations used on Drawings and in Specifications are those recognized in construction industry for indicated purposes. Where not otherwise noted symbols and abbreviations are defined by 1993 ASHRAE Fundamentals Handbook, chapter 34 "Abbreviations and Symbols", ASME and ASPE published standards.

1.12 DRAWINGS AND SPECIFICATIONS

A. These Specifications are intended to supplement the Drawings and it will not be the province of the Specifications to mention any part of the work which the Drawings are competent to fully explain in every particular and such omission is not to relieve the Contractor from carrying out portions indicated on the Drawings only.

B. Should items be required by these Specifications and not indicated on the Drawings, they are to be supplied even if of such nature that they could have been indicated thereon. In case of disagreement between Drawings and Specifications, or within either Drawings or Specifications, the better quality or greater quantity of work shall be estimated and the matter referred to the Architect or Engineer for review with a request for information and clarification at least 7 working days prior to bid opening date for issuance of an addendum.

C. The listing of product manufacturers, materials and methods in the various sections of the Specifications, and indicated on the Drawings, is intended to establish a standard of quality only. It is not the intention of the Owner or Engineer to discriminate against any product, material or method that is equal to the standards as indicated and/or specified, nor is it intended to preclude open, competitive bidding. The fact that a specific manufacturer is listed as an acceptable manufacturer should not be interpreted to mean that the manufacturers' standard product will meet the requirements of the project design, Drawings, Specifications and space constraints.

D. The Architect or Engineer and Owner shall be the sole judge of quality and equivalence of equipment, materials and methods.

E. Products by other reliable manufacturers, other materials, and other methods, will be accepted as outlined, provided they have equal capacity, construction, and performance. However, under no circumstances shall any substitution by made without the written permission of the Architect or Engineer and Owner. Request for prior approval must be made in writing 10 days prior to the bid date without fail.

F. Wherever a definite product, material or method is specified and there is not a statement that another product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method is the only one that shall be used without prior approval.

G. Wherever a definite material or manufacturer's product is specified and the Specification states that products of similar design and equal construction from the specified list of manufacturers may be substituted, it is the intention of the Owner or Engineer that products of manufacturers that are specified are the only products that will be acceptable

and that products of other manufacturers will not be considered for substitution without approval.

H. Wherever a definite product, material or method is specified and there is a statement that "OR EQUAL" product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method or an "OR EQUAL" product, material or method may be used if it complies with the specifications and is submitted for review to the Engineer as outline herein.

I. Where permission to use substituted or alternative equipment on the project is granted by the Owner or Engineer in writing, it shall be the responsibility of the Contractor or Subcontractor involved to verify that the equipment will fit in the space available which includes allowances for all required Code and maintenance clearances, and to coordinate all equipment structural support, plumbing and electrical requirements and provisions with the Mechanical (HVAC) Design Documents and all other trades, including Division 26.

J. Changes in architectural, structural, electrical, mechanical, and plumbing requirements for the substitution shall be the responsibility of the bidder wishing to make the substitution. This shall include the cost of redesign by the affected designer(s). Any additional cost incurred by affected subcontractors shall be the responsibility of this bidder and not the owner.

K. If any request for a substitution of product, material or method is rejected, the Contractor will automatically be required to furnish the product, material or method named in the Specifications. Repetitive requests for substitutions will not be considered.

L. The Owner or Engineer will investigate all requests for substitutions when submitted in accordance with above and if accepted, will issue a letter allowing the substitutions.

M. Where equipment other than that used in the design as specified or shown on the Drawings is substituted (either from an approved manufacturers list or by submittal review), it shall be the responsibility of the substituting Contractor to coordinate space requirements, building provisions and connection requirements with his trades and all other trades and pay all additional costs to other trades, the Owner, the Architect or Engineer, if any, due to the substitutions.

1.13 SUBMITTALS

A. Coordinate with Division 1 for submittal timetable requirements, unless noted otherwise within thirty (30) days after the Contract is awarded the Contractor shall submit a minimum of eight (8) complete bound sets of shop drawings and complete data covering each item of equipment or material. The first submittal of each item requiring a submittal must be received by the Architect or Engineer within the above thirty day period. The Architect or Engineer shall not be responsible for any delays or costs incurred due to excessive shop drawing review time for submittals received after the thirty (30) day time limit. The Architect and Engineer will retain one (1) copy each of all shop drawings for their files. Where full size drawings are involved, submit one (1) print and one (1) reproducible sepia or mylar in lieu of eight (8) sets. All literature pertaining to an item subject to Shop Drawing submittal shall be submitted at one time. A submittal shall not contain information from more than one Specification section, but may have a section subdivided into items or equipment as listed in each section. The Contractor may elect to submit each item or type of equipment separately. Each submittal shall include the following items enclosed in a suitable binder:

1. A cover sheet with the names and addresses of the Project, Architect, MEP Engineer, General Contractor and the Subcontractor making the submittal. The cover sheet shall also contain the section number covering the item or items submitted and the item nomenclature or description.
2. An index page with a listing of all data included in the Submittal.
3. A list of variations page with a listing all variations, including unfurnished or additional required accessories, items or other features, between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "NO VARIATIONS". Where variations affect the work of other Contractors, then the Contractor shall certify on this page that these variations have been fully coordinated with the affected Contractors and that all expenses associated with the variations will be paid by the submitting Contractor. This page will be signed by the submitting Contractor.
4. Equipment information including manufacturer's name and designation, size, performance and capacity data as applicable. All applicable Listings, Labels, Approvals and Standards shall be clearly indicated.
5. Dimensional data and scaled drawings as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances clearly indicated and labeled at a minimum scale of 1/4" = 1'-0", as required to demonstrate that the alternate or substituted product will fit in the space available.
6. Identification of each item of material or equipment matching that indicated on the Drawings.
7. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements or accessories shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method.
8. Additional information as required in other Sections of this Division.
9. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Drawings and Specifications, signed and dated in long hand. Submittals that do not comply with the above requirements shall be returned to the Contractor and shall be marked "REVISE AND RESUBMIT".

B. Refer to Division 1 for additional information on shop drawings and submittals.

C. Equipment and materials submittals and shop drawings will be reviewed for compliance with design concept only. It will be assumed that the submitting Contractor has verified that all items submitted can be installed in the space allotted. Review of shop drawings and submittals shall not be considered as a verification or guarantee of measurements or building conditions.

D. Where shop drawings and submittals are marked "REVIEWED", the review of the submittal does not indicate that submittals have been checked in detail nor does it in any way relieve the Contractor from his responsibility to furnish material and perform work as required by the Contract Documents.

E. Shop drawings shall be reviewed and returned to the Contractor with one of the following categories indicated:

1. REVIEWED: Contractor need take no further submittal action, shall include this submittal in the O&M manual and may order the equipment submitted on.
2. REVIEWED AS NOTED: Contractor shall submit a letter verifying that required exceptions to the submittal have been received and complied with including additional accessories or coordination action as noted, and shall include this

submittal and compliance letter in the O&M manual. The contractor may order the equipment submitted on at the time of the returned submittal providing the Contractor complies with the exceptions noted.

3. NOT APPROVED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is not approved, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or drawings. Contractor shall not order equipment that is not approved. Repetitive requests for substitutions will not be considered.
4. REVISE AND RESUBMIT: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked revise and resubmit, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or provide as noted on previous shop drawings. Contractor shall not order equipment marked revise and resubmit. Repetitive requests for substitutions will not be considered.
5. CONTRACTOR'S CERTIFICATION REQUIRED: Contractor shall resubmit submittal on material, equipment or method of installation. The Contractor's stamp is required stating the submittal meets all conditions of the contract documents. The stamp shall be signed by the General Contractor. The submittal will not be reviewed if the stamp is not placed and signed on all shop drawings.
6. MANUFACTURER NOT AS SPECIFIED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked manufacturer not as specified, the Contractor will automatically be required to furnish the product, material or method named in the specifications. Contractor shall not order equipment where submittal is marked manufacturer not as specified. Repetitive requests for substitutions will not be considered.

F. Materials and equipment which are purchased or installed without shop drawing review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Owner or Engineer for any reason shall be at the expense of the Contractor. The responsible Contractor shall remove the material and equipment noted above and replace with specified equipment or material at his own expense when directed in writing by the Architect or Engineer.

G. Shop Drawing Submittals shall be complete and checked prior to submission to the Engineer for review.

H. Submittals are required for, but not limited to, the following items:

1. Pipe Material and Specialties.
2. Pipe Fabrication Drawings.
3. Basic Materials.
4. Variable Air Volume Boxes.
5. Air Handling Units.
6. Cooling Towers.
7. Chillers.
8. Air Cooled Condensing Units.
9. Water Treatment.
10. Expansion Compensation.
11. Variable Frequency Drives.
12. Noise and Vibration Controls.
13. HVAC Pipe and Duct Insulation.
14. Hydronic Valves.

15. Hydronic Piping and Accessories.
16. Hydronic Pumps.
17. Roof-Top A/C Units.
18. Heating Water Boiler.
19. Portable Pipe Hanger and Equipment Supports.
20. Duct Specialties.
21. Duct Fabrication Drawings.
22. Air Distribution Devices.
23. Fan Coil Units.
24. Filters.
25. Fans.
26. Fire Dampers and Fire Smoke Dampers.
27. Temperature Controls and Control Sequences.
28. Test, Adjust and Balance Reports.
29. Testing, Adjusting and Balancing Contractor Qualifications.
30. Coordination Drawings.

I. Refer to other Division 23 sections for additional shop drawing requirements. Provide samples of actual materials and/or equipment to be used on the Project upon request of the Owner or Engineer.

1.14 COORDINATION DRAWINGS

A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Indicate the proposed locations of pipe, duct, equipment, and other materials. Include the following:
   a. Wall and type locations.
   b. Clearances for installing and maintaining insulation.
   c. Locations of light fixtures and sprinkler heads.
   d. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
   e. Equipment connections and support details.
   f. Exterior wall and foundation penetrations.
   g. Routing of storm and sanitary sewer piping.
   h. Fire-rated wall and floor penetrations.
   i. Sizes and location of required concrete pads and bases.
   j. Valve stem movement.
   k. Structural floor, wall and roof opening sizes and details.
2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
4. Prepare reflected ceiling plans to coordinate and integrate installations, air distribution devices, light fixtures, communication systems components, and other ceiling-mounted items.

B. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited

to: voltage, ampacity, capacity, electrical and piping connections, space requirements, sequence of construction, building requirements and special conditions.

C. By submitting shop drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

1.15 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Special Project Requirements, in addition to the requirements specified in Division 23, indicate the following installed conditions:

1. Duct mains and branches, size and location, for both exterior and interior; locations of dampers, fire dampers, duct access panels, and other control devices; filters, fuel fired heaters, fan coils, condensing units, and roof-top A/C units requiring periodic maintenance or repair.
2. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
3. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
4. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
5. Contract Modifications, actual equipment and materials installed.

B. Engage the services of a Land Surveyor or Professional Engineer registered in the state in which the project is located as specified herein to record the locations and invert elevations of underground installations.

C. The Contractor shall maintain a set of clearly marked black line record "AS-BUILT" prints on the job site on which he shall mark all work details, alterations to meet site conditions and changes made by "Change Order" notices. These shall be kept available for inspection by the Owner, Architect or Engineer at all times.

D. Refer to Division 1 for additional requirements concerning record drawings. If the Contractor does not keep an accurate set of as-built drawings, the pay request may be altered or delayed at the request of the Architect. Mark the drawings with a colored pencil. Delivery of as-built prints and reproducibles is a condition of final acceptance.

E. The record prints shall be updated on a daily basis and shall indicate accurate dimensions for all buried or concealed work, precise locations of all concealed pipe or duct, locations of all concealed valves, controls and devices and any deviations from the work shown on the Construction Documents which are required for coordination. All dimensions shall include at least two dimensions to permanent structure points.

F. Submit three prints of the tracings for approval. Make corrections to tracings as directed and delivered "Auto Positive Tracings" to the architect. "As-Built" drawings shall be furnished in addition to shop drawings.

G. When the option described in paragraph F., above is not exercised then upon completion of the work, the Contractor shall transfer all marks from the submit a set of clear concise

set of reproducible record "AS-BUILT" drawings and shall submit the reproducible drawings with corrections made by a competent draftsman and three (3) sets of black line prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The reproducible record "AS-BUILT" drawings shall have the Engineers Name and Seal removed or blanked out and shall be clearly marked and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS

DATE:

(NAME OF GENERAL CONTRACTOR)

BY:_____
(SIGNATURE)

(NAME OF SUBCONTRACTOR)

BY:_____
(SIGNATURE)

1.16 OPERATING MANUALS

A. Prepare maintenance manuals in accordance with Division 1 and in addition to the requirements specified in Division 1, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

1.17 CERTIFICATIONS AND TEST REPORTS

A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and schedule date for each test. This detailed completion and test schedule shall be submittal at least 90 days before the projected Project completion date.

B. Test result reporting forms shall be submitted for review no later than the date of the detailed schedule submitted.

C. Submit 4 copies of all certifications and test reports to the Architect or Engineer for review adequately in advance of completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.

D. Certifications and test reports to be submitted shall include, but not be limited to those items outlined in Section of Division 23.

1.18 MAINTENANCE MANUALS

A. Coordinate with Division 1 for maintenance manual requirements, unless noted otherwise bind together in “D ring type” binders by National model no. 79-883 or equal, binders shall be large enough to allow ¼” of spare capacity. Three (3) sets of all approved shop drawing submittals, fabrication drawings, bulletins, maintenance instructions, operating instructions and parts exploded views and lists for each and every piece of equipment furnished under this Specification. All sections shall be typed and indexed into sections and labeled for easy reference and shall utilize the individual specification section numbers shown in the Mechanical Specifications as an organization guideline. Bulletins containing information about equipment that is not installed on the project shall be properly marked up or stripped and reassembled. All pertinent information required by the Owner for proper operation and maintenance of equipment supplied by Division 23 shall be clearly and legibly set forth in memoranda that shall, likewise, be bound with bulletins.

B. Prepare maintenance manuals in accordance with Special Project Conditions, in addition to the requirements specified in Division 23, include the following information for equipment items:

1. Identifying names, name tags designations and locations for all equipment.
2. Valve tag lists with valve number, type, color coding, location and function.
3. Reviewed shop drawing submittals with exceptions noted compliance letter.
4. Fabrication drawings.
5. Equipment and device bulletins and data sheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable, i.e., description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and model numbers of replacement parts.
6. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
7. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions, servicing instructions and lubrication charts and schedules.
8. Equipment and motor name plate data.
9. Wiring diagrams.
10. Exploded parts views and parts lists for all equipment and devices.
11. Color coding charts for all painted equipment and conduit.
12. Location and listing of all spare parts and special keys and tools furnished to the Owner.
13. Furnish recommended lubrication schedule for all required lubrication points with listing of type and approximate amount of lubricant required.

C. Refer to Division 1 for additional information on Operating and Maintenance Manuals.

D. Operating and Maintenance Manuals shall be turned over to the Owner or Engineer a minimum of 14 working days prior to the beginning of the operator training period.

1.19 OPERATOR TRAINING

A. The Contractor shall furnish the services of factory trained specialists to instruct the Owner's operating personnel. The Owner's operator training shall include 12 hours of on site training in three 4 hour shifts.

B. Before proceeding with the instruction of Owner Personnel, prepare a typed outline in triplicate, listing the subjects that will be covered in this instruction, and submit the outline for review by the Owner. At the conclusion of the instruction period obtain the signature of each person being instructed on each copy of the reviewed outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.

C. Refer to other Division 23 Sections for additional Operator Training requirements.

1.20 FINAL COMPLETION

A. At the completion of the work, all equipment and systems shall be tested and faulty equipment and material shall be repaired or replaced. Refer to Sections of Division 23 for additional requirements.

B. Clean and adjust all air distribution devices and replace all air filters immediately prior to final acceptance.

C. Touch up and/or refinish all scratched equipment and devices immediately prior to final acceptance.

1.21 CONTRACTOR'S GUARANTEE

A. Use of the HVAC systems to provide temporary service during construction period will not be allowed without permission from the Owner in writing and if granted shall not be cause warranty period to start, except as defined below.

B. Contractor shall guarantee to keep the entire installation in repair and perfect working order for a period of one year after its completion and final acceptance, and shall furnish free of additional cost to the Owner all materials and labor necessary to comply with the above guarantee throughout the year beginning from the date of issue of Substantial Completion, Beneficial Occupancy by the Owner or the Certificate of Final Payment as agreed upon by all parties.

C. This guarantee shall not include cleaning or changing filters except as required by testing, adjusting and balancing.

D. All air conditioning compressors shall have parts and labor guarantees for a period of not less than 5 years beyond the date of final acceptance.

E. Refer to Sections in Division 23 for additional guarantee or warranty requirements.

1.22 TRANSFER OF ELECTRONIC FILES

A. Project documents are not intended or represented to be suitable for reuse by Architect/Owner or others on extensions of this project or on any other project. Any such reuse or modification without written verification or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Architect/Owner’s risk and without liability or legal exposure to Engineer or its consultants from all claims, damages, losses and expense, including attorney’s fees arising out of or resulting thereof.

B. Because data stored in electric media format can deteriorate or be modified inadvertently, or otherwise without authorization of the data’s creator, the party receiving the electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days of

receipt, after which time the receiving party shall be deemed to have accepted the data thus transferred to be acceptable. Any errors detected within the sixty (60) day acceptance period will be corrected by the party delivering the electronic files. Engineer is not responsible for maintaining documents stored in electronic media format after acceptance by the Architect/Owner.

C. When transferring documents in electronic media format, Engineer makes no representations as to the long term compatibility, usability or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by Engineer at the beginning of the Project.

D. Any reuse or modifications will be Contractor's sole risk and without liability or legal exposure to Architect, Engineer or any consultant.

E. The Texas Board of Architectural Examiners (TBAE) has stated that it is in violation of Texas law for persons other than the Architect of record to revise the Architectural drawings without the Architect's written consent.

It is agreed that "MEP" hard copy or computer-generated documents will not be issued to any other party except directly to the Architect/Owner. The contract documents are contractually copyrighted and cannot be used for any other project or purpose except as specifically indicated in AIA B-141 Standard Form of Agreement Between Architect and Owner.

If the client, Architect/Owner, or developer of the project requires electronic media for "record purposes", then an AutoCAD based compact disc ("CD") will be prepared. The "CD" will be submitted with all title block references intact and will be formatted in a "plot" format to permit the end user to only view and plot the drawings. Revisions will not be permitted in this configuration.

F. At the Architect/Owner's request, Engineer will prepare one "CD" of electronic media to assist the contractor in the preparation of submittals. The Engineer will prepare and submit the "CD" to the Architect/Owner for distribution to the contractor. All copies of the "CD" will be reproduced for a cost of reproduction fee of Five Hundred Dollars ($500.00) per "CD".

The "CD" will be prepared and all title blocks, names and dates will be removed. The "CD" will be prepared in a ".dwg" format to permit the end user to revise the drawings.

G. This Five Hundred Dollars ($500.00) per "CD" cost of reproduction will be paid directly from the Contractor to the Engineer. The "CD" will be prepared only after receipt of the Five Hundred Dollars ($500.00). The Five Hundred Dollars ($500.00) per "CD" cost of reproduction is to only recover the cost of the manhours necessary to reproduce the documents. It is not a contractual agreement between the Contractor and Engineer to provide any engineering services, nor any other service.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide materials and equipment manufactured by a domestic United States manufacturer.

B. Access Doors: Provide access doors as required for access to equipment, valves,

controls, cleanouts and other apparatus where concealed. Access doors shall have concealed hinges and screw driver cam locks.

C. All access panels located in wet areas such as restrooms, locker rooms, shower rooms, kitchen and any other wet areas shall be constructed of stainless steel.

D. Access Doors: shall be as follows:

1. Plastic Surfaces: Milcor Style K.
2. Ceramic Tile Surface: Milcor Style M.
3. Drywall Surfaces: Milcor Style DW.
4. Install panels only in locations approved by the Architect.

PART 3 - EXECUTION

3.01 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected via reviewed submittals.

B. Refer to equipment specifications in Divisions 2 through 48 for additional rough-in requirements.

3.02 MECHANICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate mechanical systems, equipment, and materials installation with other building components.
2. Verify all dimensions by field measurements.
3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
7. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
8. Install systems, materials, and equipment to conform with architectural action markings on submittal, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, resolve conflicts and route proposed solution to the Architect for review.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.

10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location and label.
11. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified.
12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
13. Provide roof curbs for all roof mounted equipment. Coordinate with roof construction for pitched roof. Provide roof curb to match roof slope. Refer to architectural drawings and details.
14. The equipment to be furnished under this Specification shall be essentially the standard product of the manufacturer. Where two or more units of the same class of equipment are required, these units shall be products of a single manufacturer; however, the component parts of the system need not be the product of the same manufacturer.
15. The architectural and structural features of the building and the space limitations shall be considered in selection of all equipment. No equipment shall be furnished which will not suit the arrangement and space limitations indicated.
16. Lubrication: Prior to start-up, check and properly lubricate all bearings as recommended by the manufacturer.
17. Where the word "Concealed" is used in these Specifications in connection with insulating, painting, piping, ducts, etc., it shall be understood to mean hidden from sight as in chases, furred spaces or suspended ceilings. "Exposed" shall be understood to mean the opposite of concealed.
18. Identification of Mechanical Equipment:
    a. Mechanical equipment shall be identified by means of nameplates permanently attached to the equipment. Nameplates shall be engraved laminated plastic or etched metal. Shop drawings shall include dimensions and lettering format for approval. Attachments shall be with escutcheon pins, self-tapping screws, or machine screws.
    b. Tags shall be attached to all valves, including control valves, with nonferrous chain. Tags shall be brass and at least 1-1/2 inches in diameter. Nameplate and tag symbols shall correspond to the identification symbols on the temperature control submittal and the "as-built" drawings.

3.03 CUTTING AND PATCHING

A. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

B. Perform cutting, fitting, and patching of mechanical equipment and materials required to:

1. Uncover Work to provide for installation of ill-timed Work.
2. Remove and replace defective Work.
3. Remove and replace Work not conforming to requirements of the Contract Documents.
4. Remove samples of installed Work as specified for testing.
5. Install equipment and materials in existing structures.
6. Upon written instructions from the Engineer, uncover and restore Work to provide for Engineer/Owner's observation of concealed Work, without additional cost to the Owner.
7. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Patch finished surfaces

and building components using new materials specified for the original installation and experienced Installers; refer to the materials and methods required for the surface and building components being patched; Refer to Section "DEFINITIONS" for definition of "Installer."

C. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, mechanical ducts and HVAC units, and other mechanical items made obsolete by the new Work.

D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.04 WORK SEQUENCE, TIMING, COORDINATION WITH OWNER

A. The Owner will cooperate with the Contractor, however, the following provisions must be observed:

1. A meeting will be held at the project site, prior to any construction, between the Owner's Representative, the General Contractor, the Sub-Contractors and the Engineer to discuss Contractor's employee parking space, access, storage of equipment or materials, and use of the Owner's facilities or utilities. The Owner's decisions regarding such matters shall be final.
2. During the construction of this project, normal facility activities will continue in existing buildings until renovated areas are completed. Plumbing, fire protection, lighting, electrical, communications, heating, air conditioning, and ventilation systems will have to be maintained in service within the occupied spaces of the existing building.

3.05 DEMOLITION AND WORK WITHIN EXISTING BUILDINGS

A. In the preparation of these documents every effort has been made to show the approximate locations of, and connections to the existing piping, duct, equipment and other apparatus related to this phase of the work. However, this Contractor shall be responsible for verifying all of the above information. This Contractor shall visit the existing site to inspect the facilities and related areas. This Contractor shall inspect and verify all details and requirements of all the Contract Documents, prior to the submission of a proposal. All discrepancies between the Contract Documents and actual job-site conditions shall be resolved by his contractor, who shall produce drawings that shall be submitted to the Architect/Engineer for review. All labor and materials required to perform the work described shall be apart of this Contract.

B. All equipment and/or systems noted on the Drawings "To Remain" shall be inspected and tested on site to certify its working condition. A written report on the condition of all equipment to remain, including a copy of the test results and recommended remedial actions and costs shall be made by this Contractor to the Architect/Engineer for review.

C. All equipment and/or systems noted on the Drawings "To Be Removed" shall be removed including, associated pipe and duct pipe and duct hangers and/or line supports. Where duct or pipe is to be capped for future or end of line use, it shall be properly tagged with its

function or service appropriately identified. Where existing equipment is to be removed or relocated and has an electric motor or connection, the Electrical Contractor shall disconnect motor or connection, remove wiring to a safe point and this Contractor shall remove or relocate motor or connection along with the equipment.

D. During the construction and remodeling, portions of the Project shall remain in service. Construction equipment, material tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building. None of the construction work shall interfere with the proper operation of the existing facility or be so conducted as to cause harm or danger to persons on the premises. All fire exits, stairs or corridors required for proper access, circulation or exit shall remain clear of equipment, materials or debris. The General Contractor shall maintain barricades, other separations in corridors and other spaces where work is conducted.

E. Certain work during the demolition phase of construction may require overtime or night time shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time at least seventy-two (72) hours in advance in writing.

F. Any salvageable equipment as determined by the Owner, shall be delivered to the Owner, and placed in storage at the location of his choice. All other debris shall be removed from the site immediately.

G. Equipment, piping or other potential hazards to the working occupants of the building shall not be left overnight outside of the designated working or construction area.

H. Make every effort to minimize damage to the existing building and the owner's property. Repair, patch or replace as required any damage that might occur as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction and to keep construction disrupted areas to a minimum. Corporate with the Owner and other trades in scheduling and performance of the work.

I. Include in the contract price all rerouting of existing pipe, duct, etc., and the reconnecting of the existing equipment as necessitated by field conditions to allow the installation of the new systems regardless of whether or not such rerouting, reconnecting or relocating is shown on the drawings. Furnish all temporary pipe, duct, controls, etc., as required to maintain heating, cooling, and ventilation services for the existing areas with a minimum of interruption.

J. All existing pipe, duct, materials, equipment, controls and appurtenances not included in the remodel or alteration areas are to remain in place.

K. Pipe, duct, equipment and controls serving mechanical and owner's equipment, etc., which is to remain but which is served by pipe, duct, equipment and controls that are disturbed by the remodeling work, shall be reconnected in such a manner as to leave this equipment in proper operating condition.

L. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and operating system in cooperation with other trades with a minimum of disruption or downtime.

M. Refer to Architectural "Demolition and/or Alteration" plans for actual location of walls, ceiling, etc., being removed and/or remodeled.

END OF SECTION

SECTION 23 03 00 - MECHANICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Mechanical demolition.

B. The drawings do not show all demolition work required. The contractor shall make himself familiar with the required scope of work to accomplish the work required by these documents. All demolition work implied or required shall be included in the scope of this contract.

C. Outages of services as required by the new installation will be permitted but only at a time approved by the Owner. The contractor shall allow the Owner 2 weeks in order to schedule required outages. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the contract amount.

1.02 RELATED SECTIONS

A. Section 02 40 00 - Demolition and Structure Moving.

1.03 WORK SEQUENCE, TIMING, COORDINATION WITH OWNER

A. The Owner will corporate with the Contractor, however, the following provisions must be observed:

1. During the construction of this project, normal facility activities will continue in existing buildings until new buildings or renovated areas are completed. Plumbing, fire protection, lighting, electrical, communications, heating, air conditioning, and ventilation systems will have to be maintained in service within the occupied spaces of the existing building.
2. A meeting will be held at the project site, prior to any construction, between the Owner's Representative, the General Contractor, the Sub-Contractors and the Engineer to discuss Contractor's employee parking space, access, storage of equipment or materials, and use of the Owner's facilities or utilities. The Owner's decisions regarding such matters shall be final.

1.04 DEMOLITION AND WORK WITHIN EXISTING BUILDINGS

A. In the preparation of these documents every effort has been made to show the approximate locations of, and connections to the existing piping, duct, equipment and other apparatus related to this phase of the work. However, this Contractor shall be responsible for verifying all of the above information. This Contractor shall visit the existing site to inspect the facilities and related areas. This Contractor shall inspect and verify all details and requirements of all the Contract Documents, prior to the submission of a proposal. All discrepancies between the Contract Documents and actual job-site conditions shall be resolved by his contractor, who shall produce drawings which shall be submitted to the Architect/Engineer for review. All labor and materials required to perform the work described shall be apart of this Contract.

B. All equipment and/or systems noted on the Drawings "To Remain" shall be inspected and tested on site to certify its working condition. A written report on the condition of all equipment to remain, including a copy of the test results and recommended remedial actions and costs shall be made by this Contractor to the Architect/Engineer for review.

C. All equipment and/or systems noted on the Drawings "To Be Removed" should be removed including, associated pipe and duct pipe and duct hangers and/or line supports. Where duct or pipe is to be capped for future or end of line use, it shall be properly tagged with its function or service appropriately identified. Where existing equipment is to be removed or relocated and has an electric motor or connection, the Electrical Contractor shall disconnect motor or connection, remove wiring to a safe point and this Contractor shall remove or relocate motor or connection along with the equipment.

D. During the construction and remodeling, portions of the Project shall remain in service. Construction equipment, material tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building. None of the construction work shall interfere with the proper operation of the existing facility or be so conducted as to cause harm or danger to persons on the premises. All fire exits, stairs or corridors required for proper access, circulation or exit shall remain clear of equipment, materials or debris. The General Contractor shall maintain barricades, other separations in corridors and other spaces where work is conducted.

E. Certain work during the demolition and construction phases of construction may require overtime or night time shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Project Administrator at least seventy-two (72) hours in advance in writing.

F. Any salvageable equipment as determined by the Owner, shall be delivered to the Owner, and placed in storage at the location of his choice. All other debris shall be removed from the site immediately.

G. Equipment, piping or other potential hazards to the occupants of the building shall not be left overnight outside of the designated working or construction area.

H. Make every effort to minimize damage to the existing building and the owner's property. Repair, patch or replace as required any damage which might occur as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction and to keep construction disrupted areas to a minimum. Corporate with the Owner and other trades in scheduling and performance of the work.

I. Include in the contract price all rerouting of existing pipe, duct, etc., and the reconnecting of the existing equipment as necessitated by field conditions to allow the installation of the new systems regardless of whether or not such rerouting, reconnecting or relocating is shown on the drawings. Furnish all temporary pipe, duct, controls, etc., as required to maintain heating, cooling, and ventilation services for the existing areas with a minimum of interruption.

J. All existing pipe, duct, materials, equipment, controls and appurtenances not included in the remodel or alteration areas are to remain in place.

K. Pipe, duct, equipment and controls serving mechanical and owner's equipment, etc., which is to remain but which is served by pipe, duct, equipment and controls that are

disturbed by the remodeling work, shall be reconnected in such a manner as to leave this equipment in proper operating condition.

L. No portion of the **fire protection systems** shall be turned off, modified or changed in any way without the express knowledge and written permission of the Owner's representative in order to protect systems that shall remain in service.

M. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and operating system in cooperation with other trades with a minimum of disruption or downtime.

N. Refer to Architectural "Demolition and/or Alteration" plans for actual location of walls, ceiling, etc., being removed and/or remodeled.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Field verify measurements and piping arrangements are as shown on Drawings.

B. Verify that abandoned piping and equipment serve only abandoned facilities.

C. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Owner before disturbing existing installation.

D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. Disconnect mechanical systems in walls, floors, and ceilings scheduled for removal.

B. Coordinate utility service outages with Utility Company.

C. Provide temporary connections to maintain existing systems in service during construction. When work must be performed on energized equipment, use personnel experienced in such operations.

D. Existing Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Notify Owner and local fire service at least 24 hours before partially or completely disabling system.

Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING MECHANICAL WORK

A. Demolish and extend existing mechanical work under provisions of Division 02 and this Section.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned piping to source of supply.

D. Remove exposed abandoned piping systems, including abandoned systems above accessible ceiling finishes. Cut systems flush with walls and floors, and patch surfaces.

E. Repair adjacent construction and finishes damaged during demolition and extension work.

F. Maintain access to existing installations which remain active. Modify installation or provide access panels as appropriate.

G. Extend existing installations using materials and methods compatible with existing installations, or as specified.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

3.05 INSTALLATION

A. Install relocated materials and equipment under the provisions of Division 02.

3.06 REMOVAL OF MATERIALS

A. The contractor shall modify, remove, and/or relocate all materials and items so indicated on the drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Salvage materials shall remain the property of the Owner, and shall be delivered to such destination as directed by the Owner. Materials and/or items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operative condition. The contractor may, at his discretion and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.

B. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The contractor shall clean and repair and provide all new materials, fittings, and appurtenances required to complete the relocations and to restore to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.

C. When items scheduled for relocation are found to be in damaged condition before work has been started on dismantling, the contractor shall call the attention of the Owner to

such items and receive further instructions before removal. Items damaged in repositioning operations are the contractor's responsibility and shall be repaired or replaced by the contractor as approved by the Owner, at no additional cost to the Owner.

D. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points indicated on the drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied-off or disconnected in a safe manner acceptable to the Owner. All disconnections or connections into the existing facilities shall be done in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted without prior specific approval of the Owner as hereinbefore specified.

E. Certain work during the demolition phase of construction may require overtime or nighttime shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner's Representative at least 72 hours in advance.

F. Make every effort to minimize damage to the existing building and the Owner's property. Repair, patch, or replace as required any damage which might occur as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction. Cooperate with the Owner and other trades in scheduling and performance of the work.

G. Include in the contract price all rerouting of existing conduits, wiring, outlet boxes, fixtures, etc., and the reconnecting of existing fixtures as necessitated by field conditions to allow the installation of the new systems. Furnish all temporary conduit, wiring, boxes, etc., as required to maintain lighting and power service for the existing areas with a minimum of interruption. Remove wire and conduit back to nearest accessible active junction box and extend to existing homeruns as required.

H. The contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen, and shall be responsible for repairing such loss or damage. The contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection and in-service maintenance of all electrical services for the new and existing facilities. The contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing all such temporary protection upon completion of the work.

I. Where existing construction is removed to provide working and extension access to existing utilities, contractor shall remove doors, piping, conduit, outlet boxes, wiring, light fixtures, air conditioning ductwork and equipment, etc., to provide this access and shall reinstall same upon completion of work in the areas affected.

J. Where partitions, walls, floors, or ceilings of existing construction are being removed, all contractors shall remove and reinstall in locations approved by the Architect all devices required for the operation of the various systems installed in the existing construction.

END OF SECTION

SECTION 23 05 29 – HANGERS AND SUPPORT FOR PIPING AND EQUIPMENT - HVAC

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Pipe, and equipment hangers, supports and associated anchors.

B. Sleeves and seals.

C. Flashing and sealing equipment and pipe stacks.

1.02 RELATED WORK

A. Section 21 00 00 – Fire Suppression.

B. Section 22 10 00 – Plumbing Piping and Pumps.

C. Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment.

D. Section 23 07 16 – HVAC Equipment Insulation.

E. Section 23 07 19 – HVAC Piping Insulation.

F. Section 23 21 13 – Above Ground Hydronic Piping.

G. Section 23 21 16 – Underground Hydronic Piping.

1.03 REFERENCES

A. ANSI/ASME B31.1 - Power Piping.

B. NFPA 13 - Standard for the Installation of Sprinkler Systems.

C. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems.

1.04 QUALITY ASSURANCE

A. Supports for Sprinkler Piping: In conformance with NFPA 13.

B. Supports for Standpipes: In conformance with NFPA 14.

1.05 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division One.

B. Indicate hanger and support framing and attachment methods.

PART 2 - PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

A. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch Malleable iron, adjustable swivel, split ring.

B. Hangers for Pipe Sizes 2 to 4 Inches Carbon steel, adjustable, clevis.

C. Hangers for Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.

D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for pipe sizes 6 inches and over.

E. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

F. Wall Support for Pipe Sizes 4 Inches and over: adjustable steel yoke and cast iron roll.

G. Vertical Support: Steel riser clamp.

H. Floor Support for Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.

I. Floor Support for Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.

J. Roof Pipe Supports and Hangers: Galvanized Steel Channel System as manufactured by Portable Pipe Hangers, Inc. or approved equal.

For pipes 2-1/2" and smaller – Type PP10 with roller
For pipes 3" through 8" – Type PS
For multiple pipes – Type PSE - Custom

K. Copper Pipe Support and Hangers: Electro-galvanized with thermoplastic elastomer cushions; Unistrut "Cush-A-Clamp" or equal. Hangers: Plastic coated; Unistrut or equal.

L. For installation of protective shields refer to specification section 22 05 29 - 3.03.

M. Shields for Vertical Copper Pipe Risers: Sheet lead.

N. Pipe Rough-In Supports in Walls/Chases: Provide preformed plastic pipe supports, Sioux Chief "Pipe Titan" or equal.

2.02 HANGER RODS

A. Galvanized Hanger Rods: Threaded both ends, threaded one end, or continuous threaded.

2.03 INSERTS

A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.04 FLASHING

A. Metal Flashing: 20 gage galvanized steel.

B. Lead Flashing: 4 lb. /sq. ft. sheet lead for waterproofing; 1 lb. /sq. ft. sheet lead for soundproofing.

C. Caps: Steel, 20 gage minimum; 16 gage at fire resistant elements.

D. Coordinate with roofing contractor/architect for type of flashing on metal roofs.

2.05 EQUIPMENT CURBS

A. Fabricate curbs of hot dipped galvanized steel.

B. For metal roof construction, roof curbs shall be made of aluminum or stainless steel. Coordinate with architectural drawings and details.

2.06 SLEEVES

A. Sleeves for Pipes through Non-fire Rated Floors: Form with 18 gage galvanized steel, tack welded to form a uniform sleeve.

B. Sleeves for Pipes through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe, schedule 40.

C. Sleeves for Pipes through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated steel sleeves including seals, UL listed.

D. Sleeves for Round Ductwork: Form with galvanized steel.

E. Sleeves for Rectangular Ductwork: Form with galvanized steel.

F. Fire Stopping Insulation: Glass fiber type, non-combustible, U.L. listed.

G. Caulk: Paintable 25-year acrylic sealant.

H. Pipe Alignment Guides: Factory fabricated, of cast semi-steel or heavy fabricated steel, consisting of bolted, two-section outer cylinder and base with two-section guiding spider that bolts tightly to pipe. Length of guides shall be as recommended by manufacturer to allow indicated travel.

2.07 FABRICATION

A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

B. Design hangers without disengagement of supported pipe.

C. Design roof supports without roof penetrations, flashing or damage to the roofing material.

2.08 FINISH

A. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

PART 3 - EXECUTION

3.01 INSERTS

A. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. Coordinate with structural engineer for placement of inserts.

B. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

C. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.

D. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab. Verify with structural engineer prior to start of work.

3.02 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as follows:

PIPE SIZE	MAX. HANGER SPACING	HANGER DIAMETER
(Steel Pipe)		
1/2 to 1-1/4 inch	7'-0"	3/8"
1-1/2 to 3 inch	10'-0"	3/8"
4 to 6 inch	10'-0"	1/2"
8 to 10 inch	10'-0"	5/8"
12 to 14 inch	10'-0"	3/4"
15 inch and over	10'-0"	7/8"
(Copper Pipe)		
1/2 to 1-1/4 inch	5'-0"	3/8"
1-1/2 to 2-1/2 inch	8'-0"	3/8"
3 to 4 inch	10'-0"	3/8"
6 to 8 inch	10'-0"	1/2"
(Cast Iron)		
2 to 3 inch	5'-0"	3/8"
4 to 6 inch	10'-0"	1/2"
8 to 10 inch	10'-0"	5/8"
12 to 14 inch	10'-0"	3/4"
15 inch and over	10'-0"	7/8"
(PVC Pipe)		
1-1/2 to 4 inch	4'-0"	3/8"
6 to 8 inch	4'-0"	1/2"
10 and over	4'-0"	5/8"

B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

C. Place a hanger within 12 inches of each horizontal elbow and at the vertical horizontal transition.

D. Use hangers with 1-1/2 inch minimum vertical adjustment.

E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.

F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.

G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Install hangers with nut at base and above hanger; tighten upper nut to hanger after final installation adjustments.

J. Portable pipe hanger systems shall be installed per manufactures instructions.

K. Distances between supports are maximum distance. Supports shall be provided to carry the pipe/equipment load.

3.03 Insulated Piping: Comply with the following installation requirements.

A. Clamps: Attach galvanized clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.

B. Saddles: Install galvanized protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.

C. Shields: Install protective shields MSS Type 40 on cold and chilled water piping that has vapor barrier. Shields shall span an arc of 180 degrees and shall have dimensions in inches not less than the following:

NPS	LENGTH	THICKNESS
1/4 THROUGH 3-1/2	12	0.048
4	12	0.060
5 & 6	18	0.060
8 THROUGH 14	24	0.075
16 THROUGH 24	24	0.105

D. Piping 2” and larger provide galvanized sheet metal shields with calcium silicate at hangers/supports.

E. Insert material shall be at least as long as the protective shield.

F. Thermal Hanger Shields: Install where indicated, with insulation of same thickness as piping.

3.04 EQUIPMENT BASES AND SUPPORTS

A. Provide equipment bases of concrete.

B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct support of steel members. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.05 FLASHING

A. Provide flexible flashing and metal counter flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Flash vent and soil pipes projecting 8 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter flash and seal.

C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.

D. Seal floor shower mop sink and all other drains watertight to adjacent materials.

E. Provide curbs for mechanical roof installations 8 inches minimum high above roofing surface. Contact architect for all flashing details and roof construction. Seal penetrations watertight.

3.06 SLEEVES

A. Set sleeves in position in formwork. Provide reinforcing around sleeves.

B. Extend sleeves through floors minimum one inch above finished floor level. Caulk sleeves full depth with fire rated thermfiber and 3M caulking and provide floor plate.

C. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with U.L. listed fire stopping insulation and caulk seal air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

D. Fire protection sleeves may be flush with floor of stairways.

END OF SECTION

SECTION 23 05 53 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 23 02 00, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

1.03 Refer to Architectural Sections for additional requirements.

PART 2 - PRODUCTS

2.01 VALVE AND PIPE IDENTIFICATION

A. Valves:

1. All valves shall be identified with a 1-1/2" diameter brass disc wired onto the handle. The disc shall be stamped with 1/2" high depressed black filled identifying numbers. These numbers shall be numerically sequenced for all valves on the job.

2. The number and description indicating make, size, model number and service of each valve shall be listed in proper operational sequence, properly typewritten. Three copies to be turned over to Owner at completion.

3. Tags shall be fastened with approved meter seal and 4 ply 0.018 smooth copper wire. Tags and fastenings shall be manufactured by the Seton Name Plate Company or approved equal.

4. All valves shall be numbered serially with all valves of any one system and/or trade grouped together.

B. Pipe Marking:

1. All interior visible piping located in accessible spaces such as above accessible ceilings, equipment rooms, attic space, under floor spaces, etc., shall be identified with all temperature pipe markers as manufactured by W.H. Brady Company, 431 West Rock Ave., New Haven, Connecticut, or approved equal.

2. All exterior visible piping shall be identified with UV and acid resistant outdoor grade acrylic plastic markers as manufactured by Set Mark distributed by Seton nameplate company. Factory location 20 Thompson Road, Branford, Connecticut, or approved equal.

3. Generally, markers shall be located on each side of each partition, on each side of each tee, on each side of each valve and/or valve group, on each side of each piece of equipment, and, for straight runs, at equally spaced intervals not to exceed 75 feet. In congested area, marks shall be placed on each pipe at the points where it enters and leaves the area and at the point of connection of each piece of equipment and automatic control valve. All markers shall have directional arrows.

4. Markers shall be installed after final painting of all piping and equipment and in such a manner that they are visible from the normal maintenance position. Manufacturer's installation instructions shall be closely followed.

5. Markers shall be colored as indicated below per ANSI/OSHA Standards:

SYSTEM	COLOR	LEGEND
Chilled Water	Green	Chilled Water Supply Chilled Water Return
Condenser Water	Green	Condenser Water Supply Condenser Water Return
Compressed Air	Blue	Compressed Air
Pneumatic Control	Yellow	Pneumatic Controls
Oxygen	Yellow	Oxygen
Nitrogen	Green	Nitrogen
Deionized Water	Green	Deionized Water
Steam	Yellow	Steam Supply Steam Return

C. Pipe Painting:

1. All piping exposed to view shall be painted as indicated or as directed by the Architect in the field. Confirm all color selections with Architect prior to installation.

2. The entire fire protection piping system shall be painted red.

3. All piping located in mechanical rooms and exterior piping shall be painted as indicated below:

System	Color
Condenser Water Supply and Return	Light Green
Chilled Water Supply and Return	Light Blue
Heating Hot Water Supply and Return	Reddish Orange

PART 3 - EXECUTION

3.01 All labeling equipment shall be installed as per manufacturers printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Contractors price shall include all items required as per manufacturers' requirements.

3.03 All piping shall be cleaned of rust, dirt, oil and all other contaminants prior to painting. Install primer and a quality latex paint over all surfaces of pipe.

END OF SECTION

SECTION 23 07 16 – HVAC EQUIPMENT INSULATION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 23 02 00, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

B. Work specified elsewhere.
1. Basic materials and methods.
2. Piping systems.
3. Air distribution equipment.

1.03 WARRANTY

A. Warrant the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

B. Defects shall include, but not be limited to, the following:
1. Mildewing.
2. Peeling, cracking, and blistering.
3. Condensation on exterior surfaces.

1.04 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.

1.05 DELIVERY AND STORAGE

A. DELIVERY: Deliver undamaged materials in the manufacturer's unopened containers clearly labeled with flame and smoke ratings.

PART 2 - PRODUCTS

2.01 It is the intent of these specifications to secure superior quality workmanship resulting in an absolutely satisfactory installation of insulation from the standpoint of both function and appearance. Particular attention shall be given to valves, fittings, pumps, etc., requiring low temperature insulation to insure full thickness of insulation and proper application of the vapor seal. All flaps of vapor barrier jackets and/or canvas covering must be neatly and securely smoothed and sealed down.

2.02 The type of insulation and its installation shall be in strict accordance with these specifications for each service, and the application technique shall be as recommended by the manufacturer. All insulation types, together with adhesives and finishes shall be submitted and approved before any insulation is installed.

2.03 A sample quantity of each type insulation and each type application shall be installed and approval secured prior to proceeding with the main body of the work. Condensation caused by improper installation of insulation shall be corrected by Installing Contractor. Any damage caused by condensation shall be made good at no cost to the Owner or Architect/Engineer.

2.04 Glass fiber materials as manufactured by Owens/Corning, PPG, CSG, or Johns Manville will be acceptable, if they comply with the specifications.

2.05 All insulation shall have composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to insulation) fire and smoke hazard as tested by Procedure ASTM E084, NFPA 255 and UL 723 not exceeding:

Flame Spread 25
Smoke Developed 50

2.06 Accessories, such as adhesives, mastics and cements shall have the same component ratings as listed above.

2.07 All products or their shipping cartons shall have a label affixed, indicating flame and smoke ratings do not exceed the above requirements.

PART 3 - EXECUTION

3.01 All insulation shall be installed in accordance with the manufacturer’s recommendations and printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturers requirements.

3.03 CHILLED WATER PUMPS

A. Shall be insulated with Certain-Teed IB-600 rigid insulation board, 2" thick, cut and formed into a box and secured in place with 3/4" wide x .020 galvanized bands spaced on 9" centers. Bands shall be pulled snug over sheets of insulation board. All joints shall be well and neatly fitted and so arranged that the assembly may be dismantled with ease permitting access to the pump. All voids on the interior of box shall be filled with glass fiber blanket insulation. Exterior shall be finished with a trowel coat of Foster's 30-35 vapor barrier mastic, a layer of 1" mesh galvanized wire, and a coat of J.M. #352 cement. Final finish shall be an eight ounce canvas jacket, pasted and sealed in place with Foster's 30-36 Seafas.

B. Pipe insulation shall be extended over all cold parts of chilled water pumps not directly over drainage basin of pump base.

3.04 BOILER EXHAUST SYSTEM

A. Insulate boiler stack, breaching and induced draft fan housing in contact with flue gases, with one inch thick high temperature, spun glass-fiber blanket. Manville 1000 Spin-Glass or approved equal, secured between outer facing of 1 inch galvanized wire mesh.

Calcium silicate insulation, Manville Thermo-12 or approved equal, may be applied at the contractor's option followed by application of 1 inch galvanized wire mesh.

B. In exposed areas, apply 1 1/4 inch coat of insulating and finishing cement, Ryder "V" One Coat or approved equal, troweled to a smooth surface. After cement has dried, surfaces shall be weatherproofed using 2 coats of mastic, Childers CP-10, with a layer of white glass cloth reinforcing embedded between coats.

END OF SECTION

SECTION 23 07 19 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 23 02 00, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

B. Furnish and install piping insulation to:

1. Chilled water and heating hot water piping.
2. Condensate drainage piping.
3. Refrigerant piping.
4. All pipes subject to freezing conditions shall be insulated.

C. Work specified elsewhere.

1. Painting.
2. Pipe hangers and supports.

D. For insulation purpose piping is defined as the complete piping system including supplies and returns, pipes, valves, automatic control valve bodies, fittings, flanges, strainers, thermometer well, unions, reducing stations, and orifice assemblies.

1.03 WARRANTY

A. Warrant the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship.

B. Defects shall include, but not be limited to, the following:

1. Mildewing.
2. Peeling, cracking, and blistering.
3. Condensation on exterior surfaces.

1.04 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, project variations, and accessories.

1.05 DELIVERY AND STORAGE

A. DELIVERY: Deliver undamaged materials in the manufacturer's unopened containers. Containers shall be clearly labeled with the insulation's flame and smoke ratings.

PART 2 - PRODUCTS

2.01 It is the intent of these specifications to secure superior quality workmanship resulting in an absolutely satisfactory installation of insulation from the standpoint of both function and appearance. Particular attention shall be given to valves, fittings, pumps, etc., requiring low temperature insulation to insure full thickness of insulation and proper application of the vapor seal. All flaps of vapor barrier jackets and/or canvas covering must be neatly and securely smoothed and sealed down.

2.02 The type of insulation and its installation shall be in strict accordance with these specifications for each service, and the application technique shall be as recommended by the manufacturer. All insulation types, together with adhesives and finishes shall be submitted and approved prior to installation.

2.03 A sample quantity of each type of insulation and each type application shall be installed and approval secured prior to proceeding with the main body of the work. Condensation caused by improper installation of insulation shall be corrected by Installing Contractor. Any damage caused by condensation shall be made good at no cost to the Owner or Architect/Engineer.

2.04 All insulation shall have composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to insulation) fire and smoke hazard as tested by Procedure ASTM E084, NFPA 255 and UL 723 not exceeding:

Flame Spread 25
Smoke Developed 50

2.05 Accessories, such as adhesives, mastics and cements shall have the same component ratings as listed above.

2.06 All products or their shipping cartons shall have a label affixed, indicating flame and smoke ratings do not exceed the above requirements.

2.07 APPROVED MANUFACTURERS

A. Calcium silicate materials shall be as manufactured by Johns Manville.

B. Glass fiber materials shall be as manufactured by Johns Manville or Owens-Corning and shall have the same thermal properties, density, fire rating, vapor barrier, etc., as the types specified herein, subject to review by the Engineer.

C. Adhesives shall be as manufactured by Childers, Foster, HB Fuller or Armstrong, and shall have the same adhesive properties, fire rating, vapor seal, etc., as the types specified herein, subject to review by the Engineer.

D. Armaflex elastomeric cellular thermal insulation by Armstrong.

E. Phenolic foam insulation shall be as manufactured by Kooltherm Insulation (Koolphen).

F. Metal jacketing and fitting covers shall be as manufactured by Childers or RPR Products.

2.08 MATERIALS

A. CHILLED WATER AND HEATING HOT WATER PIPE: Provide fiberglass pipe insulation with ASJ-SSL jacket or phenolic foam with ASJ and all joints sealed.

B. CONDENSATE DRAINAGE PIPING: Fire resistant fiberglass insulation; insulation not required when piping is exposed on roof.

C. REFRIGERANT PIPING: Refrigerant pipe insulation shall be model "AP-2000", fire rated for use in environmental air plenums. Apply manufacturers recommended finish and sealant for exterior applications.

D. METAL JACKETING: Utilize Childers “Strap-On” jacketing. Provide preformed fitting covers for all elbows and tees.

PART 3 - EXECUTION

3.01 All insulation shall be installed in accordance with the manufacturers’ recommendations and printed installation instructions, including high density inserts at all hangers and pipe supports to prevent compression of insulation.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturers requirements.

3.03 Pipes located outdoors or in tunnels shall be insulated same as concealed piping; and in addition shall have a jacket of 0.016 inch thick, smooth aluminum with longitudinal modified Pittsburg Z-Lock seam and 2 inch overlap. Jacketing shall be easily removed and replaced without damage. All butt joints shall be sealed with gray silicone. Galvanized banding is not acceptable.

3.04 All insulated piping located over driveways shall have an aluminum shield permanently banded over insulation to protect it from damage from car antennas.

3.05 WATER PIPE INSULATION INSTALLATION

A. The insulation shall be applied to clean, dry pipes with all joints firmly butted together. Where piping is interrupted by fittings, flanges, valves or hangers and at intervals not to exceed 25 feet on straight runs, an isolating seal shall be formed between the vapor barrier jacket and the bare pipe. The seal shall be by the applications of adhesive to the exposed insulation joint faces, carried continuously down to and along 4 inches of pipe and up to and along 2 inches of jacket.

B. Pipe fittings and valves shall be insulated with pre-molded or shop fabricated glass fiber covers finished with two brush coats of vapor barrier mastic reinforced with glass fabric.

C. All under lap surfaces shall be clean and free of dust, etc. before the SSL is sealed. These laps shall be firmly rubbed to insure a positive seal. A brush coat of vapor retarder shall be applied to all edges of the vapor barrier jacket.

3.06 STANDBY-GENERATOR ENGINE EXHAUST PIPING

A. Entire engine exhaust pipe from exhaust manifold to outside terminal shall be enclosed in a 1" thick layer of calcium silicate insulation shall cover the first layer.

B. A second insulating layer of 1" thick calcium silicate shall cover the first layer.

C. Joints for the first and second layer shall be staggered.

D. Apply aluminum jacket over outer layer of insulation.

E. Insulate exhaust muffler in the same manner as the exhaust piping.

3.07 FIRE RATED INSULATION

A. All pipe penetrations through walls and concrete floors shall be fire rated by applying USG Thermafiber in the space between the concrete and the pipe.

B. The fire rating shall be additionally sealed by using 3M brand model CP 25 or 303 fire barrier caulk and putty.

C. All fire rating material shall be insulated in accordance with manufacturer's printed instructions.

PART 4 - SCHEDULES

4.01 LOW TEMPERATURE SURFACES	MINIMUM INSULATION THICKNESS BASED ON FIBERGLASS
A. Condensate drain lines:	¾ inch
B. Drains receiving condensate:	1 inch
C. Chilled Water Piping:	
(1) Located outdoors:	2 inch
(2) Located indoors:	
(a) 4 inch and smaller:	1½ inch
(b) Larger than 4 inch:	2 inch
D. Refrigerant Piping	
(1) 1½“ and smaller	1 inch
(2) Larger than 1½ inch	1½ inch

4.02 HIGH TEMPERATURE SURFACES	MINIMUM INSULATION THICKNESS
A. Hot Water Piping:	
(1) Operating temperature 105°F or less:	1 inch
(2) Operating temperature higher than 105°F and pipe size 1½ inch or smaller	1 inch
(3) Operating temperature higher than 105°F and pipe size more than 1½ inch	2 inch
B. Steam Piping:	
(1) Pipe size 1½ inch and smaller	1½ inch
(2) Pipe size more than 1½ inch	3 inch

END OF SECTION

23 09 00 – INSTRUMENTATION AND CONTROL FOR HVAC

1. Acceptable Manufacturers:

   Johnson Controls

   Siemens

   Honeywell

23 09 13.13 ACTUATORS AND OPERATORS

A. GENERAL REQUIREMENTS

2. Damper and valve actuators shall be electronic and/or pneumatic, as specified in the System Description section. Exact OEM equivalents of specified actuators/operators shall be acceptable if clearly identified in submittals.

3. The manufacturer shall be ISO 9001 certified.

B. ELECTRONIC DAMPER ACTUATORS

1. Spring Return Actuators:

   a. Manufactured, brand labeled or distributed by Johnson Controls or approved equal.

   b. Regulatory Agency Listing: cULus ,CSA C22.2 No. 24-93, and CE marked.

   c. Direct-Coupled Design: Requires no crankarm or linkage for mounting to a shaft.

   d. Coupling: toothed V-bolt clamp and nuts with toothed cradle.

   e. Reversible Mounting: Provides either clockwise or counterclockwise operation.

   f. Power Failure Operation: Mechanical spring return system drives load to the home position. Other forms of internal energy storage for power failure operation are not acceptable.

   g. Motor Technology:

      i. Modulating Types: Microprocessor-controlled Brushless DC motor.

      ii. On/Off Types: DC brush motor.

   h. Overload Protection: Electronic stall detection protects from overload at all angles of rotation without the use of end switches.

   i. Enclosure Ratings:

      i. NEMA type 2 / IP54 mounted in any orientation.

   j. Double-Insulated construction: Eliminate the need for electrical ground wires.

   k. Wiring: Integral cables with colored and numbered conductors.

   l. Sized for torque required to seal damper at load conditions.

m. Parallel Operation: Actuators shall be available that are capable of being mechanically or electrically paralleled.

n. Proportional actuators shall be user configurable without the use of external computer software or programming tools. Calibration, input signal range selection, and control logic reversal shall be selectable with an external mode selection switch.

o. Operating Temperature Range:

p. Power Requirements:

i. Modulating Types:

ii. 2-Position Types:

23 09 13.23 SENSORS AND TRANSMITTERS

A. GENERAL REQUIREMENTS

1. Installation, testing, and calibration of all sensors, transmitters, and other input devices shall be provided to meet the system requirements. Exact OEM equivalents of specified sensors and transmitters shall be acceptable if clearly identified in submittals.

B. TEMPERATURE SENSORS

1. General Requirements

a. Sensors and transmitters shall be provided, as outlined in the input/output summary and sequence of operations.

b. The temperature sensor shall be of the resistance type, and shall be either two-wire 1000 ohm nickel RTD, or two-wire 1000 ohm platinum RTD. Thermistor sensors of 10,000 or 2,250 ohms resistance may be substituted based on the application.

c. The following point types (and the accuracy of each) are required, and their associated accuracy values include errors associated with the sensor, lead wire, and A to D conversion.

Point Type	Accuracy
Room Temp	+ .5°F
Duct Temperature	+ .5°F
All Others	+ .75°F

2. Room Temperature Sensors

a. Room sensors shall be constructed for either surface or wall box mounting.

b. Room sensors shall have the following options when specified:

i. Setpoint warmer/cooler.

ii. Individual heating/cooling setpoint.

iii. Momentary override request for activation of after-hours operation.

iv. Analog thermometer.

3. Room Temperature Sensors with Integral Display

   a. Room sensors shall be constructed for either surface or wall box mounting.

   b. Room sensors shall have an integral LCD display and the following capabilities when specified:

      i. Display room air temperatures.

      ii. Display and adjust room comfort setpoint.

      iii. Display and adjust fan operation status.

      iv. Setpoint override request via setpoint adjust dial or buttons.

      v. Timed override request via occupancy override with status indication for activation of after-hours setpoint operation.

      vi. Occupancy sensor status.

      vii. Toggle between Degrees F and Degrees C.

      viii. Toggle between temperature and humidity where specified.

4. Thermowells

   a. Thermowell manufacturer shall have models available in stainless steel, brass body, and copper bulb.

   b. When thermowells are required, the sensor and well shall be supplied as a complete assembly, including wellhead and sensor.

   c. Thermowells shall be pressure rated and constructed in accordance with the system working pressure.

   d. Thermowells and sensors shall be mounted in a direct mount (no adapter) offering faster installation or 1/2” NFT saddle and allow easy access to the sensor for repair or replacement.

   e. Thermowells constructed of 316 stainless steel shall comply with Canadian Registration Number (CRN) pressure vessel rating.

5. Outside Air Sensors

   a. Outside air sensors shall be designed to withstand the environmental conditions to which they will be exposed. They shall be provided with a solar shield.

   b. Sensors exposed to wind velocity pressures shall be shielded by a perforated plate that surrounds the sensor element.

   c. Temperature transmitters shall be of NEMA 3R (IP54) or NEMA 4 (IP65) construction and rated for ambient temperatures.

d. The outdoor sensor shall be capable of being mounted on a roof, pole or side of a building utilizing its preassembled mounting bracket.

e. Outside air relative humidity sensors 0-100% full range of accurate measurement. Operating temperature -4 to 140°F (-20 to 60°C).

f. Outside air temperature sensors operating temperature range -40 to 140°F, +/- .55°F (+/- .3°C).

6. Duct Mount Sensors

   a. Duct mount sensors shall mount in an electrical box through a hole in the duct, positioned to provide ease of accessibility for repair or replacement.

   b. Duct sensors shall be insertion type and constructed as a complete assembly, including lock nut and mounting plate.

   c. For outdoor air duct applications, a weatherproof mounting box with weatherproof cover and gasket shall be provided.

7. Averaging Sensors

   a. For ductwork greater in any dimension that 48 inches and/or where air temperature stratification exists, an averaging sensor with multiple sensing points shall be used.

   b. For plenum applications, such as mixed air temperature measurements, a continuous averaging sensor or a string of sensors mounted across the plenum shall be used to account for stratification and/or air turbulence. The averaging string shall have a minimum of 4 sensing points per 12-foot long segment.

   c. Capillary supports at the sides of the duct shall be provided to support the sensing string.

1. The sensor shall be a solid-state type, relative humidity sensor of the Thin Film Capacitance or Bulk Polymer Design. The sensor element shall resist service contamination.

2. The humidity transmitter shall be equipped with non-interactive span and zero adjustments, a 2-wire isolated loop powered, 4-20 mA, 0-100% linear proportional output.

3. The humidity transmitter shall meet the following overall accuracy, including lead loss and Analog to Digital conversion. 3% between 20% and 80% RH at 77°F unless specified elsewhere.

4. Outside air relative humidity sensors shall be installed with a rain proof, perforated cover. The transmitter shall be installed in a NEMA 3R (IP54) or NEMA 4 (IP65) enclosure with sealtite fittings.

5. A single point humidity calibrator shall be provided, if required, for field calibration. Transmitters shall be shipped factory pre-calibrated.

6. Duct type sensing probes shall be constructed of 304 stainless steel, and shall be equipped with a neoprene grommet, bushings, and a mounting bracket.

C. CO_2 SENSORS

1. Where shown on the drawings, CO_2 sensors shall have the following features:

   a. Jumper selectable: 0-20mA, 4-20mA & 0-10 VDC output.

   b. Liquid Crystal Display (LCD).

2. The CO_2 sensors shall have the ability to monitor and output the following variables as required by the systems sequence of operations:

   a. Zone CO_2.

3. The CO_2 shall transmit the information back to the controller via jumper selectable 0-20mA, 4-20mA & 0-10 VDC output signals:

   a. The CO_2 sensors shall provide a maximum output current of 25mA; Maximum output voltage of 12.5V.

   b. The CO_2 sensors shall be FCC compliant to CFR47 Part 15 subpart B Class A.

4. The CO_2 sensors shall be available with:

   a. CO_2 response time (0-63%) of 1 minute.

   b. Less than 0.083% of full scale/°F temperature dependence of CO_2 output.

   c. Long term CO_2 stability ±5% of full scale for 5 years.

   d. CO_2 measurement accuracy of ±(40ppm + 2.0% of reading.)

   e. CO_2 non-linearity of less than 1.0% of full scale.

5. The CO_2 sensors may include the following items:

   a. Relay output module.

   b. LCD module.

   c. Analog temperature module with linear 0-10 VDC output for 32-122F.

D. DIFFERENTIAL PRESSURE TRANSMITTERS

1. General Air and Water Pressure Transmitter Requirements:

   a. Pressure transmitters shall be constructed to withstand 100% pressure over-range without damage, and to hold calibrated accuracy when subject to a momentary 40% over-range input.

   b. Pressure transmitters shall transmit a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA output signal.

   c. Differential pressure transmitters used for flow measurement shall be sized to the flow sensing device, and shall be supplied with Tee fittings and shut-off valves in the

high and low sensing pick-up lines to allow the balancing Contractor and Owner permanent, easy-to-use connection.

d. A minimum of a NEMA 1 housing shall be provided for the transmitter. Transmitters shall be located in accessible local control panels wherever possible.

2. Low Differential Water Pressure Applications (0” - 20” WC):

   a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of flow meter differential pressure or water pressure sensing points.

   b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:

      i. .01-20” WC input differential pressure range.

      ii. 4-20 mA output.

      iii. Maintain accuracy up to 20 to 1 ratio turndown.

      iv. Reference Accuracy: +0.2% of full span.

   c. Acceptable Manufacturers: Setra and Mamac.

3. Medium to High Differential Water Pressure Applications (Over 21” WC):

   a. The differential pressure transmitter shall meet the low-pressure transmitter specifications with the following exceptions:

      i. Differential pressure range 10” WC to 300 PSI.

      ii. Reference Accuracy: +1% of full span (includes non-linearity, hysteresis, and repeatability).

   b. Standalone pressure transmitters shall be mounted in a bypass valve assembly panel. The panel shall be constructed to NEMA 1 standards. The transmitter shall be installed in the panel with high and low connections piped and valved. Air bleed units, bypass valves, and compression fittings shall be provided.

   c. Acceptable Manufacturers: Setra and Mamac.

4. Building Differential Air Pressure Applications (-1” to +1” WC):

   a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.

   b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:

i. -1.00 to +1.00 WC input differential pressure ranges. (Select range appropriate for system application.)

ii. 4-20 mA output.

iii. Maintain accuracy up to 20 to 1 ratio turndown.

iv. Reference Accuracy: +0.2% of full span.

v. Acceptable Manufacturers: Johnson Controls or approved equal.

5. Low Differential Air Pressure Applications (0" to 2.5" WC):

a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.

b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications.

i. (0.00 - 1.00" to 5.00") WC input differential pressure ranges. (Select range appropriate for system application.)

ii. 4-20 mA, 0-5 VDC, 0-10 VDC output.

iii. Maintain accuracy up to 20/1 ratio turndown.

iv. Reference Accuracy: +0.25%, or 0.5% of full span.

c. Acceptable Manufacturers: Johnson Controls and Ruskin.

6. Medium Differential Air Pressure Applications (5" to 21" WC):

a. The pressure transmitter shall be similar to the Low Air Pressure Transmitter, except that the performance specifications are not as severe. Differential pressure transmitters shall be provided that meet the following performance requirements.

i. Zero & span: (c/o F.S./Deg. F): .04% including linearity, hysteresis and repeatability.

ii. Accuracy: 1% F.S. (best straight line) Static Pressure Effect: 0.5% F.S. (to 100 psig.

iii. Thermal Effects: <+.033 F.S./Deg. F. over 40°F to 100°F (calibrated at 70°F.)

b. Standalone pressure transmitters shall be mounted in a bypass valve assembly panel. The panel shall be constructed to NEMA 1 standards. The transmitter shall be installed in the panel with high and low connections piped and valved. Air bleed units, bypass valves, and compression fittings shall be provided.

c. Acceptable manufacturers: Johnson Controls and Ruskin.

E. FLOW MONITORING

1. Air Flow Monitoring

    a. Fan Inlet Air Flow Measuring Stations

        i. At the inlet of each fan and near the exit of the inlet sound trap, airflow sensors shall be provided that shall continuously monitor the fan air volumes or velocity pressure.

        ii. Each sensor shall be surface mount type. Unit shall be capable of monitoring and reporting the airflow and temperature at each fan inlet location through two or four sensing circuits. If a static pressure manifold is used, it shall incorporate dual offset static tips on the opposing sides of the averaging manifold so as to be insensitive to flow-angle variations of as much as + 20° in the approaching air stream.

        iii. Devices creating fan performance degradation, resulting in additional energy consumption, caused from pressure drop associated with probes or mounting apparatus in the center of the fan inlet are not allowed. The device shall not induce a significant pressure drop, nor shall the sound level within the duct be amplified by its singular or multiple presence in the air stream. Sensor circuit casings shall be constructed of U.L. 94 flame rated high impact ABS and include a stainless steel thermistor cap that maintains the precise calibrated flow over the heated and ambient measurement points.

        iv. Acceptable manufacturers: Johnson Controls, Air Monitor Corp., Tek-Air Systems, Inc., or Dietrich Standard.

    b. Single Probe Air Flow Measuring Sensor

        i. The single probe airflow-measuring sensor shall be duct mounted with an adjustable sensor insertion length of up to eight inches. The transmitter shall produce a 4-20 mA or 0-10 VDC signal linear to air velocity. The sensor shall be a thermal dispersion and utilize one temperature sensor and a heated thermistor. The sensor pair shall measure the air temperature and airflow velocity.

    c. Duct Air Flow Measuring Stations

        i. Furnish and install, at locations shown on plans or as in accordance with schedules, an equalized air measuring probe system piped to a high performance pressure transducer or an electronic type airflow temperature measuring station.

        ii. Each device shall be designed and built in order to comply with, and provide results in accordance with, accepted practice as defined for system testing in the ASHRAE Handbook of fundamentals, as well as in the Industrial Ventilation Handbook.

        iii. Assembly shall be AMCA tested and capable of measuring a range from 70 to 5,000 FPM (22 to 1524 MPM).

        iv. Equalized air measuring assembly shall measure to ±3% average and consist of 6063T5 extruded aluminum step sensing blade(s) with anodized finish, plenum-rated polyethylene pressure tubing, brass barbed fittings, mounting hardware and a glass-on-silicone capacitance sensor pressure transducer capable of measuring up to five field-selectable pressure ranges up to 2.5 in. WC.

v. The transducer shall be accurate to ±0.5%, or 0.25% of full scale and be contained in a National Electrical Manufacturer's Association (NEMA) 4 (IP-65) enclosure. Transducer shall be factory mounted and piped to high and low pressure ports through fittings made of brass.

vi. All sensor tubing shall terminate in solid brass barbed fittings.

vii. Total and static pressure manifolds shall terminate with external ports for connection to control tubing. An identification label shall be present on each unit casing, listing model number, size, area, and airflow capacity.

viii. Air straightener shall be provided for sizes over 17 square feet (1.6 sq meter).

ix. Airflow measuring station assemblies shall be fabricated of galvanized steel or aluminum casing of appropriate thickness for slip fits or with 90 Deg. connecting flanges in configuration and size equal to that of the duct into which it is mounted. Each station shall be complete with an air directionalizer and parallel cell profile suppressor (3/4" maximum cell) across the entering air stream and mechanically fastened to the casing in such a way to withstand velocities up to 5000 feet per minute.

x. Electronic air measuring station shall be capable of monitoring and reporting the airflow and temperature at each measuring location through one or more measuring probes containing multiple sensor points and a control transmitter that outputs a 4-20 mA linear signal.

xi. Probe(s) shall be constructed of an airfoil shaped aluminum extrusion containing the sensor circuit(s).

xii. Each sensor circuit shall consist of coated thermistors, for temperature and velocity, mounted to a Printed Circuit Board (PCB). Multiplexer board shall be encased to prevent moisture damage.

xiii. Control transmitter shall be capable of processing independent sensing points and shall operate on a fused 24 VAC supply.

xiv. Control transmitter shall feature a 16 x 2 character alphanumeric LCD screen, digital offset/gain adjustment, continuous performing sensor/transmitter diagnostics, and a visual alarm to detect malfunctions.

xv. Installation Considerations

- The maximum allowable pressure loss through the Flow and Static Pressure elements shall not exceed .04" WC at 1000 feet per minute, or .11" WC at 2000 feet per minute. Each unit shall measure the airflow rate within an accuracy of plus 3-5% as determined by AMCA.
- Where the stations are installed in insulated ducts, the airflow passage of the station shall be the same size as the inside airflow dimension of the duct. Station flanges shall be 1.5 inches to facilitate matching connecting ductwork.
- Where control dampers are provided as part of the airflow measuring station, parallel blade precision controlled volume dampers integral to the station and complete with actuator, and linkage shall be provided.

- Stations shall be installed in strict accordance with the manufacturer's published requirements, and in accordance with ASME Guidelines affecting non-standard approach conditions.

xvi. All air measuring devices shall be tested according to AMCA Standard 610.

xvii. Acceptable manufacturers: Johnson Controls, Air Monitor Corp., Tek-Air, Ruskin, and Dietrich Standard.

d. Static Pressure Traverse Probe

i. Duct static traverse probes shall be provided where required to monitor duct static pressure. The probe shall contain multiple static pressure sensors located along exterior surface of the cylindrical probe.

ii. Acceptable manufacturers: Cleveland Controls.

e. Shielded Static Air Probe

i. Where indicated on plans or in schedules a shielded static pressure probe shall be provided at each end of the building. The probe shall have multiple sensing ports, an impulse suppression chamber, and airflow shielding.

f. Water Flow Monitoring

i. Water flow meters shall be electromagnetic type with integral microprocessor-Based electronics. The meter shall have an accuracy of 0.25%.

ii. Acceptable manufacturers: Onicon.

F. POWER MONITORING DEVICES

1. Current Measurement (amps)

a. Current measurement shall be by a combination current transformer and a current transducer. The current transformer shall be sized to reduce the full amperage of the monitored circuit to a maximum 5 Amp signal, which will be converted to a 4-20 mA DDC compatible signal for use by the Facility Management System.

b. Current Transformer – A split core current transformer shall be provided to monitor motor amps.

i. Operating frequency – 50 - 400 Hz.

ii. Insulation – 0.6 Kv class 10Kv BIL.

iii. UL recognized.

iv. Five amp secondary.

v. Select current range as appropriate for application.

vi. Acceptable manufacturers: Setra.

c. Current Transducer – A current to voltage or current to mA transducer shall be provided. The current transducer shall include:

i. 6X input over amp rating for AC inrushes of up to 120 amps.

ii. Manufactured to UL 1244.

iii. Accuracy: +.5%, Ripple +1%.

iv. Minimum load resistance 30kOhm.

v. Input 0-20 amps.

vi. Output 4-20 mA.

vii. Transducer shall be powered by a 24 VDC regulated power supply (24 VDC +5%).

viii. Acceptable manufacturers: Setra.

G. STATUS AND SAFETY SWITCHES

1. General Requirements

a. Switches shall be provided to monitor equipment status, safety conditions, and generate alarms at the Building Management System (BMS) when a failure or abnormal condition occurs. Safety switches shall be provided with two sets of contacts and shall be interlock wired to shut down respective equipment.

2. Current Sensing Switches

a. The current sensing switch shall be self-powered with solid-state circuitry and a dry contact output. It shall consist of a current transformer, a solid state current sensing circuit, adjustable trip point, solid state switch, SPDT relay, and an LED indicating the on or off status. A conductor of the load shall be passed through the window of the device. It shall accept over-current up to twice its trip point range.

b. Current sensing switches shall be used for run status for fans, pumps, and other miscellaneous motor loads.

c. Current sensing switches shall be calibrated to show a positive run status only when the motor is operating under load. A motor running with a broken belt or coupling shall indicate a negative run status.

d. Acceptable manufacturers: Johnson Controls or approved equal.

3. Air Filter Status Switches

a. Differential pressure switches used to monitor air filter status shall be of the automatic reset type with SPDT contacts rated for 2 amps at 120VAC.

b. A complete installation kit shall be provided, including: static pressure tops, tubing, fittings, and air filters.

c. Provide appropriate scale range and differential adjustment for intended service.

d. Acceptable manufacturers: Johnson Controls, Cleveland Controls.

4. Air Flow Switches

a. Differential pressure flow switches shall be bellows actuated mercury switches or snap acting micro-switches with appropriate scale range and differential adjustment for intended service.

b. Acceptable manufacturers: Johnson Controls, Cleveland Controls.

5. Air Pressure Safety Switches

a. Air pressure safety switches shall be of the manual reset type with SPDT contacts rated for 2 amps at 120VAC.

b. Pressure range shall be adjustable with appropriate scale range and differential adjustment for intended service.

c. Acceptable manufacturers: Johnson Controls, Cleveland Controls.

6. Water Flow Switches

a. Water flow switches shall be equal to the Johnson Controls P74.

7. Low Temperature Limit Switches

a. The low temperature limit switch shall be of the manual reset type with Double Pole/Single Throw snap acting contacts rated for 16 amps at 120VAC.

b. The sensing element shall be a minimum of 15 feet in length and shall react to the coldest 18-inch section. Element shall be mounted horizontally across duct in accordance with manufacturers recommended installation procedures.

c. For large duct areas where the sensing element does not provide full coverage of the air stream, additional switches shall be provided as required to provide full protection of the air stream.

d. The low temperature limit switch shall be equal to Johnson Controls A70.

H. CONTROL RELAYS

1. Control Pilot Relays

a. Control pilot relays shall be of a modular plug-in design with retaining springs or clips.

b. Mounting Bases shall be snap-mount.

c. DPDT, 3PDT, or 4PDT relays shall be provided, as appropriate for application.

d. Contacts shall be rated for 10 amps at 120VAC.

e. Relays shall have an integral indicator light and check button.

f. Acceptable manufacturers: Johnson Controls, Lectro.

I. THERMOSTATS – ELECTRIC

1. Electric room thermostats of the heavy-duty type shall be provided for unit heaters, cabinet unit heaters, and ventilation fans, where required. All these items shall be provided with concealed adjustment. Finish of covers for all room-type instruments shall match and, unless otherwise indicated or specified, covers shall be manufacturer's standard finish.

2. Acceptable Manufacturers: Penn, Emerson, Honeywell.

3. Butterfly Valves shall meet the performance requirements of ASME Class 150 or Class 300.

4. Valves shall be maintenance free.

5. Valves shall be provided with a 3 year equipment warranty.

6. Valve electric actuators shall be UL-recognized or CSA-certified.

7. Valves shall be Johnson Controls VF Series butterfly valves or approved equal.

J. GLOBE VALVES, BRASS, 1/2 THROUGH 2 IN.

1. Valves shall have bodies manufactured from a RoHS compliant brass.

2. Valves shall meet the pressure and temperature requirements of ANSI B16.15, Class 250.

3. Valve stems shall be a 300 Series Stainless Steel.

4. Valves with brass plug and seat shall have stem seals with Self-Adjusting Ethylene Propylene Rubber (EPR) Ring Pack U-Cups.

5. Valves with Stainless Steel plug and seat shall valve stem seals with Spring Loaded PTFE and Elastomer V-Rings.

6. Valves with brass trim shall have a maximum leakage specification of 0.01% of maximum flow per ANSI/FCI 70-2, Class 4 and valves with stainless steel trim shall have a maximum leakage of 0.05% of maximum flow.

7. Flow Characteristics shall be equal percentage for two-way valves and linear for three-way valves.

8. Valves shall be serviceable without being removed from the pipe.

9. Valves shall be provided with a 3 year equipment warranty.

10. Valve electric actuators shall be UL-recognized or CSA-certified.

11. Valves shall be Johnson Controls VG7000 Series globe valves or approved equal.

K. GLOBE VALVES, CAST IRON, 2-1/2 THROUGH 6 IN.

1. Valves shall have bodies manufactured from cast iron.

2. Valves shall meet the pressure and temperature requirements of ANSI B16.1, Class 125.

3. Valve stems shall be a 316 Series Stainless Steel.

4. Valves shall have stem seals with Ethylene Propylene Terpolymer (EPT) Ring Pack U-Cups.
5. Valves shall have a maximum leakage specification of 0.1% of maximum flow per ANSI/FCI 70-2, Class 3.
6. Flow Characteristics shall be equal modified linear.
7. Valves shall be serviceable without being removed from the pipe.
8. Valves shall be provided with a 3 year equipment warranty.
9. Valve electric actuators shall be UL-recognized or CSA-certified.
10. Valves shall be Johnson Controls VG2000 Series globe valves or approved equal.

L. ELECTRIC ZONE VALVES, 1/2 THROUGH 1-1/4 IN.

1. Valves shall have bodies manufactured from Forged Brass.
2. Valves stems shall be brass (Hard Chrome Plated.)
3. Valve Actuator shall be UL, cUL listed or CSA certified.
4. Valves shall be rated for service with hot water, chilled water and 50% glycol solutions.
5. Two Position valves shall have models available rated for use with 15 psig saturated steam.
6. Valve Actuator shall be replaceable without removing valve from the pipe.
7. Modulating Valves flow characteristics shall be equal percentage.
8. Valves shall be provided with a 2 year equipment warranty.
9. Valve actuators shall be UL-recognized or CSA-certified.
10. Valves shall be Johnson Controls J Series electric zone valves or approved equal.

M. PRESSURE INDEPENDENT VALVES, 1/2 THROUGH 2 IN.

1. Valves bodies shall be manufactured from forged brass and shall be nickel plated.
2. Valves shall have a stem and ball manufactured from chrome plated brass.
3. Valve seat shall be fiberglass reinforced with Teflon®.
4. Characterizing disk shall be brass for 1/2 and 3/4 in. valves, and Tefzel® for sizes 1 through 2 in. valves.
5. Valves shall pressure ratings of 600 psi for 1/2, 3/4 and 1 in. size valves, and pressure rating of 400 psi for 1-1/4, 1-1/2 and 2 in. size valves.
6. Closeoff Pressure rating shall be 200 psi differential pressure.
7. Valves shall have a maximum leakage specification of 0.01% of maximum flow per ANSI/FCI 70-2, Class 4 with a 50 psi differential pressure applied.
8. Valves shall be maintenance free.

9. Valves shall be provided with a 5 year equipment warranty.

10. Valve actuators shall be UL-recognized or CSA-certified.

11. Valves shall be Johnson Controls P1000 Series pressure independent valves or approved equal.

23 09 13.43 CONTROL DAMPERS

A. The BMS Contractor shall furnish all automatic dampers. All automatic dampers shall be sized for the application by the BMS Contractor or as specifically indicated on the drawings.

B. All dampers used for throttling airflow shall be of the opposed blade type arranged for normally open or normally closed operation, as required. The damper is to be sized so that, when wide open, the pressure drop is a sufficient amount of its close-off pressure drop to shift the characteristic curve to near linear.

C. All dampers used for two-position, open/close control shall be parallel blade type arranged for normally open or closed operation, as required.

D. Damper frames and blades shall be constructed of either galvanized steel or aluminum. Maximum blade length in any section shall be 60”. Damper blades shall be 16-gauge minimum and shall not exceed eight (8) inches in width. Damper frames shall be 16-gauge minimum hat channel type with corner bracing. All damper bearings shall be made of reinforced nylon, stainless steel or oil-impregnated bronze. Dampers shall be tight closing, low leakage type, with synthetic elastomer seals on the blade edges and flexible stainless steel side seals. Dampers of 48”x48” size shall not leak in excess of 8.0 cfm per square foot when closed against 4” WC static pressure when tested in accordance with AMCA Std. 500.

E. Airfoil blade dampers of double skin construction with linkage out of the air stream shall be used whenever the damper face velocity exceeds 1500 FPM or system pressure exceeds 2.5” WC, but no more than 4000 FPM or 6” WC.

1. Acceptable manufacturers are Johnson Controls VD-1250, VD1630, or VD-1330, Ruskin CD50 or CD60, and Vent Products 5650.

F. One piece rolled blade dampers with exposed or concealed linkage may be used with face velocities of 1500 FPM or below.

1. Acceptable manufacturers: Johnson Controls VD-1620, VD-1320, Ruskin CD36, and Vent Products 5800.

G. Multiple section dampers may be jack-shafted to allow mounting of piston pneumatic actuators and direct connect electronic actuators. Each end of the jackshaft shall receive at least one actuator to reduce jackshaft twist.

23 09 23 DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC/BUILDING MANAGEMENT SYSTEM

TABLE OF CONTENTS

PART 1 – GENERAL

1.A RELATED DOCUMENTS

1. All work of this Division shall be coordinated and provided by the single BMS Contractor.

2. The work of this Division shall be scheduled, coordinated, and interfaced with the associated work of other trades. Reference the applicable sections for details.

3. The work of this Division shall be as required by the Specifications, Point Schedules and Drawings.

4. If the BMS Contractor believes there are conflicts or missing information in the project documents, the Contractor shall promptly request clarification and instruction from the design team.

1.B DEFINITIONS

1. Analog: A continuously variable system or value not having discrete levels. Typically exists within a defined range of limiting values.

2. Binary: A two-state system where an “on” condition is represented by one discrete signal level and an “Off” condition is represented by a second discrete signal level.

3. BMS: The total integrated system of fully operational and functional elements, including equipment, software, programming, and associated materials, to be provided by this Division BMS Contractor and to be interfaced to the associated work of other related trades.

4. BMS Contractor: The single Contractor to provide the work of this Division. This Contractor shall be the primary manufacturer, installer, commissioner and ongoing service provider for the BMS work.

5. Control Sequence: A BMS pre-programmed arrangement of software algorithms, logical computation, target values and limits as required to attain the defined operational control objectives.

6. Direct Digital Control: The digital algorithms and pre-defined arrangements included in the BMS software to provide direct closed-loop control for the designated equipment and controlled variables. Inclusive of Proportional, Derivative and Integral control algorithms together with target values, limits, logical functions, arithmetic functions, constant values, timing considerations and the like.

7. BMS Network: The total digital on-line real-time interconnected configuration of BMS digital processing units, workstations, panels, sub-panels, controllers, devices and associated elements individually known as network nodes. May exist as one or more fully interfaced and integrated sub-networks, LAN, WAN or the like.

8. Node: A digitally programmable entity existing on the BMS network.

9. BMS Integration: The complete functional and operational interconnection and interfacing of all BMS work elements and nodes in compliance with all applicable codes, standards and ordinances to provide a single coherent BMS as required by this Division.

10. Provide: The term “Provide” and its derivatives when used in this Division shall mean to furnish, install in place, connect, calibrate, test, commission, warrant, document and supply the associated required services ready for operation.

11. PC: Personal Computer from a recognized major manufacturer or a virtual equivalent provided by, or with the consent of the owner.

12. Furnish: The term “Furnish” and its derivatives when used in this Division shall mean supply at the BMS Contractor’s expense to the designated third party trade contractor for installation. BMS Contractor shall connect furnished items to the BMS, calibrate, test, commission, warrant and document.

13. Wiring: The term “Wiring” and its derivatives when used in this Division shall mean provide the BMS wiring and terminations.

14. Install: The term “Install” and its derivatives when used in this Division shall mean receive at the jobsite and mount.

15. Protocol: The term “protocol” and its derivatives when used in this Division shall mean a defined set of rules and standards governing the on-line exchange of data between BMS network nodes.

16. Software: The term “software” and its derivatives when used in this Division shall mean all of programmed digital processor software, preprogrammed firmware and project specific digital process programming and database entries and definitions as generally understood in the BMS industry for real-time, on-line, integrated BMS configurations.

17. The use of words in the singular in these Division documents shall not be considered as limiting when other indications in these documents denote that more than one such item is being referenced.

18. Headings, paragraph numbers, titles, shading, bolding, underscores, clouds and other symbolic interpretation aids included in the Division documents are for general information only and are to assist in the reading and interpretation of these Documents.

19. The following abbreviations and acronyms may be used in describing the work of this Division:

AHJ	Authority Having Jurisdiction
AI	Analog Input
AO	Analog Output
AWG	American Wire Gauge
BTL	BACnet® Testing Laboratories
CPU	Central Processing Unit
DDC	Direct Digital Control
DI	Digital Input
DO	Digital Output
EEPROM	Electronically Erasable Programmable Read Only Memory
EMI	Electromagnetic Interference

HD	High Definition
HOA	Hand-Off-Auto
I/O	Input/Output
IT	Information Technology
LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MCC	Motor Control Center
NC	Normally Closed
NO	Normally Open
OAT	Outdoor Air Temperature
OEM	Original Equipment Manufacturer (Private label)
OWS	Operator Workstation
PC	Personal Computer
ppm	parts per million
RAM	Random Access Memory
RF	Radio Frequency
RFI	Radio Frequency Interference
RH	Relative Humidity
ROM	Read Only Memory
RTD	Resistance Temperature Device
TCP/IP	Transmission Control Protocol/Internet Protocol
UPS	Uninterruptible Power Supply
VAC	Volts, Alternating Current
VAV	Variable Air Volume
VDC	Volts, Direct Current
VPN	Virtual Private Network
VSD	Variable Speed Drive
WAN	Wide Area Network

1.C BMS SYSTEM DESCRIPTION

1. The BMS shall be a complete system designed for use with the enterprise IT systems. This functionality shall extend into the equipment rooms. Devices residing on the automation network located in equipment rooms and similar shall be fully IT compatible devices that mount and communicate directly on the IT infrastructure in the facility. Contractor shall be responsible for coordination with the owner's IT staff to ensure that the BMS will perform in the owner's environment without disruption to any of the other activities taking place on that LAN.

2. Any and all components of the BMS that are connected via field bus or IP network, including the network controllers, field controllers, application specific controllers, server and user interface software, system and controller programming tools and software applications shall be designed, engineered, and tested to work together as a complete building management system, and shall be manufactured by the same BMS manufacturer. Systems that use or require network controllers, field controllers, application specific controllers, server and user interface software, programming tools and software from more than one BMS manufacturer shall not be accepted.

3. All points of user interface shall be on standard computing devices that do not require the purchase of any special software from the BMS manufacturer for use as a building operations terminal. The primary point of interface on these devices will be a standard Web Browser.

4. Where necessary and as dictated elsewhere in these Specifications, Servers shall be used for the purpose of providing a location for extensive archiving of system configuration data, and historical data such as trend data and operator transactions. All data stored will be through the use of a standard data base platform: Microsoft SQL Server Express or Microsoft SQL Server as dictated elsewhere in this specification.

5. The work of the single BMS Contractor shall be as defined individually and collectively in all Sections of this Division specification together with the associated Point Sheets and Drawings and the associated interfacing work as referenced in the related documents.

6. The BMS work shall consist of the provision of all labor, materials, tools, equipment, software, software licenses, software configurations and database entries, interfaces, wiring, tubing, installation, labeling, engineering, calibration, documentation, samples, submittals, testing, commissioning, training services, permits and licenses, transportation, shipping, handling, administration, supervision, management, insurance, temporary protection, cleaning, cutting and patching, warranties, services, and items, even though these may not be specifically mentioned in these Division documents which are required for the complete, fully functional and commissioned BMS.

7. Provide a complete, neat and workmanlike installation. Use only manufacturer employees who are skilled, experienced, trained, and familiar with the specific equipment, software, standards and configurations to be provided for this Project.

8. Manage and coordinate the BMS work in a timely manner in consideration of the Project schedules. Coordinate with the associated work of other trades so as not to impede or delay the work of associated trades.

9. The BMS as provided shall incorporate, at minimum, the following integrated features, functions and services:

    a. Operator information, alarm management and control functions.

b. Information management including monitoring, transmission, archiving, retrieval, and reporting functions.

c. Diagnostic monitoring and reporting of BMS functions.

d. Energy management.

e. Standard applications for terminal HVAC systems.

f. Enterprise-wide information and control access.

g. Offsite monitoring and management access.

h. [Indoor Air Quality monitoring and control].

1.D QUALITY ASSURANCE

1. GENERAL

a. The BMS Contractor shall be the primary manufacturer-owned branch office that is regularly engaged in the engineering, programming, installation and service of total integrated BMS.

b. The BMS Contractor shall be a recognized national manufacturer, installer and service provider of BMS.

c. The BMS Contractor shall have a branch facility within a 100-mile radius of the job site supplying complete maintenance and support services on a 24 hour, 7-day-a-week basis. The BMS Contractor shall have, at this facility, a trained, directly employed and full time technical staff, spare parts inventory, and all necessary test and diagnostic equipment.

d. The BMS architecture shall consist of the products of a manufacturer regularly engaged in the production of BMS, and shall be the manufacturer's latest standard of design at the time of bid.

2. WORKPLACE SAFETY AND HAZARDOUS MATERIALS

a. Provide a safety program in compliance with the Contract Documents.

b. The BMS Contractor shall have a corporately certified comprehensive Safety Certification Manual and a designated Safety Supervisor for the Project.

c. The Contractor and its employees and subtrades shall comply with federal, state and local safety regulations.

d. The Contractor shall ensure that all subcontractors and employees have written safety programs in place that covers their scope of work, and that their employees receive the training required by the OSHA rules that have jurisdiction for at least each topic listed in the Safety Certification Manual.

e. Hazards created by the Contractor or its subcontractors shall be eliminated before any further work proceeds.

f. Hazards observed but not created by the Contractor or its subcontractors shall be reported to either the General Contractor or the Owner within the same day. The Contractor shall be required to avoid the hazard area until the hazard has been eliminated.

g. The Contractor shall sign and date a safety certification form prior to any work being performed, stating that the Contractor's company is in full compliance with the Project safety requirements.

h. The Contractor's safety program shall include written policy and arrangements for the handling, storage and management of all hazardous materials to be used in the work in compliance with the requirements of the AHJ at the Project site.

i. The Contractor's employees and subcontractor's staff shall have received training as applicable in the use of hazardous materials and shall govern their actions accordingly.

3. QUALITY MANAGEMENT PROGRAM

a. Designate a competent and experienced employee to provide BMS Project Management. The designated Project Manager shall be empowered to make technical, scheduling and related decisions on behalf of the BMS Contractor. At minimum, the Project Manager shall:

- Manage the scheduling of the work to ensure that adequate materials, labor and other resources are available as needed.
- Manage the financial aspects of the BMS Contract.
- Coordinate as necessary with other trades.
- Be responsible for the work and actions of the BMS workforce on site.

1.E REFERENCES

1. All work shall conform to the following Codes and Standards, as applicable:

a. National Fire Protection Association (NFPA) Standards.

b. National Electric Code (NEC) and applicable local Electric Code.

c. UL listing and labels.

d. UL 864 UUKL Smoke Control.

e. UL 268 Smoke Detectors.

f. UL 916 Energy Management.

g. NFPA 70 – National Electrical Code.

h. NFPA 90A – Standard For The Installation Of Air Conditioning And Ventilating Systems.

i. NFPA 92A and 92B Smoke Purge/Control Equipment.

j. Factory Mutual (FM).

k. American National Standards Institute (ANSI).

l. National Electric Manufacturer's Association (NEMA).

m. American Society of Mechanical Engineers (ASME).

n. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).

o. Air Movement and Control Association (AMCA).

p. Institute of Electrical and Electronic Engineers (IEEE).

q. American Standard Code for Information Interchange (ASCII).

r. Electronics Industries Association (EIA).

s. Occupational Safety and Health Administration (OSHA).

t. American Society for Testing and Materials (ASTM).

u. Federal Communications Commission (FCC) including Part 15, RF Devices.

v. Americans Disability Act (ADA).

w. ANSI/EIA 909.1-A-1999 (LonWorks®).

x. ANSI/ASHRAE Standard 195 (BACnet).

2. In the case of conflicts or discrepancies, the more stringent regulation shall apply.

3. All work shall meet the approval of the Authorities Having Jurisdiction at the project site.

1.F WORK BY OTHERS

1. The demarcation of work and responsibilities between the BMS Contractor and other related trades shall be as outlined in the BMS RESPONSIBILITY MATRIX.

BMS Responsibility Matrix

Work	Furnish	Install	Low Volt. Wiring/Tube	Line Power
BMS low voltage and communication wiring *[1] (note 1)	BMS	BMS	BMS	N/A
VAV box controller (note 2)	BMS	23*[2]	BMS	26
BMS conduits and raceway	BMS	BMS	BMS	BMS
VAV boxes	23	23	N/A	N/A
BMS Current Switches.	BMS	BMS	BMS	N/A
BMS Control Relays	BMS	BMS	BMS	N/A
Power distribution system monitoring interfaces	26	26	BMS	26
Elect. baseboard heating control (note 3)	23	26*[3]	N/A*[3]	26
All BMS Nodes, equipment, housings,	BMS	BMS	BMS	BMS

Work	Furnish	Install	Low Volt. Wiring/Tube	Line Power
enclosures and panels.				
VSDs	BMS	26	BMS	26
Computer Room A/C Unit field-mounted controls	23	23	BMS	26
Fan Coil Unit controls	BMS	BMS	BMS	26
Cabinet/Unit Heater controls (note 6)	BMS/23*6	26/BMS*6	BMS	26
Packaged RTU space mounted controls	23	BMS	BMS	26
Packaged RTU factory-mounted controls	23	23	BMS	26
Packaged RTU field-mounted controls	BMS	BMS	BMS	26
Starters, HOA switches	26	26	N/A	26
Control damper actuators	BMS	BMS	BMS	26

Footnotes:

*1. BMS low voltage and communications wiring: BMS Ethernet communications cable and IP infrastructure furnish and install by BMS Contractor or Division 26 Electrical Contractor as per options in Paragraph 2, A6 above.

*2. VAV box controller factory installation would normally be by Division 23 Mechanical who furnishes the VAV boxes; could be by BMS for field installation of special controllers, see item.

*3. Electric Baseboard Heating Controls – for line voltage stand-alone controls: furnished by Division 23 Mechanical Contractor who furnishes the baseboard units; line voltage controls installed and connected by Division 26 Electrical Contractor. Alternately, controls may be furnished and installed by BMS Contractors for projects requiring Baseboard Heating controls to be integrated into the BMS. Refer to Section 230993 SEQUENCE OF OPERATIONS.

*4. Smoke Detector also wired to shut down AHU/HVAC by BMS Contractor; Division 26 for projects NYC.

*5. Fire/Smoke Dampers: BMS Contractor to provide and ensure OPEN/CLOSE control of Fire/Smoke dampers as coordinated between BMS HVAC systems sequences, controls and overrides, and the Fire Alarm system control status priorities and overrides.

*6. Cabinet/Unit Heater Controls – for line voltage stand-alone controls: furnished by Division 23 Mechanical Contractor who furnishes the Cabinet/Unit Heaters; line voltage stand-alone controls installed and connected by Division 26 Electrical Contractor. Alternately, controls may be furnished and installed by BMS Contractors for projects requiring Cabinet/Unit Heater controls to be integrated into BMS. Refer to Section 230993 SEQUENCE OF OPERATIONS (end of this section).

1.G SUBMITTALS

1. SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

   a. The BMS contractor shall submit a list of all shop drawings with submittals dates within 30 days of contract award.

   b. Submittals shall be in defined packages. Each package shall be complete, shall only reference itself, and previously submitted packages. The packages shall be as approved by the Architect and Engineer for Contract compliance.

c. Allow 15 working days for the review of each package by the Architect and Engineer in the scheduling of the total BMS work.

d. Equipment and systems requiring approval of local authorities must comply with such regulations and be approved. Filing shall be at the expense of the BMS Contractor where filing is necessary. Provide a copy of all related correspondence and permits to the Owner.

e. Prepare an index of all submittals and shop drawings for the installation. Index shall include a shop drawing identification number, Contract Documents reference and item description.

f. The BMS Contractor shall correct any errors or omissions noted in the first review.

g. At a minimum, submit the following:

- BMS network architecture diagrams including all nodes and interconnections.
- Systems schematics, sequences, and flow diagrams.
- Points schedule for each point in the BMS, including: Point Type, Object Name, Expanded ID, Display Units, Controller type, and Address.
- Samples of Graphic Display screen types and associated menus.
- Detailed Bill of Material list for each system or application, identifying quantities, part numbers, descriptions, and optional features.
- Control Damper Schedule including a separate line for each damper provided under this section and a column for each of the damper attributes, including Code Number, Fail Position, Damper Type, Damper Operator, Duct Size, Damper Size, Mounting, and Actuator Type.
- Room Schedule including a separate line for each VAV box and/or terminal unit indicating location and address.
- Control Valve Schedules including a separate line for each valve provided under this section and a column for each of the valve attributes: Code Number, Configuration, Fail Position, Pipe Size, Valve Size, Body Configuration, Close off Pressure, Capacity, Valve CV, Design Pressure, and Actuator Type.
- Details of all BMS interfaces and connections to the work of other trades.
- Product data sheets or marked catalog pages including part number, photo and description for all products including software.

2. EXISTING SYSTEMS INVENTORY

   a. Where applicable, provide a complete and current BMS site inventory for all existing field and supervisory controllers to be integrated into the new BMS including manufacturer, model number, firmware version, available updates, battery condition, integrations, controlled equipment, and point counts.

   b. Site inventory shall be provided on a separate, new USB compatible flash drive.

1.H RECORD DOCUMENTATION

1. OPERATION AND MAINTENANCE MANUALS.

   a. Three (3) copies of the Operation and Maintenance Manuals shall be provided to the Owner's Representative upon completion of the project. The entire Operation and Maintenance Manual shall be furnished on Compact Disc media or USB Flash Drive, and include the following for the BMS provided:

      - Table of contents.
      - As-built system record drawings. Computer Aided Drawings (CAD) record drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal.
      - Manufacturer’s product data sheets or catalog pages for all products including software.
      - System Operator’s manuals.
      - Archive copy of all site-specific databases and sequences.
      - BMS network diagrams.
      - Interfaces to all third party products and work by other trades.

   b. The Operation and Maintenance Manual shall be self-contained, and include all necessary software required to access the product data sheets. Include a logically organized table of contents. Viewer software shall provide the ability to display, zoom, print, and search all documents.

2. On-Line documentation: After completion of all tests and adjustments the contractor shall provide a copy of all as-built information and product data to be installed on a customer designated computer workstation and server.

1.I WARRANTY

1. STANDARD MATERIAL AND LABOR WARRANTY:

   a. Provide a one-year labor and material warranty on the BMS.

   b. If within twelve (12) months from the date of acceptance of product, upon written notice from the owner, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the option of the BMS Contractor at the cost of the BMS Contractor.

c. Maintain an adequate supply of materials within 100 miles of the Project site such that replacement of key parts and labor support, including programming. Warranty work shall be done during BMS Contractor's normal business hours.

PART 2 – PRODUCTS

2.A GENERAL DESCRIPTION

1. The BMS shall use an open architecture and fully support a multi-vendor environment. To accomplish this effectively, the BMS shall support open communication protocol standards and integrate a wide variety of third party devices and applications. The system shall be designed for use on the Internet, or intranets using off the shelf, industry standard technology compatible with other owner provided networks.

2. The BMS shall consist of the following:

   a. Network Engine(s)

   b. Field Equipment Controller(s)

   c. Input/Output Module(s)

   d. Local Display Device(s)

   e. Portable Operator's Terminal(s)

   f. Distributed User Interface(s)

   g. Network processing, data storage and communications equipment

   h. Other components required for a complete and working BMS

3. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, controllers and operator devices, while re-using existing controls equipment.

4. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution.

   a. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

   b. The System shall maintain all settings and overrides through a system reboot.

5. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution.

6. The System shall comply with (UL) 864 (UUKL) Ninth Edition Smoke Control Listing including the UL 864 Ninth Edition Standard for Control Units and Accessories for Fire Alarm Systems.

   a. The System shall comply with the following NFPA Codes and Standards as applicable:

      i. NFPA 70 National Electrical Code.

ii. NFPA 72 National Fire Alarm Code.

iii. NFPA 101 Life Safety Code.

iv. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilation Systems.

v. NFPA 92B Guide for Smoke Management Systems in Malls, Atria, and Large Areas.

7. The System shall comply with the following International Code Council (ICC) Codes:

   a. Building Officials and code Administrators International (BOMA) model code.

   b. International Conference of Building Officials (ICBO) model code.

   c. Southern Building Code Congress International (SBCCI) regulations.

8. Acceptable Manufacturers

   a. Johnson Controls, Metasys.

   b. Honeywell, Enterprise Building Integrator (EBI).

   c. Siemens Building Systems, APOGEE.

2.B BMS SYSTEM ARCHITECTURE

1. AUTOMATION NETWORK

   a. The automation network shall be based on a PC industry standard of Ethernet TCP/IP. Where used, LAN controller cards shall be standard “off the shelf” products available through normal PC vendor channels.

   b. The BMS shall network multiple user interface clients, application and data servers, automation engines, system controllers and application-specific controllers including but not limited to:

      i. Network Automation Engines

      ii. Network Integration Engines

      iii. Network Control Engines

   c. Select Field Equipment Controllers

   d. Select VAV Modular Assemblies

   e. Third Party BACnet controllers and peripheral devices with compatibility listed by BACnet International

   f. Application and Data Server.

   g. All BMS devices on the automation network shall be capable of operating at a minimum communication speed of 100 Mbps, with full peer-to-peer network communication.

h. Network Security – To protect the BMS from unauthorized users and computer hackers the Automation Network shall support HTTPS with TLS 1.2 between components, including the Application and Data Server(s), Network Engines, Mobile User Interface and Site Management Portal. Self-signed certificates are installed on supported products, with the option of configuring trusted certificates. Computing devices supplied by the BMS vendor will automatically shut down unused ports to deter unauthorized access.

i. The automation network will be compatible with other enterprise-wide networks. Where indicated, the automation network shall be connected to the enterprise network and share resources with it by way of standard networking devices and practices.

2. CONTROL NETWORK

a. Network Engines (NAE, NIE, NCE) shall provide supervisory control over the control network and shall selectively support the following communication protocols:

i. BACnet Standard Master-Slave/Token-Passing (MS/TP) Bus Protocol ASHRAE SSPC-135:

a) The NAE shall be BTL certified and carry the BTL Label.

b) The NAE shall be tested and certified as a BACnet Building Controller (B-BC).

ii. The Johnson Controls N2 Field Bus.

iii. Modbus® TCP and RTU.

b. Control networks shall provide either “Peer-to-Peer”, Master-Slave, or Supervised Token Passing communications, and shall operate at a minimum communication speed of 9600 baud.

c. Control network shall support digital controllers as indicated in plans and specifications.

d. Default control network communication protocol for this project shall be BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135.

e. A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided for each controller device (master or slave) that will communicate on the BACnet MS/TP Bus.

f. The PICS shall be submitted 10 days prior to bidding.

3. INTEGRATION: **BACNET**

4. HARDWIRED

i. Analog and digital signal values shall be passed from one system to another via hardwired connections.

ii. There will be one separate physical point on each system for each point to be integrated between the systems.

g. Direct Protocol (Integrator Panel)

i. The BMS system shall include appropriate hardware equipment and software to allow bi-directional data communications between the BMS system and third party manufacturers' control panels. The BMS shall have the ability to receive, react to, and return information from multiple building systems, variable frequency drives, power monitoring system, and gas.

ii. All data required by the application shall be mapped into the Automation Engine's database, and shall be transparent to the operator.

iii. Point inputs and outputs from the third party controllers shall have real-time interoperability with BMS software features such as: Control Software, Energy Management, Custom Process Programming, Alarm Management, Historical Data and Trend Analysis, Totalization, and LAN Communications.

h. BACnet Protocol Integration – BACnet

i. The neutral protocol used between systems will be BACnet IP and comply with the ASHRAE BACnet standard 135.

ii. A complete Protocol Implementation Conformance Statement (PICS) shall be provided for all BACnet system devices.

iii. The ability to command, share point object data, change of state (COS) data and schedules between the host and BACnet systems shall be provided.

2.C USER INTERFACE

5. MOBILE, WEB BASED, USER INTERFACE (MUI)

a. GENERAL

i. The mobile, web based, user interface shall be HTML5-compliant and provide device-agnostic access to the system from smartphones, tablets, portable and desktop computers. User Interfaces that require software installation on the client device (e.g. Java, MicrosoftSilverlight®, Adobe® Flash®), or software downloads from an online app store shall not be acceptable for these purposes.

ii. The mobile user interface shall provide system operators with a simple location-based navigation approach to finding information, including the ability to search for any location by name and to bookmark a location in a standard browser.

iii. The mobile user interface shall organize and display information using customer specific locations and spaces. At a minimum, the user interface shall provide:

- Organization of all space, equipment and point information in a familiar way (using standard equipment names and location descriptions), reducing the need for extensive training prior to use.

- A navigation mechanism or tree for users to select the specific location or space for accessing information – only spaces and locations in the navigation tree or equipment serving that space, nothing more.
- The ability to search for and/or bookmark any location, space, or equipment by name for quick access to critical or troublesome areas.
- Application of the same navigation mechanisms across any client device (e.g. Smart phone, tablet, personal computer) for consistency and ease of use.

iv. The same user interface elements shall be accessible from any type of personal computer or mobile device running any type of operating system supported (e.g. iOS, Android, Windows®). It shall automatically adapt and optimize the display for the screen size and touch screen navigation.

v. The user interface shall provide support for up to 50 concurrent users from individuals with defined access to the system.

vi. Specific hardware and software types in the Network tree shall also include access to one or more the following views in their dashboard depending on hardware type or network element (e.g. MS/TP trunk):

- Summary View
- Diagnostic View
- Network View
- Trend View

vii. It shall be possible to hide the Network Tree and return to the Spaces Tree at any time by clicking on the Spaces Icon above the tree.

b. DASHBOARD DISPLAYS

i. The user interface shall provide the ability to view equipment visualizations, floor plans, and/or other graphics on mobile or desktop client devices in a browser environment, without the need for additional plugins or software. Graphics shall be accessible via a space (for floorplans, campus maps, etc.) or equipment dashboard.

ii. Standard dashboards shall be configured for each defined space including one of the following predefined or custom elements:

- Equipment Serving Space
- Potential Problem Areas
- Equipment Summary
- Graphic Display (if specified)
- Schedule

iii. Standard dashboards shall be configured for each system or device (typ. mechanical or electrical equipment) including the following predefined or custom elements:

- Trend
- Equipment Activity Summary
- Equipment Relationships Summary
- Equipment Data

- Graphic Display (if specified)
- Schedule

iv. Users with appropriate permissions shall have access to a Dashboards Manager that can change the display order of Summaries and Data elements, add or remove elements and apply custom dashboards layouts to equipment and space by type.

v. Dashboard Manager shall apply dashboards to spaces or equipment based on the viewing platform (Desktop/Tablet or Phone) in order to tailor the user experience to the needs of the specific user base.

vi. Default dashboard displays by space and equipment type shall be created per the guidelines in this specification or by mutual agreement with the owner's representative.

c. ALARM MANAGEMENT

i. The user interface shall provide a single display of all potential issues in a facility including items currently in alarm, warning, override, out-of-service and offline.

ii. The user interface shall provide notification of new alarms, visually and audibly.

iii. The user interface shall provide the ability to view a summary of alarms, including a chart of the number of alarms in each of the defined alarm priority ranges. The priority ranges should be filterable.

iv. The user interface shall provide the capability to view multiple occurrences of the same alarm, ultimately providing the ability to acknowledge or discard all occurrences of the alarm in a single action.

v. The user interface shall provide the capability to view, and filter on, all alarms present in a well-defined mechanical system using the equipment serving equipment relationships.

vi. The user interface shall provide the capability to acknowledge and discard all occurrences of at least 1000 alarms in one operation.

vii. The user interface shall provide the user with the understanding of what physical space is being affected when an alarm occurs. The user interface shall provide the ability to filter alarms by physical space affected when the alarm occurred.

viii. The user interface shall provide the capability to monitor alarms 24/7 without requiring an active login to the system, accessible via segregated web page. The user interface shall provide the capability to enabled or disable the 24/7 alarm monitor mode if desired.

d. EQUIPMENT ACTIVITY SUMMARY

i. The user interface shall provide a filterable, single display, of all activity related to a specific piece of equipment including user changes, discarded user changes, pending alarms, discarded alarms, and acknowledged alarms for at least one year of historical data.

ii. Items shall be listed in timed order with the latest activity at the top of the list.

iii. Filters shall allow only specific activities for specific data points occurring within a specific time and date window to be displayed.

iv. It shall be possible to export a .csv copy of the currently displayed summary by clicking or tapping on the export icon.

v. It shall be possible to create a custom trend graph containing the data shown in the currently displayed summary by tapping or clicking on the trend icon in the header bar and selecting the specific points to trend in the resulting selection panel.

vi. Clicking on the information icon in front of any displayed activity listed in the summary shall expand the display to include the name of the user, server time, value prior to the activity, the ability to annotate the activity and a user selectable icon for displaying a trend graph of the point.

e. EQUIPMENT DATA SUMMARY

i. The user interface shall provide a summary of all data pertaining to a particular piece of mechanical or electrical equipment in a tabular format.

ii. Clicking or tapping on any value in the summary shall display a related command panel allowing the user to command, override, or change service condition of the point selected and to annotate such actions for future reference.

iii. It shall be possible to export a .pdf copy of the report with a single click on the associated export icon.

f. EQUIPMENT SERVING SPACE SUMMARY

i. The user interface shall provide a summary of all mechanical and electrical equipment as defined in the points list that serves a selected space from the navigation tree.

ii. The summary shall be capable of including a subset of the viewable points for each system representing the key elements of interest to operators without subjecting them to long lists of points irrelevant to basic operation.

iii. Clicking or tapping on any item in the summary shall navigate to the item’s assigned home page in the user interface.

iv. It shall be possible to view a custom trend of information contained in the summary with a single click of the trend icon residing in the title header.

v. It shall be possible to display specific systems and points by filtering equipment types desired.

vi. Because the data is intended to be a snapshot of the current conditions in the space it shall not dynamically update but a click or tap on the update icon at any time performs that function.

g. POTENTIAL PROBLEM AREAS

i. The user interface shall provide a summary of all points in the system related to the space that are not operating correctly (e.g. alarm, off normal or not communicating correctly) in order to provide the operator with a quick update on current conditions.

ii. The information shall include:

- Point status (via color.)
- Point name.
- Value of the point when the summary was taken.
- Equipment that contains the offending point.
- Space that is served by that equipment.

iii. Data points in the summary may be filtered by one or more types of off-normal condition (e.g. above setpoint, offline and overridden).

iv. The summary may be exported in .csv format for inclusion in spreadsheets or other documents.

h. EQUIPMENT SUMMARY

i. The user interface shall provide a summary that allows the user to compare all similar equipment that serves the space as well as downstream (child) spaces in order to evaluate conditions quickly and determine patterns for troubleshooting purposes.

ii. Each unique equipment type shall be selectable and display a representative set of values along with the space(s) being served by the device. Equipment types can be selected from a dropdown menu in the summary.

iii. Clicking or tapping on a selected device in the summary shall navigate to the home page for that piece of equipment while clicking or tapping a data point shall display the command panel for that point.

iv. It shall be possible to export a .pdf copy of the currently displayed summary by clicking or tapping on the export icon.

v. It shall be possible to create a custom trend graph containing the data shown in the currently displayed summary by clicking on the trend icon in the header bar and selecting the specific points to trend in the resulting selection panel.

i. USER DEFINED SUMMARIES

i. Provide the capability to view, command, and modify large quantities of similar data in summaries without the use of a secondary application (e.g. a spreadsheet). These summaries shall be generated automatically or user defined. User defined summaries shall allow up to seven user defined columns describing attributes to be displayed including custom column labels with up to 100 rows per summary.

j. TREND

i. The user interface shall provide the capability to view historical trend data from multiple pieces of equipment in both bar and line formats.

ii. The user shall have the ability to navigate to a selection list of frequently viewed trends.

iii. Trend graphs shall have to ability to be smartly auto-generated based on equipment and space relationships.

iv. Each graph shall include a dedicated selection icon to export a copy of the graphic and data in .pdf format or the data only as a .csv file.

k. OPERATOR ACCESS

i. The user interface shall provide the ability to segment access to building data based on the space(s) or location(s) the user is physically located in and/or manages. The user interface shall provide the capability to assign “inherited” space permissions and the ability to assign user’s space based access in bulk.

ii. The user interface shall provide the ability to segment access to building data based on the space(s) or location(s) the user is physically located in and/or manages. The user interface shall provide the capability to assign “inherited” space permissions and the ability to assign user’s space based access in bulk.

l. GRAPHICS

i. The user interface shall display an equipment visualization or graphic within the context of its associated space (building, floor, room, etc.) or equipment dashboard.

ii. Graphics shall include the ability to define individual information layers for operator selection in order to clarify systems status and simplify operation on mobile devices. Where desired a master layer may be defined to include important information about the facility on all graphic screens.

iii. Graphics shall support the use of photo-realistic symbols as well as color change and animation to match the status of the related system control point.

iv. It shall be possible to export a time stamped .pdf file of the graphic being viewed in order to communicate the current conditions in the space or the equipment being viewed and to provide a historic record.

v. An integral graphic manager shall be provided including the following features and capabilities:

- Creation and modification of graphics from any HTML5 capable browser without the need for additional plug-ins or software packages.
- Access to a full suite of pre-defined templates for air and water sourced HVAC applications as well as the ability to add custom templates as created for other use. Pre-aliased graphic templates may be defined and saved for repetitive representations of common mechanical and electrical equipment.
- A full suite of pre-defined three dimensional symbols for mechanical and electrical systems as well as all line, text and shape tools required for integration into a graphic with zoom and pan capabilities on multiple platforms and in multiple browsers.

- The ability to search and replace items in multiple graphics with a single command.
- The ability to import and insert photos and images into the graphic.
- The ability of the graphics manager to create and edit graphics including the ability to bind graphic elements to the values and conditions of system points in both an on-line and off-line mode.

vi. As required, the BMS Contractor shall provide software licenses in the name of the owner for programming, configuration and graphics building tools to allow designated representatives to make changes, modifications or additions to the system. While future updates or revisions may require an update fee, the owner shall incur no additional cost if they choose not to update. Systems that require any annual or time-limited licensing fees shall not be permitted.

m. SCHEDULING

i. The user interface shall provide the capability to display, in a singular view, all of the effective schedules in the context of the space (building/floor/room, etc.) or equipment that the schedule effects. The software should have the ability to display an effective schedule, for the present, or a future date.

ii. The user interface shall provide a report of all schedules affecting a space or equipment. The report shall provide the user details of events that comprise the weekly schedule and exception schedule(s). The report shall provide a means of viewing individual breakout scheduling elements for Weekly Schedule, Exceptions and Default Commands.

iii. The user interface shall provide the capability to efficiently change or modify schedules in mass quantities. This includes the capability to add, in bulk, exceptions to schedules, in addition to assigning, in bulk, weekly schedules.

n. COMMAND AND CONTROL

i. It shall be possible to command system analog and binary points via a dropdown menu accessed by clicking or tapping on the value shown in any equipment summary or graphic display and completing the task in the resultant menu including an optional annotation.

ii. Commanding multiple points shall be possible on displays where multiple like system elements can be chosen.

o. OFFLINE OPERATION

i. The mobile user interface shall have the ability to operate in an offline mode in order to create or edit graphics and dashboard elements.

ii. Content created offline shall be available to all authorized users for inclusion of an operating user interface later.

6. SITE MANAGEMENT PORTAL AND ASSOCIATED APPLICATION COMPONENTS

a. General – The Site Management Portal and its user interface shall serve as the primary tool for creation and maintenance of the BMS.

b. All features and functions of the Site Manager and associated user Interface defined in this document shall be available on any computer connected directly or via a WAN/VPN to the automation network and conforming to the following specifications.

c. The software shall run be accessible and operational on a Microsoft Internet Explorer (11.0 or higher) browser and support the following functions:

   i. Configuration.

   ii. Commissioning.

   iii. Data Archiving.

   iv. Monitoring.

   v. Commanding.

   vi. System Diagnostics.

d. Minimum hardware requirements for client devices:

   i. 8GB RAM.

   ii. 3.0 GHz Clock Speed Intel Microprocessor.

   iii. 100 GB Hard Drive (free space for cut and paste/screen captures.)

   iv. SVGA 1024x768 resolution display with 64K colors and 16 bit color depth.

   v. Mouse or other pointing device.

e. Operator Interface

   i. An integrated browser based client application shall be provided as the user interface program for operators familiar with the detailed operation of the BMS and charged with the maintenance and optimization of the mechanical/electrical systems in the facility.

   ii. The System shall employ an event-driven rather than a device polling methodology to dynamically capture and present new data to the user.

   iii. All Inputs, Outputs, Setpoints, and all other parameters as defined within Part 3, shown on the design drawings, or required as part of the system software, shall be displayed for operator viewing and modification from the operator interface software.

   iv. The user interface software shall provide help menus and instructions for each operation and/or application.

   v. The system shall support customization of the user interface configuration and a home page display for each operator.

   vi. The system shall support user preferences in the following screen presentations:

      - Alarm.

- Trend.
- Display.
- Applications.

vii. All controller software operating parameters shall be displayed for the operator to view/modify from the user interface. These include: setpoints, alarm limits, time delays, PID tuning constants, run-times, point statistics, schedules, and so forth.

viii. The Operator Interface shall incorporate comprehensive support for functions including, but not necessarily limited to, the following:

- User access for selective information retrieval and control command execution.
- Monitoring and reporting.
- Alarm, non-normal, and return to normal condition annunciation.
- Selective operator override and other control actions.
- Information archiving, manipulation, formatting, display and reporting.
- BMS internal performance supervision and diagnostics.
- On-line access to user HELP menus.
- On-line access to current BMS as-built records and documentation.
- Means for the controlled re-programming, re-configuration of BMS operation and for the manipulation of BMS database information in compliance with the prevailing codes, approvals and regulations for individual BMS applications.

ix. The system shall support a list of application programs configured by the users that are called up by the following means:

- The Tools Menu.
- Hyperlinks within displays.
- Key sequences.

x. The operation of the control system shall be independent of the user interface, which shall be used for operator communications only. Systems that rely on an operator workstation to provide supervisory control over controller execution of the sequences of operations or system communications shall not be acceptable.

f. Alarms

i. Alarms shall be routed directly from Network Automation Engines to PCs and servers. It shall be possible for specific alarms from specific points to be routed to specific PCs and servers. The alarm management portion of the user interface shall, at the minimum, provide the following functions:

- Log date and time of alarm occurrence.
- Generate a “Pop-Up” window, with audible alarm, informing a user that an alarm has been received.

- Allow a user, with the appropriate security level, to acknowledge, temporarily silence, or discard an alarm.
- Provide an audit trail on hard drive for alarms by recording user acknowledgment, deletion, or disabling of an alarm. The audit trail shall include the name of the user, the alarm, the action taken on the alarm, and a time/date stamp.
- Provide the ability to direct alarms to an e-mail address or alphanumeric pager. This must be provided in addition to the pop up window described above. Systems that use e-mail and pagers as the exclusive means of annunciating alarms are not acceptable.
- Configuration of which NAE offline alarms are seen by each user.
- Any attribute of any object in the system may be designated to report an alarm.

ii. The BMS shall annunciate diagnostic alarms indicating system failures and non-normal operating conditions.

iii. The BMS shall allow a minimum of 4 categories of alarm sounds customizable through user defined .wav files.

iv. The BMS shall annunciate application alarms at minimum, as required by Part 3.

g. Reports and Summaries

i. Reports and Summaries shall be generated and directed to the user interface displays, with subsequent assignment to printers, or disk. As a minimum, the system shall provide the following reports:

- All points in the BMS.
- All points in each BMS application.
- All points in a specific controller.
- All points in a user-defined group of points.
- All points currently in alarm.
- All points locked out.
- All user defined and adjustable variables, schedules, interlocks and the like.

ii. Summaries and Reports shall be accessible via standard user interface functions and not dependent upon custom programming or user defined HTML pages.

iii. Selection of a single menu item, tool bar item, or tool bar button shall print any displayed report or summary on the system printer for use as a building management and diagnostics tool.

iv. Provide the capability to view, command and modify large quantities of similar data in tailored summaries created online without the use of a secondary application like a spreadsheet. Summary definition shall allow up to seven user defined columns describing attributes to be displayed including custom column labels. Up to 100 rows per summary shall be supported. Summary viewing shall be available over the network using a standard Web browser.

v. Provide a focused set of reports that includes essential information required for effective management of energy resources within the facility. Energy reports shall be configurable from predefined, preconfigured templates. Reports shall be selectable by date, time, area and device. Each report shall include a color visual summary of essential energy information. Required items:

- Energy Overview.
- Load Profile.
- Simple Energy Cost.
- Consumption.
- Equipment Runtime.
- Electrical Energy.
- Energy Production.

h. Schedules

i. A graphical display for time-of-day scheduling and override scheduling of building operations shall be provided. At a minimum, the following functions shall be provided:

- Weekly schedules.
- Exception Schedules.
- Monthly calendars.

ii. Weekly schedules shall be provided for each group of equipment with a specific time use schedule.

iii. It shall be possible to define one or more exception schedules for each schedule including references to calendars.

iv. Monthly calendars shall be provided that allow for simplified scheduling of holidays and special days for a minimum of five years in advance. Holidays and special days shall be user-selected with the pointing device or keyboard, and shall automatically reschedule equipment operation as previously defined on the exception schedules.

v. Changes to schedules made from the User Interface shall directly modify the schedule database stored in an engine or server.

vi. Schedules and Calendars shall comply with ASHRAE SP135/2008 BACnet Standard.

vii. The Calendar object supports an option to add a reference to another Calendar Object that is designated to be the master for the facility. Any Supervisory and BAC calendars can be configured to reference a single master Global Calendar. Changes to the master global calendar are automatically synced with all calendars that are referenced.

viii. Selection of a single menu item or tool bar button shall print any displayed schedule on the system printer for use as a building management and diagnostics tool.

ix. Software shall be provided to configure and implement optimal start and stop programming based on existing indoor and outdoor environmental conditions as well as equipment operating history.

i. Security/Passwords

i. Multiple-level passwords access protection shall be provided via roles and permissions. The feature will allow the system to base access on a user's job title or role and allow the user/manager access interface control, display, and database manipulation capabilities based on an assigned password.

ii. Roles may be copied and altered to meet specific roles and permissions based on the particular policies.

iii. Each user shall have the following: a user account name (with a maximum of 30 characters), a complex password or passphrase (with a min of 8 characters and a max of 50 characters), other user account policies (such as session timeout), timesheet access based on day of the week and time of day, and specific user view.

iv. The system shall allow each user to change his or her password at will.

v. When entering or editing passwords, the system shall not echo the actual characters for display on the monitor.

vi. A maximum of 150 categories may be used to determine or assign areas of responsibilities to each user account. A maximum of 13 (of the 150) named categories which are specifics such as "No Access, View, Advanced Review, Operate, Intervene, Diagnostic, Manage Item Events, Manage Every, and Configure Items".

vii. A minimum of 100 unique passwords shall be supported.

viii. Operators shall be able to perform only those commands available for their respective passwords. Display of menu selections shall be limited to only those items defined for the access level of the password used to log-on.

ix. Operators shall be further limited to only access, command, and modify those buildings, systems, and subsystems for which they have responsibility. Provide a minimum of 100 categories of systems to which individual operators may be assigned.

x. The system shall automatically generate a report of log-on/log-off and system activity for each user. Any action that results in a change in the operation or configuration of the control system shall be recorded, including: modification of point values, schedules or history collection parameters, and all changes to the alarm management system, including the acknowledgment and deletion of alarms.

xi. The system shall have the ability to provide a Department of Defense (DoD) specific warning banner for applicable sites that warns the user they are accessing a restricted site.

xii. After successful login to the Site Management Portal (SMP) the last time and date that user name was previously logged in is shown on the screen.

xiii. Each login attempt is recorded in the system Audit Log with the option to record the IP address of the PC that made the login.

j. Trend data viewing and analysis

i. Provide a trend viewing utility that shall have access to all database points.

ii. It shall be possible to retrieve any historical database point for use in displays and reports by specifying the point name and associated trend name.

iii. The trend viewing utility shall have the capability to define trend study displays to include multiple trends.

iv. Displays shall be able to be single or stacked graphs with on-line selectable display characteristics, such as ranging, color, and plot style.

v. Display magnitude and units shall both be selectable by the operator at any time without reconfiguring the processing or collection of data. This is a zoom capability.

vi. Display magnitude shall automatically be scaled to show full graphic resolution of the data being displayed.

vii. The Display shall support the user's ability to change colors, sample sizes, and types of markers.

k. Database Management

i. Where a separate SQL database is utilized for information storage the System shall provide a Database Manager that separates the database monitoring and managing functions by supporting two separate windows.

ii. Database secure access shall be accomplished using standard SQL authentication including the ability to access data for use outside of the Building Automation application.

iii. The database managing function shall include summarized information on trend, alarm, event, and audit for the following database management actions:

- Backup.
- Purge.
- Restore.

7. MOBILE ACCESS PORTAL GATEWAY

a. General: The Mobile Access Portal (MAP) Gateway shall provide a complementary extension to the DDC system user interface requirements previously described in these specifications. The MAP Gateway shall provide an HTML5 browser interface between mobile devices and DDC controllers without the requirement for operational

engines or servers. A task specific mobile application shall not be required to use the MAP Gateway.

i. The MAP Gateway shall be a hardware/software device which consists of a combination WiFi Access Point hotspot and user interface web server, with BACnet MS/TP RS-485 connectivity, and optional Ethernet IP connectivity.

ii. The MAP Gateway can be used tether free using its built in WiFi Access Point or it can be connected to an existing building network through the MAP Gateway Ethernet IP port. This feature may also be used to provide remote connectivity for accessing building controls through the site's IT infrastructure.

iii. When not connected via the Ethernet IP port, the MAP Gateway shall provide a secure, isolated connection to controllers on the BACnet MS/TP field bus with no opportunities to "jump off", or bridge over, to the site's IT infrastructure.

iv. The MAP Gateway shall serve up HTML5 web pages to allow authorized users to view and/or override controller inputs, outputs, setpoints, schedules, trends, and to view and acknowledge alarms via a browser interface.

v. The MAP Gateway shall not require the user to purchase or install any software or applications on the user's smart phone, tablet, PC, or smart device.

vi. MAP Functionality: The MAP Gateway shall be capable of serving pre-configured Web Pages to an HTML5 enabled browser. Authorized persons can interact with space and control application set points, alarms, schedules, and trends using a PC, iMac, notebook, smart phone, tablet, or mobile device with WiFi connectivity.

vii. The MAP Gateway shall include the following pre-configured user interface web pages linked to real-time data in the field controllers:

- Device List Page: Include a Device List Page that will allow the user to scroll through all of the controllers connected to the associated MS/TP Field Bus. When the MAP Gateway is plugged directly into a controller and/or its associated room sensor, the Device List Page will indicate which controller it is connected to. The Device List will show an alarm indication (if any are present) for each connected controller. The operator can click on any controller summary to advance to the Device Home Page.
- Device Home Page: Each controller on the MS/TP Field Bus will include a home page that can be selected on the Device List page. The Device Home Page will show the relevant value and status information for the respective controller using consistent summary graphics that are derived from the equipment model and/or standard control applications libraries. The summary graphic will change to red if there is an alarm present for that controller. The Device Home Page will also show an alarm indication box for the highest priority alarm for that controller.
- Device Alarm Page: An Alarm Page shall allow the user to toggle between a list of Active Alarms or All Alarms. The Alarm Page shall be organized to automatically show the highest priority alarm indication for each connected device. The Alarm Page will display color differentiation of alarm priorities. The Alarm Page will provide an accordion pull-down view of reoccurring alarms, showing the date-time stamp of the alarms.

- Point View/ Edit Page: The Device Home Page shall provide a slide-over menu for each device, which will allow the user to select Point View/Edit Pages. The Point View/Edit Page will provide a scrolling list of all of the input and output points for each device, along with their respective software points. The Point View/Edit page will show the point name, status/reliability, and current value in the appropriate engineering units. An icon will appear for points that can be overridden or edited; clicking on the icon will open a point edit dialog screen. The point edit screen will show the pre-configured minimum and maximum limits; changing the point value can be done with a slider or mobile keyboard. Ex. For a VAV box controller, the technician can change temperature set points, change minimum and maximum velocity set point, display room temperature, and display duct velocity.

viii. Audit Log: Provides a log of user actions on MAP Gateway device that Administrators may download. The Audit Log will be stored in non-volatile memory so that it persists on device restarts. Audit Log messages will include data/time stamp, current user, current device name and address (commands only), and commanded value (commands only).

ix. Tailored Summary: Provides the ability to set up a custom summary tailored to the specific needs of the operator and the capabilities of the connected equipment. Tailored summaries can aggregate and display information from multiple controllers on a field bus.

x. Live Trend: Provides users with the ability to specify up to 3 points from a controller to trend in near real-time. The user shall have the ability to choose the sample interval and the total time covered in the display (x-axis). The system will create an appropriate y-axis automatically. Each trended variable shall be identified by unique color and symbol.

xi. Airflow Balancing: The gateway shall provide a tool for VAV box commissioning and air balancing for controllers provided under this specification. Connectivity to the individual boxes will not require connection to each controller but rather a connection to a single device on the MS/TP network within WiFi range.

xii. Report Creation: It shall be possible to create reports that summarize system status and setpoints and to forward those reports to a central repository for the creation of as-built summaries or commissioning documents.

b. RS-485 connectivity and connections.

i. The MAP Gateway shall include an RS-485 Port configured as BACnet MS/TP Master. Communications with devices and field controllers shall be possible via the following modes; all of these connections will provide access to all controllers on the MS/TP Field Controller bus:

- Connecting to a Smart Equipment Controller through the Sensor-Actuator Bus (SA Bus) RJ12 jack.
- Connecting to a field controller through the field controller SA Bus RJ12 jack.
- Connecting to the SA Bus of the field controller from a network room sensor via the RJ12 jack on the network room sensor.
- Connecting directly to the field controller bus, using an RJ12 to Terminal Block adaptor.

ii. The MAP Gateway power may be supplied via the SA Bus, the field controller bus, or a micro USB port.

c. USB connection: The MAP Gateway shall include a USB Port to provide access to MAP web pages through the USB port for stationary user interface configurations or USB connected equipment:

i. The USB port will follow USB 2.0 Network Device Profile.

ii. Network Profile will have similar security requirements to Ethernet Port with fixed IP Ports but no AES Encryption.

d. Multi-Client access: The MAP Gateway shall provide multi-client connectivity for up to three (3) simultaneous users, and shall provide three (3) password protected User Roles with automatic LOGOUT after 30 minutes of inactivity.

e. Security: In order to provide greater security for the enterprise-wide BMS, the MAP Gateway shall provide a user interface for interacting with the BMS without connecting to the enterprise-wide BMS. The Wi-Fi Port shall provide WPA2 Security with AES 128 Bit Encryption:

i. AP Only Operation or Client Mode to connect to other Wi-Fi networks.

ii. The MAP Gateway shall provide a WiFi to Ethernet Pass-thru option; this option shall be disabled by default.

iii. The MAP Gateway shall provide an option to disable the built-in Wi-Fi; this option shall only be available when the Ethernet connection is enabled.

iv. When connected to an enterprise or BMS specific IT infrastructure, the MAP Gateway shall be designed and connected for use inside of a firewall.

v. The MAP Gateway shall provide Authentication/Authorization.

vi. The MAP Gateway shall be certified as penetration tested by a professional agency that specializes in penetration testing for IT appliances and devices.

f. Navigation: the MAP Gateway pages shall be derived from the respective HVAC equipment model and/or standard HVAC control application. The pages use and support HTML5 navigation practices, such as click to select, slide over/down.

g. Installation and status indicators:

i. The MAP Gateway shall be designed to work as a portable device or it may be permanently mounted on site.

ii. Portable: The MAP Gateway shall include a preconfigured, flexible coiled RJ-12 Cable to connect in the field directly to controllers or through wall mounted room sensors with an RJ-12 port. The MAP Gateway shall include a protective Rubber Bumper Guard and a Lanyard.

iii. Stationary: The MAP Gateway shall include a Stationary Mounting Cradle to install the device in a panel. RJ-12 Cable, and an auto-switching 90-230 VAC Power Supply.

iv. Status Indication: The MAP Gateway shall provide LED lights to indicate overall operating condition and status, communications for the MS/TP bus connection, communications via the Ethernet connection, and WiFi connection and signal strength.

h. MAP Gateway web page configuration and linking:

i. The MAP Gateway shall provide automatic BACnet MS/TP device detection and connection, and automatic web page configuration and point linking.

i. Portable Operator Terminal:

i. For systems that do not provide full access to systems configuration and definition as defined in this section via a browser based user interface, the BMS Contractor shall provide a portable operator terminal for troubleshooting, commissioning, and programming purposes. The terminal shall be configured as follows:

- Personal Laptop Computer Manufacturer – Dell, Compaq or HP.
- 8GB RAM – Windows 10 Professional.
- 3.2 GHz Clock Speed Intel Microprocessor.
- 500 GB Hard Drive for storage of programs and historical data.
- (2) USB 3.0 ports minimum.
- 1 Standard QWERTY Keyboard with 83 keys minimum.
- Integral 2 button Track Point, Track Pad or Track Ball.
- 15” Wide Screen HD with minimum 1920x1080 resolution color display.
- Complete operator workstation software package, including any hardware or software tools required for required system functionality.
- Original printed manuals for all software and peripherals.
- Original installation media for all software, device drivers, and peripherals.
- Registration cards and paid-up licenses for all included software shall be provided to the Owner.
- Carrying case.
- Spare battery.
- External power supply/battery charger.

ii. Software:

- Portable operator terminals shall support all controllers within the system on a direct-connect communications basis.
- When used to access First or Second Tier controllers, the portable operator terminal shall utilize the standard operator workstation software, as previously defined.
- When used to access Application Specific Controllers, the portable operator terminal shall utilize either the standard operator workstation software, as previously defined, or controller-specific utility software.

iii. Proprietary Portable Terminal:

- Manufacturers providing proprietary portable terminals shall submit technical data sheets for the terminal and all associated software and hardware.

2.D NETWORK AUTOMATION ENGINES

1. GENERAL

a. The Network Automation Engine (NAE) shall be a fully user-programmable, supervisory controller. The NAE shall monitor the network of distributed application-specific controllers, provide global strategy and direction, and communicate on a peer-to-peer basis with other Network Engines.

b. Automation network – The NAE shall reside on the automation network and shall support a subnet of system controllers.

c. User Interface – Each NAE shall have the ability to deliver a web based User Interface using the Site Management Portal functionality previously described. All computers connected physically or virtually to the automation network shall have access to the web based user interface.

i. The web based user interface software shall be embedded in the NAE. Systems that require a local copy of the system database on the user's personal computer are not acceptable.

ii. The NAE shall support a minimum of two (2) concurrent users.

iii. The web-based user shall have the capability to access all system data through a single NAE.

iv. Remote users connected to the network through an Internet Service Provider (ISP) or telephone dial up shall also have total system access through one NAE.

v. Systems that require the user to address more than one NAE to access all system information are not acceptable.

vi. The NAE shall have the capability of generating web based user interface graphics. The graphics capability shall be embedded in the NAE.

vii. Systems that only support user interface graphics from a central database or require the graphics to reside on the user's personal computer are not acceptable.

viii. The web based user interface shall support the following functions using a standard version of Microsoft Internet Explorer:

- Configuration
- Commissioning
- Data Archiving
- Monitoring
- Commanding

- System Diagnostics

ix. Systems that require workstation software or modified web browsers for system queries are not acceptable.

x. The NAE shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems.

d. Processor – The NAE shall be microprocessor-based with a minimum word size of 32 bits. The NAE shall be a multi-tasking, multi-user, and real-time digital control processor. Standard operating systems shall be employed. NAE size and capability shall be sufficient to fully meet the requirements of this Specification.

e. Memory – Each NAE shall have sufficient memory to support its own operating system, databases, and control programs, and to provide supervisory control for all control level devices.

f. User Authentication – The NAE shall support local users, Active Directory users, Microsoft Office 365 users and Remote Authentication Dial-in User Service (RADIUS).

g. Password Security – Access to the embedded user interface shall require a password of 8 to 50 characters including a minimum of one lower case letter, one upper case letter, one number, and one special character. An alarm shall be generated after three unsuccessful attempts within 15 minutes and the user shall be denied access until permission is renewed by a system administrator.

h. Network Security – Communication between the NAE and other system networked devices including additional Network Engines, Application and Data Servers, Open Data Servers (BACnet listed OWS), and user interface clients shall be encrypted and support HTTPS with Transport Level Security (TLS) Version 1.2. Self-signed certificates are to be provided with the option of configuring trusted certificates.

i. Hardware Real Time Clock – The NAE shall include an integrated, hardware-Based, real-time clock.

j. Diagnostics – The NAE shall continuously perform self-diagnostics, communication diagnosis, and diagnosis of all panel components. The Network Automation Engine shall provide both local and remote annunciation of any detected component failures, low battery conditions, or repeated failures to establish communication.

k. Power Failure – In the event of the loss of normal power, The NAE shall continue to operate for a user adjustable period of up to 10 minutes after which there shall be an orderly shutdown of all programs to prevent the loss of database or operating system software.

i. During a loss of normal power, the control sequences shall go to the normal system shutdown conditions. All critical configuration data shall be saved into Flash memory.

ii. Upon restoration of normal power and after a minimum off-time delay, the controller shall automatically resume full operation without manual intervention through a normal soft-start sequence.

l. Certification – The NAE shall be listed by UL.

m. Controller network – The NAE shall selectively support the following communication protocols on the controller network:

i. The NAE shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135 on the controller network.

- The NAE shall support Remote field bus integration via a BACnet IP to MS/TP router.
- The NAE shall be BTL certified and carry the BTL Label.
- The NAE shall be tested and certified as a BACnet Building Controller (B-BC).
- A BACnet Protocol Implementation Conformance Statement shall be provided for the NAE.
- The Conformance Statements shall be submitted 10 days prior to bidding.

2. NETWORK AUTOMATION ENGINE – STANDARD

a. The NAE shall support a minimum of:

i. Fifty (50) BACnet Standard MS/TP controllers.

ii. Sixty-four (64) LonWorks FTT10 Free Topology control devices.

iii. Fifty (50) N2 control devices.

b. The NAE shall include troubleshooting LED indicators to identify the following conditions:

i. Power – On/Off.

ii. Ethernet Traffic – Ethernet Traffic/No Ethernet Traffic.

iii. Ethernet Connection Speed – 10 Mbps/100 Mbps.

iv. FC Bus – Normal Communications/No Field Communications.

v. Peer Communication – Data Traffic between NAE Devices.

vi. Run – NAE Running/NAE in Startup/NAE Shutting Down/Software Not Running.

vii. Bat Fault – Battery Defective, Data Protection Battery Not Installed.

viii. Fault – General Fault.

ix. Modem RX – NAE Modem Receiving Data (as required).

x. Modem TX – NAE Modem Transmitting Data (as required).

c. Communications Ports – The NAE shall provide the following ports for operation of operator I/O devices, such as industry-standard computers, modems, and portable operator's terminals:

i. USB port.

ii. RS-232 serial data communication port.

iii. RS-485 port.

iv. Ethernet port.

3. NETWORK AUTOMATION ENGINE – LARGE

a. The NAE shall support a minimum of:

i. One Hundred (100) BACnet Standard MS/TP controllers.

ii. One Hundred (100) N2 control devices.

b. The NAE shall include troubleshooting LED indicators to identify the following conditions:

i. Power – On/Off.

ii. Ethernet Traffic – Ethernet Traffic/No Ethernet Traffic.

iii. Ethernet Connection Speed – 10 Mbps/100 Mbps.

iv. FC Bus – Normal Communications/No Field Communications.

v. Peer Communication – Data Traffic between NAE Devices.

vi. Run – NAE Running/NAE in Startup/NAE Shutting Down/Software Not Running.

vii. Bat Fault – Battery Defective, Data Protection Battery Not Installed.

viii. Fault – General Fault.

ix. Modem RX – NAE Modem Receiving Data (as required).

x. Modem TX – NAE Modem Transmitting Data (as required).

c. Communications Ports – The NAE shall provide the following ports for operation of operator I/O devices, such as industry-standard computers, modems, and portable operator's terminals.

i. USB port.

ii. RS-232 serial data communication port.

iii. RS-485 port.

iv. Ethernet port.

d. Provide Johnson Controls NAE-45XX or approved equal as indicated on plans.

2.E NETWORK CONTROL ENGINES

1. NETWORK CONTROL ENGINES

   a. The Network Control Engine (NCE) shall be a fully user-programmable, supervisory controller. The NCE shall monitor the network of distributed application-specific controllers, provide global strategy and direction, and communicate on a peer-to-peer basis with other Network Automation Engines.

   b. The NCE shall be a fully user-programmable, digital controller that includes a minimum of 33 I/O points.

   c. Automation Network – The NCE shall reside on the automation network and shall support a subnet of 32 Field controllers.

   d. User Interface – Each NCE shall have the ability to deliver a web based user interface as previously described. All computers connected physically or virtually to the automation network shall have access to the web based user interface.

      i. The web based user interface software shall be embedded in the NCE. Systems that require a local copy of the system database on the user's personal computer are not acceptable.

      ii. The NCE shall support a minimum of two (2) concurrent users.

      iii. The NCE shall have the capability of generating web based user interface graphics. The graphics capability shall be embedded in the NCE.

      iv. Systems that only support user interface graphics from a central database or require the graphics to reside on the user's personal computer are not acceptable.

      v. The web based user interface shall support the following functions using a standard version of Microsoft Internet Explorer:

         - Configuration
         - Commissioning
         - Data Archiving
         - Monitoring
         - Commanding
         - System Diagnostics

      vi. Systems that require workstation software or modified web browsers are not acceptable.

      vii. The NCE shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems.

   e. User Authentication – The NCE shall support local users, Active Directory users, Microsoft Office 365 users and Remote Authentication Dial-in User Service (RADIUS).

   f. Password Security – Access to the embedded user interface shall require a password of 8 to 50 characters including a minimum of one lower case letter, one upper case letter, one number, and one special character. An alarm shall be generated after three unsuccessful attempts within 15 minutes and the user shall be denied access until permission is renewed by a system administrator.

g. Network Security – Communication between the NCE and other system networked devices including additional Network Engines, Application and Data Servers, Open Data Servers (BACnet listed OWS), and user interface clients shall be encrypted and support HTTPS with Transport Level Security (TLS) Version 1.2. Self-signed certificates are to be provided with the option of configuring trusted certificates.

h. The NCE shall employ a finite state programming to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals.

i. The NCE shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only, shall not be acceptable.

j. The NCE shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.

k. The NCE shall support the following number and types of inputs and outputs:

   i. Ten Universal Inputs – shall be configured to monitor any of the following:

      - Analog Input, Voltage Mode
      - Analog Input, Current Mode
      - Analog Input, Resistive Mode
      - Binary Input, Dry Contact Maintained Mode
      - Binary Input, Pulse Counter Mode

   ii. Eight Binary Inputs – shall be configured to monitor either of the following:

      - Dry Contact Maintained Mode
      - Pulse Counter Mode

   iii. Four Analog Outputs – shall be configured to output either of the following:

      - Analog Output, Voltage Mode
      - Analog Output, Current Mode

   iv. Seven Binary Outputs – shall output the following:

      - 24 VAC Triac

   v. Four Configurable Outputs – shall be configured to output either of the following:

      - Analog Output, Voltage Mode
      - Binary Output, 24 VAC Triac Mode

l. The NCE shall have the ability to monitor and control a network of sensors and actuators over a SA Bus.

   i. The SA Bus shall be a MS/TP Bus supporting BACnet Standard protocol SSPC-135.

   ii. The SA Bus shall support a minimum of 10 devices.

iii. The SA Bus shall operate at a maximum distance of 1,200 Ft. between the NCE and the furthest connected device.

m. The NCE shall have the capability to execute complex control sequences involving direct wired I/O points as well as input and output devices communicating over the Field Trunk or the SA Bus.

- Control definition for the chiller plant in a single FAC, FEC, or NCE, as supported by available memory and point I/O, or capable of being split across multiple FACs, FECs, or NCEs.

iv. Central heating plant applications.

v. Lighting and electrical distribution.

vi. Built-up air handling units for special applications.

vii. Power generation and energy monitoring equipment.

viii. Interfaces to security and fire detection systems.

n. The NCE shall support a Local Controller Display either as an integral part of the NCE or as a remote device communicating over the SA Bus.

i. The Display shall use a BACnet Standard SSPC-135 MS/TP protocol.

ii. The Display shall allow the user to view monitored points without logging into the system.

iii. The Display shall allow the user to view and change setpoints, modes of operation, and parameters.

iv. The Display shall provide password protection with user adjustable password timeout.

v. The Display shall be menu driven with separate paths for:

- Input/Output
- Parameter/Setpoint
- Overrides

vi. The Display shall use easy-to-read English text messages.

vii. The Display shall allow the user to select the points to be shown and in what order.

viii. The Display shall support a back lit LCD with adjustable contrast and brightens and automatic backlight brightening during user interaction.

ix. The display shall be a minimum of 4 lines and a minimum of 20 characters per line.

x. The Display shall have a keypad with no more than 6 keys.

xi. The Display shall be panel mountable.

o. The NCE shall be microprocessor-based with a minimum word size of 32 bits. The NAE shall be a multi-tasking, multi-user, and real-time digital control processor. Standard operating systems shall be employed. NCE size and capability shall be sufficient to fully meet the requirements of this Specification.

p. The NCE shall employ an industrial single board computer.

q. Each NCE shall have sufficient memory to support its own operating system, databases, and control programs, and to provide supervisory control for all control level devices.

r. The NCE shall include an integrated, hardware-based, real-time clock.

s. The NCE shall employ nonvolatile Flash memory to store all programs and data. The NCE shall employ a data protection battery to save data and power the real time clock when primary power is interrupted.

t. The NCE shall provide removable, color coded, screw terminal blocks for 24 VAC power, communication bus and I/O point field wiring.

u. The NCE shall include troubleshooting LED indicators to identify the following conditions:

- Power
- Fault
- SA Bus
- FC Bus
- Modem TX
- Modem RX
- Battery Fault
- Ethernet
- 10 LNK
- 100 LNK
- Run
- Peer Com

v. Communications Ports – The NCE shall provide the following ports for operation of operator I/O devices, such as industry-standard computers, modems, and portable operator's terminals.

i. USB port

ii. RS-232 serial data communication port

iii. RS-485 port

iv. RJ-45 Ethernet port

v. RJ-12 jack

w.

2. FIELD EQUIPMENT CONTROLLER

   a. The Field Equipment Controller (FEC) shall be a fully user-programmable, digital controller that communicates via BACnet MS/TP protocol or optionally via N2Open.

      i. The FEC shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135 on the controller network.

         - The FEC shall be BTL certified and carry the BTL Label.
         - The FEC shall be tested and certified as a BACnet Application Specific Controller (B-ASC).
         - A BACnet Protocol Implementation Conformance Statement shall be provided for the FEC.
         - The Conformance Statement shall be submitted 10 days prior to bidding.

   b. The FEC shall employ finite state programming to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals.

   c. Controllers shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable. The FEC shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.

   d. The FEC shall include troubleshooting LED indicators to identify the following conditions:

      i. Power On.

      ii. Power Off.

      iii. Download or Startup in progress, not ready for normal operation.

      iv. No Faults.

      v. Device Fault.

      vi. Field Controller Bus – Normal Data Transmission.

      vii. Field Controller Bus – No Data Transmission.

      viii. Field Controller Bus – No Communication.

      ix. SA Bus – Normal Data Transmission.

      x. SA Bus – No Data Transmission.

      xi. SA Bus – No Communication.

   e. The FEC shall accommodate the direct wiring of analog and binary I/O field points with the following minimum A/D and D/A conversion resolution.

      i. Provide a minimum 15 bit A/D resolution for analog inputs.

ii. Provide a minimum 15 bit D/A resolution for analog outputs.

f. The FEC shall support the following types of inputs and outputs:

i. Universal Inputs – shall be configured to monitor any of the following:

- Analog Input, Voltage Mode.
- Analog Input, Current Mode.
- Analog Input, Resistive Mode.
- Binary Input, Dry Contact Maintained Mode.
- Binary Input, Pulse Counter Mode.

ii. Binary Inputs – shall be configured to monitor either of the following:

- Dry Contact Maintained Mode.
- Pulse Counter Mode.

iii. Analog Outputs – shall be configured to output either of the following:

- Analog Output, Voltage Mode.
- Analog Output, current Mode.

iv. Binary Outputs – shall output the following:

- 24 VAC Triac.

v. Configurable Outputs – shall be capable of the following:

- Analog Output, Voltage Mode.
- Binary Output Mode.

g. The FEC shall have the ability to reside on a Field Controller Bus (FC Bus).

i. The FC Bus shall be a MS/TP Bus supporting BACnet Standard protocol SSPC-135.

ii. The FC Bus shall support communications between the FECs and the NAE.

iii. The FC Bus shall also support Input/Output Module (IOM) communications with the FEC and with the NAE.

iv. The FC Bus shall support a minimum of 100 IOMs and FECs in any combination.

v. The FC Bus shall operate at a maximum distance of 15,000 Ft. between the FEC and the furthest connected device.

h. The FEC shall have the ability to monitor and control a network of sensors and actuators over a SA Bus.

i. The SA Bus shall be a MS/TP Bus supporting BACnet Standard Protocol SSPC-135.

ii. The SA Bus shall support a minimum of 10 devices per trunk.

iii. The SA Bus shall operate at a maximum distance of 1,200 Ft. between the FEC and the furthest connected device.

i. The FEC shall have the capability to execute complex control sequences involving direct wired I/O points as well as input and output devices communicating over the FC Bus or the SA Bus.

j. The FEC shall support, but not be limited to, the following applications.

iv. Heating central plant applications.

v. Built-up air handling units for special applications.

vi. Terminal & package units.

vii. Special programs as required for systems control.

k. The FEC shall support a Local Controller Display either as an integral part of the FEC or as a remote device communicating over the SA Bus.

i. The Display shall use a BACnet Standard SSPC-135 MS/TP protocol.

ii. The Display shall allow the user to view monitored points without logging into the system.

iii. The Display shall allow the user to view and change setpoints, modes of operation, and parameters.

iv. The Display shall provide password protection with user adjustable password timeout.

v. The Display shall be menu driven with separate paths for:

- Input/Output.
- Parameter/Setpoint.
- Overrides.

vi. The Display shall use easy-to-read English text messages.

vii. The Display shall allow the user to select the points to be shown and in what order.

viii. The Display shall support a back lit LCD with adjustable contrast and brightens and automatic backlight brightening during user interaction.

ix. The display shall be a minimum of 4 lines and a minimum of 20 characters per line.

x. The Display shall have a keypad with no more than 6 keys.

xi. The Display shall be panel mountable.

l. Provide Johnson Controls FEC or approved equal as shown on plans.

2.F Field Devices

1. Advanced Application VAV Modular Assembly

    a. The Advanced Application VAV Modular Assembly (AVMA) shall provide both standalone and networked DDC of pressure-independent, VAV terminal units.

    b. The AVMA shall be BTL certified and carry the BTL Label.

        i. The AVMA shall be tested and certified as a BACnet Advanced Application Controller (B-AAC).

        ii. A BACnet Protocol Implementation Conformance Statement shall be provided for the AVMA.

        iii. The Conformance Statement shall be submitted 10 days prior to bidding.

    c. The AVMA shall communicate over the Automation Network in compliance with BACnet IPv4 and supporting BACnet Protocol Revision 12 (PR12).

    d. The AVMA shall include an integral real-time clock and support time-based tasks that enables these field controllers to monitor and control:

        i. Schedules.

        ii. Calendars.

        iii. Alarms.

        iv. Trends.

2. VAV Modular Assembly

    a. The VAV Modular Assembly (VMA) shall provide both standalone and networked DDC of pressure-independent, VAV terminal units. It shall address both single and dual duct applications.

    b. The VMA shall be BTL certified and carry the BTL Label.

        i. The VMA shall be tested and certified as a BACnet Application Specific Controller (B-ASC).

        ii. A BACnet Protocol Implementation Conformance Statement shall be provided for the VMA.

        iii. The Conformance Statement shall be submitted 10 days prior to bidding.

    c. The VAV Modular Assembly shall communicate over the Field Controller Bus using BACnet Standard protocol SSPC-135.

    d. The VAV Modular Assembly shall have internal electrical isolation for AC power, DC inputs, and MS/TP communications as provided. An externally mounted isolation transformer shall not be acceptable.

e. The VAV Modular Assembly shall be a configurable digital controller with integral differential pressure transducer and damper actuator. All components shall be connected and mounted as a single assembly that can be removed as one piece. Alternate configurations shall be available as follows:

   i. A configurable digital controller with integral differential pressure transducer but without a damper actuator – for controlling large VAV boxes that require high torque.

   ii. A configurable digital controller with an integral damper actuator but without a differential pressure transducer –for commercial zoning applications or for pressure-dependent VAV box applications.

   iii. A configurable digital controller with an integral damper actuator and ball valve linkage but without a differential pressure transducer –for chilled beam applications.

f. The VAV Modular Assembly shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB or the controller is designed and suitable for use in other environmental air space (plenums) in accordance with Section 300.252(C) of the National Electrical Code.

g. The integral damper actuator shall be a fast response stepper motor capable of stroking 90 degrees in 60 seconds for quick damper positioning to speed commissioning and troubleshooting tasks.

h. The controller shall determine airflow by a state-of-the-art digital non-flow pressure sensor to provide 14-bit resolution with bidirectional flow operation that supports automatic correction for polarity on high- and low-pressure DP tube connections; this pressure sensor eliminates high- and low-pressure connection mistakes.

i. Each controller shall have the ability to automatically calibrate the flow sensor to eliminate pressure transducer offset error due to ambient temperature / humidity effects.

j. The controller shall utilize a proportional plus integration (PI) algorithm for the space temperature control loops.

k. Each controller shall continuously, adaptively tune the control algorithms to improve control and controller reliability through reduced actuator duty cycle. In addition, this tuning reduces commissioning costs, and eliminates the maintenance costs of manually re-tuning loops to compensate for seasonal or other load changes.

l. The controller shall provide the ability to download and upload VMA configuration files, both locally and via the communications network. Controllers shall be able to be loaded individually or as a group.

m. Control setpoint changes initiated over the network shall be written to VMA non-volatile memory to prevent loss of setpoint changes and to provide consistent operation in the event of communication failure.

n. The controller firmware shall be flash-upgradeable remotely via the communications bus to minimize costs of feature enhancements.

o. The controller shall provide fail-soft operation if the airflow signal becomes unreliable, by automatically reverting to a pressure-dependent control mode.

p. The controller shall interface with balancer tools that allow automatic recalculation of box flow pickup gain (“K” factor), and the ability to directly command the airflow control loop to the box minimum and maximum airflow setpoints.

q. Controller shall have on-board diagnostics. These diagnostics shall consist of control loop performance measurements executing at each control loop’s sample interval, which may be used to continuously monitor and document system performance. The VMA shall calculate Exponentially Weighted Moving Averages (EWMA) for each of the following. These metrics shall be available to the end user for efficient management of the VAV terminals.

    i. Absolute temperature loop error.

    ii. Signed temperature loop error.

    iii. Absolute airflow loop error.

    iv. Signed airflow loop error.

    v. Average damper actuator duty cycle.

r. The controller shall detect system error conditions to assist in managing the VAV zones. The error conditions shall consist of:

    i. Unreliable space temperature sensor.

    ii. Unreliable differential pressure sensor.

    iii. Starved box.

    iv. Actuator stall.

    v. Insufficient cooling.

    vi. Insufficient heating.

s. The controller shall provide a flow test function to view damper position vs. flow in a graphical format. The information would alert the user to check damper position. The VMA would also provide a method to calculate actuator duty cycle as an indicator of damper actuator runtime.

t. The controller shall provide a compliant interface for ASHRAE Standard 62-1989 (indoor air quality), and shall be capable of resetting the box minimum airflow based on the percent of outdoor air in the primary air stream.

u. The controller shall comply with ASHRAE Standard 90.1 (energy efficiency) by preventing simultaneous heating and cooling, and where the control strategy requires reset of airflow while in reheat, by modulating the box reheat device fully open prior to increasing the airflow in the heating sequence.

v. Application Configuration

i. The VAV Modular Assembly shall be configured with a software tool that provides a simple Question/Answer format for developing applications and downloading.

w. Sensor Support

i. The VMA shall communicate over the SA Bus with a Network Sensor.

ii. The VMA shall support an LCD display room sensor.

iii. The VMA shall also support standard room sensors as defined by analog input requirements.

iv. The VMA shall support humidity sensors defined by the AI side loop.

x. Provide Johnson Controls VMAxx or approved equal as shown on plans.

3. INPUT/OUTPUT MODULE

a. The Input/Output Module (IOM) provides additional inputs and outputs for use in digital controllers.

b. The IOM shall communicate with controllers over the FC Bus or the SA Bus.

c. The IOM shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135.

i. The IOM shall be BTL certified and carry the BTL Label.

ii. The IOM shall be tested and certified as a BACnet Application Specific Controller (B-ASC).

iii. A BACnet Protocol Implementation Conformance Statement shall be provided for the IOM.

iv. The Conformance Statement shall be submitted 10 days prior to bidding.

d. The IOM shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.

e. The IOM shall have a minimum of 4 points to a maximum of 17 points.

f. The IOM shall support the following types of inputs and outputs:

i. Universal Inputs – shall be configured to monitor any of the following:

- Analog Input, Voltage Mode.
- Analog Input, Current Mode.
- Analog Input, Resistive Mode.
- The IOM shall provide minimum 15 bit A/D resolution of analog inputs.
- Binary Input, Dry Contact Maintained Mode.
- Binary Input, Pulse Counter Mode.

ii. Binary Inputs – shall be configured to monitor either of the following:

- Dry Contact Maintained Mode.

- Pulse Counter Mode.

iii. Analog Outputs – shall be configured to output either of the following:

- Analog Output, Voltage Mode.
- Analog Output, current Mode.
- The IOM shall provide minimum 15 bit D/A resolution of analog outputs.

iv. Binary Outputs – shall output the following:

- 24 VAC Triac.

v. Configurable Outputs – shall be capable of the following:

- Analog Output, Voltage Mode.
- Binary Output Mode.

g. The IOM shall include troubleshooting LED indicators to identify the following conditions:

i. Power On.

ii. Power Off.

iii. Download or Startup in progress, not ready for normal operation.

iv. No Faults.

v. Device Fault.

vi. Normal Data Transmission.

vii. No Data Transmission.

viii. No Communication.

h. Provide Johnson Controls IOM or approved equal as shown on plans.

ix. The network thermostat shall provide the flexibility to adjust the following control parameters:

- Adjustable maximum setpoint offset from 0 to 20°F.
- Adjustable fan on delay from 0 to 120 seconds.
- Adjustable fan off delay from 0 to 120 seconds.
- Adjustable minimum reheat on time from 0 to 360 seconds.
- Adjustable minimum reheat off time from 0 to 360 seconds.
- Adjustable supply fan minimum command from 0 to 100%.
- Adjustable supply fan Medium command from 0 to 100%.
- Adjustable supply fan high command from 0 to 100%.
- Adjustable reheat minimum damper position from 0 to 100%.
- Adjustable proportional valve opened voltage from 0 to 10 VDC.
- Adjustable proportional valve closed voltage from 0 to 10 VDC.

i. Provide Johnson Controls TEC362x or approved equal where indicated on plans.

j. Where required by application and indicated on plans or room schedules provide the network thermostat with an integral Passive Infra-Red (PIR) occupancy sensor.

k. Where required by application and indicated on plans or room schedules provide the network thermostat with an integral relative humidity sensor.

4. NETWORK SENSORS

a. The Network Sensors (NS) shall have the ability to monitor the following variables as required by the systems sequence of operations:

i. Zone Temperature.

ii. Zone Humidity.

iii. Zone Setpoint.

iv. Discharge Air Temperature.

v. Zone CO_2.

b. The Network Zone Temperature Sensors shall include the following items:

i. A backlit LCD to indicate the temperature, humidity and setpoint.

ii. An LED to indicate the status of the Override feature.

iii. A button to toggle the temperature display between Fahrenheit and Celsius.

iv. A button to program the display for temperature or humidity.

v. A button to initiate a timed override command.

vi. Available in either surface mount, wall mount, or flush mount.

vii. Available with either screw terminals or phone jack.

c. The Network CO_2 Zone Sensors shall include the following:

i. Available in either surface mount or wall mount.

ii. Available with screw terminals or phone jack.

iii. Measurement range of 0-2000 ppm

iv. Sensing resolution of 1 ppm.

v. Sensing accuracy of +/- 2% of the reading plus 40 ppm.

d. Provide Johnson Controls NS series or approved equal where indicated on plans.

2.G SYSTEM TOOLS

1. SYSTEM CONFIGURATION TOOL

a. The Configuration Tool shall be a software package enabling a computer platform to be used as a stand-alone engineering configuration tool for a Network Automation Engine (NAE) or a Network Integration Engine (NIE).

b. The configuration tool shall provide an archive database for the configuration and application data.

c. The configuration tool shall have the same look-and-feel at the Site Management Portal user interface regardless of whether device configuration is being done online or offline.

d. The configuration tool shall include the following features:

   i. Basic system navigation tree for connected networks.

   ii. Integration of Johnson Controls N1, LonWorks, and BACnet enabled devices.

   iii. Customized user navigation trees.

   iv. Point naming operating parameter setting.

   v. Graphic diagram configuration.

   vi. Alarm and event message routing.

   vii. Graphical logic connector tool for custom programming.

   viii. Downloading, uploading, and archiving databases.

e. The configuration tool shall provide a site discovery feature to automatically discover field devices on connected buses and networks. Automatic discovery shall be available for the following field devices:

   i. BACnet Devices.

   ii. Johnson Controls N2 Bus devices.

f. The configuration tool shall be capable of programming the Field Equipment Controllers.

   i. The configuration tool shall provide the capability to configure, simulate, and commission the Field Equipment Controllers.

   ii. The configuration tool shall allow the FECs to be run in Simulation Mode to verify the applications.

   iii. The configuration tool shall contain a library of standard applications to be used for configuration.

g. The configuration tool shall be capable of programming the field devices.

   iv. The configuration tool shall provide the capability to configure, simulate, and commission the field devices.

   v. The configuration tool shall allow the field devices to be run in Simulation Mode to verify the applications.

vi. The configuration tool shall contain a library of standard applications to be used for configuration.

h. Provide Johnson Controls SCT or approved equal.

2.H COMPUTING HARDWARE AND SOFTWARE

1. GENERAL

a. Computing hardware, software and operating systems shall be provided at the revision level or model number as specified or at the latest release of the vendor if not specified.

b. In order to provide a consistent level of performance, all PCs shall be provided with Operating Systems and Processors by the manufacturer specified.

2. DEDICATED WEB BASED USER INTERFACE

a. PC Hardware – The personal computer(s) shall be configured as follows:

i. Memory – 16 GB (8 GB Minimum.)

ii. CPU– Intel Quad Core processor. 3.2 GHz Clock Speed (minimum.)

iii. Hard Drive – 500 GB hard drive capacity.

iv. Hard drive backup system – CD/RW, DVD/RW or network backup software provided by owners IT department.

v. Ports – (2) USB 3.0, Ethernet, VGA, microphone/headset.

vi. Keyboard – 101 Keyboard and 2 Button Mouse.

vii. Display configuration – 1-2 displays as follows:

- Each Display – 24” LED Flat Panel Monitor 1920 x 1080 resolution minimum.
- 16 bit or higher color resolution.
- Display card with multiple monitor support.

b. Operating System Software

i. Windows 10 Professional or Enterprise Edition with Ann. Update (64 bit.)

ii. Provide complete operator workstation software package, including any hardware or software keys. Include the original installation disks and licenses for all included software, device drivers, and peripherals.

iii. Provide software registration cards to the Owner for all included software.

c. Peripheral Hardware

i. Reports printer (Dedicated):

- Printer Make – Hewlett Packard DeskJet.
- Print Speed – 600 DPI Black, 300 DPI Color.
- Buffer – 64 K Input Print Buffer (minimum.)

3. APPLICATION AND DATA SERVER

   a. PC Hardware – The personal computer shall be configured as follows:

      i. Memory – 8 GB.

      ii. CPU – Intel Dual Core processor. 2.8 GHz Clock Speed (minimum.)

      iii. Hard Drive – 240 GB free hard drive space after program installation.

      iv. Hard Drive Backup – DVD/RW or 500 GB portable back-up drive.

      v. Ports: (2) USB 3.0, VGA, HDMI 1920x1080 resolution, Ethernet – 10/100/1000.

      vi. User Interface:

         - 101 key full size QWERTY Keyboard with number pad.
         - Two (2) Button LED mouse.
         - LED flat panel 24 in. monitor with wide screen full HD resolution.

   b. Software/Operating System Requirements

      i. Windows 10 Pro or Windows 10 Enterprise Editions with Anniversary Update (version 1607) (64-bit.)

      ii. SQL 2014 Express SP3 (64-bit.)

      iii. Microsoft Office Professional.

      iv. BMS supplier-specific programs and files required for described functionality.

4. EXTENDED APPLICATION AND DATA SERVER

   a. PC Hardware – The personal computer(s) shall be configured as follows:

      i. Memory – 16 GB (8 GB Minimum.)

      ii. CPU – Intel Quad Core processor. 3.2 GHz Clock Speed (minimum.)

      iii. Optical Media Drive – DVD-RW 16x.

      iv. Hard Drives – 2x 500GB configured as Raid 1 (mirroring) with write caching turned on.

      v. Hard Drive Backup – 1TB portable back-up drive or secure network backup provided by owner’s IT department.

      vi. Ports: (2) USB 3.0, HDMI capable of Wide screen 1920x1080 resolution, Ethernet 10/100/1000.

vii. User Interface:

- 101 key full size QWERTY Keyboard with number pad.
- Two (2) Button LED mouse.
- LED flat panel 24 in. monitor with wide screen full HD resolution.

b. Software/Operating System Requirements

i. Windows Server 2012 (64-bit.)

ii. SQL 2014 SP2 (64-bit.)

iii. Microsoft Office Professional.

iv. BMS supplier-specific programs and files required for described functionality.

2.I MISCELLANEOUS DEVICES

1. VARIABLE FREQUENCY MOTOR SPEED CONTROL DRIVES

a. The VSD and all components shall be designed, manufactured and tested in accordance with the latest applicable standards.

i. Institute of Electrical and Electronic Engineers (IEEE)

- IEEE 519-1992: Guide for harmonic content and control.

ii. Underwriters Laboratories (UL508C: Power Conversion Equipment)

- UL
- cUL

iii. National Electrical Manufacturer's Association (NEMA)

- ICS 7.0: Industrial Controls & Systems for VSDs.

iv. EN 61000-3-12, EN 61800-3 (1996) +A11 (2000) Category C2

- Fulfill all EMC immunity requirements.

b. VSD through 250 HP shall have the following features:

i. The VSD may be designed in a NEMA Type 1, NEMA 12, or NEMA 3R enclosure.

ii. Incoming Power: Three-phase, 208 / 240 / 480 (+10% to -10%) and 50/60 Hz (+10 to -5%). The VSD shall provide microprocessor-based control for three-phase induction motors. The controller's full load output current rating shall be based on a low overload application at 40°C ambient and 1.5 - 10 kHz switching frequency with automatic switching frequency de-rating in case of overload.

iii. Humidity: 0 to 95% (non-condensing and non-corrosive).

iv. Altitude: 0 to 3,300 feet (1000 meters) above sea level.

v. Ambient Temperature: -10 to 40°C (VT).

vi. Storage Temperature: -40 to 70°C.

vii. The VSDs shall be of the Pulse Width Modulated (PWM) design converting the utility input voltage and frequency to a variable voltage and frequency output via a two-step operation.

viii. The VSDs shall have an efficiency at full load and speed that exceeds 97%. The efficiency shall exceed 90% at 50% speed.

ix. The VSDs shall maintain a minimum line side displacement power factor of 0.96, regardless of speed and load for VFDs less than 75 HP. The VSDs shall maintain a minimum line side displacement power factor of .99, regardless of speed and load for motors greater than 75 HP.

x. The VSDs shall have a one (1) minute overload current rating of 110% for low overload applications.

xi. The current withstand rating of the drive shall be 100,000 AIC.

xii. The VSDs shall be capable of operating any NEMA design B squirrel cage induction motor, regardless of manufacturer, with a horsepower and current rating within the capacity of the VSD.

xiii. The VSDs shall have an integral EMI/RFI filter as standard.

xiv. VFD must contain a circuit breaker or fused disconnect as an option.

xv. Total harmonic distortion shall be calculated based on total demand distortion conditions as defined in IEEE 519-1992. Any harmonic calculations shall be done based on the kVA capacity, X/R ratio and the impedance of the utility transformer feeding the installation, as noted on the drawings, and the total system load.

xvi. Provide built in Communication capability for interface with RS-485 (ModBus RTU) (Johnson Controls Metasys N2) (MS/TP BACnet) or Ethernet (BACnet/IP) (Modbus/TCP).

- Communication capability via expansion card to support RS-485 shall include Johnson Controls Metasys – SA Bus

c. Provide Johnson Controls VSD Series II or equal as indicated on plans.

- Temperatures, return air and discharge air temperatures, coil differential temperature, requested compressor speed, and indoor unit alarm status and alarm code.

PART 3 – PERFORMANCE/EXECUTION

3.A BMS SPECIFIC REQUIREMENTS

1. GRAPHIC DISPLAYS

a. Provide a color graphic system flow diagram display for each system with all points as indicated on the point list. All terminal unit graphic displays shall be from a standard design library.

b. User shall access the various system schematics via a graphical penetration scheme and/or menu selection.

2. CUSTOM REPORTS:

a. Provide custom reports as required for this project.

3. ACTUATION / CONTROL TYPE

a. Primary Equipment

i. Controls shall be provided by equipment manufacturer as specified herein.

ii. All damper and valve actuation shall be electric.

b. Air Handling Equipment

i. All air handlers shall be controlled with a HVAC-DDC Controller.

ii. All damper and valve actuation shall be electric.

c. Terminal Equipment:

iii. Terminal Units (VAV, UV, etc.) shall have electric damper and valve actuation.

iv. All Terminal Units shall be controlled with HVAC-DDC Controller.

3.B INSTALLATION PRACTICES

1. BMS WIRING

a. All conduit, wiring, accessories and wiring connections required for the installation of the BMS, as herein specified, shall be provided by the BMS Contractor unless specifically shown on the Electrical Drawings under Division 24 Electrical. All wiring shall comply with the requirements of applicable portions of Division 24 and all local and national electric codes, unless specified otherwise in this section.

b. All BMS wiring materials and installation methods shall comply with BMS manufacturer recommendations.

c. The sizing, type and provision of cable, conduit, cable trays, and raceways shall be the design responsibility of the BMS Contractor. If complications arise, however, due to the incorrect selection of cable, cable trays, raceways and/or conduit by the BMS Contractor, the Contractor shall be responsible for all costs incurred in replacing the selected components.

d. Class 2 Wiring

i. All Class 2 (24 VAC or less) wiring shall be installed in conduit unless otherwise specified.

ii. Conduit is not required for Class 2 wiring in concealed accessible locations. Class 2 wiring not installed in conduit shall be supported every 5’ from the building structure utilizing metal hangers designed for this application. Wiring shall be installed parallel to the building structural lines. All wiring shall be installed in accordance with local code requirements.

e. Class 2 signal wiring and 24 VAC power can be run in the same conduit. Power wiring 120VAC and greater cannot share the same conduit with Class 2 signal wiring.

f. Provide for complete grounding of all applicable signal and communications cables, panels and equipment so as to ensure system integrity of operation. Ground cabling and conduit at the panel terminations. Avoid grounding loops.

2. BMS LINE VOLTAGE POWER SOURCE

a. 120-volt AC circuits used for the BMS shall be taken from panel boards and circuit breakers provided by Division 24.

b. Circuits used for the BMS shall be dedicated to the BMS and shall not be used for any other purposes.

c. DDC terminal unit controllers may use AC power from motor power circuits.

3. BMS RACEWAY

a. All wiring shall be installed in conduit or raceway except as noted elsewhere in this specification. Minimum control wiring conduit size 1/2”.

b. Where it is not possible to conceal raceways in finished locations, surface raceway (Wiremold) may be used as approved by the Architect.

c. All conduits and raceways shall be installed level, plumb, at right angles to the building lines and shall follow the contours of the surface to which they are attached.

d. Flexible Metal Conduit shall be used for vibration isolation and shall be limited to 3 feet in length when terminating to vibrating equipment. Flexible Metal Conduit may be used within partition walls. Flexible Metal Conduit shall be UL listed.

4. PENETRATIONS

a. Provide fire stopping for all penetrations used by dedicated BMS conduits and raceways.

b. All openings in fire proofed or fire stopped components shall be closed by using approved fire resistive sealant.

c. All wiring passing through penetrations, including walls shall be in conduit or enclosed raceway.

d. Penetrations of floor slabs shall be by core drilling. All penetrations shall be plumb, true, and square.

5. BMS IDENTIFICATION STANDARDS

a. Node Identification. All nodes shall be identified by a permanent label fastened to the enclosure. Labels shall be suitable for the node location.

b. Cable types specified in Item A shall be color coded for easy identification and troubleshooting.

6. BMS PANEL INSTALLATION

a. The BMS panels and cabinets shall be located as indicated at an elevation of not less than 2 feet from the bottom edge of the panel to the finished floor. Each cabinet shall be anchored per the manufacturer's recommendations.

b. The BMS contractor shall be responsible for coordinating panel locations with other trades and electrical and mechanical contractors.

7. INPUT DEVICES

a. All Input devices shall be installed per the manufacturer recommendation.

b. Locate components of the BMS in accessible local control panels wherever possible.

8. HVAC INPUT DEVICES – GENERAL

a. All Input devices shall be installed per the manufacturer recommendation.

b. Locate components of the BMS in accessible local control panels wherever possible.

c. The mechanical contractor shall install all in-line devices such as temperature wells, pressure taps, airflow stations, etc.

d. Input Flow Measuring Devices shall be installed in strict compliance with ASME guidelines affecting non-standard approach conditions.

e. Outside Air Sensors

i. Sensors shall be mounted on the North wall to minimize solar radiant heat impact or located in a continuous intake flow adequate to monitor outdoor air conditions accurately.

ii. Sensors shall be installed with a rain proof, perforated cover.

f. Water Differential Pressure Sensors

i. Differential pressure transmitters used for flow measurement shall be sized to the flow-sensing device.

ii. Differential pressure transmitters shall be supplied with tee fittings and shut-off valves in the high and low sensing pick-up lines.

iii. The transmitters shall be installed in an accessible location wherever possible.

g. Medium to High Differential Water Pressure Applications (Over 21" WC)

i. Air bleed units, bypass valves and compression fittings shall be provided.

h. Air Flow Measuring Stations (if applicable)

   i. Where the stations are installed in insulated ducts, the airflow passage of the station shall be the same size as the inside airflow dimension of the duct.

   ii. Station flanges shall be two inch to three inch to facilitate matching connecting ductwork.

i. Duct Temperature Sensors

   i. Duct mount sensors shall mount in an electrical box through a hole in the duct and be positioned so as to be easily accessible for repair or replacement.

   ii. The sensors shall be insertion type and constructed as a complete assembly including lock nut and mounting plate.

   iii. For ductwork greater in any dimension than 48 inches or where air temperature stratification exists such as a mixed air plenum, utilize an averaging sensor.

   iv. The sensor shall be mounted to suitable supports using factory approved element holders.

j. Space Sensors

   i. Shall be mounted per ADA requirements.

   ii. Provide lockable tamper-proof covers in public areas and/or where indicated on the plans.

k. Low Temperature Limit Switches

   i. Install on the discharge side of the first water or steam coil in the air stream.

   ii. Mount element horizontally across duct in a serpentine pattern insuring each square foot of coil is protected by 1 foot of sensor.

   iii. For large duct areas where the sensing element does not provide full coverage of the air stream, provide additional switches as required to provide full protection of the air stream.

l. Air Differential Pressure Status Switches

   i. Install with static pressure tips, tubing, fittings, and air filter.

m. Water Differential Pressure Status Switches

   i. Install with shut off valves for isolation.

n. HVAC Output Devices

   i. All output devices shall be installed per the manufacturers' recommendation. The mechanical contractor shall install all in-line devices such as control valves, dampers, airflow stations, pressure wells, etc.

ii. Actuators: All control actuators shall be sized capable of closing against the maximum system shut-off pressure. The actuator shall modulate in a smooth fashion through the entire stroke. When any pneumatic actuator is sequenced with another device, pilot positioners shall be installed to allow for proper sequencing.

iii. Control Dampers: Shall be opposed blade for modulating control of airflow. Parallel blade dampers shall be installed for two position applications.

iv. Control Valves: Shall be sized for proper flow control with equal percentage valve plugs. The maximum pressure drop for water applications shall be 5 PSI. The maximum pressure drop for steam applications shall be 7 PSI.

3.C TRAINING

1. THE BMS CONTRACTOR SHALL PROVIDE THE FOLLOWING TRAINING SERVICES:

   a. One day of on-site orientation by a system technician who is fully knowledgeable of the specific installation details of the project. This orientation shall, at a minimum, consist of a review of the project as-built drawings, the BMS software layout and naming conventions, and a walk through of the facility to identify panel and device locations.

3.D COMMISSIONING REQUIREMENTS

1. FULLY COMMISSION ALL ASPECTS OF THE BMS WORK.

2. VAV BOX PERFORMANCE VERIFICATION AND DOCUMENTATION:

   a. The BMS Contractor shall test each VAV box for operation and correct flow. At each step, after a settling time, box air flows and damper positions will be sampled. Following the tests, a pass/fail report indicating results shall be produced. Possible results are Pass, No change in flow between full open and full close, Reverse operation or Maximum flow not achieved. The report shall be submitted as documentation of the installation.

   b. The BMS Contractor shall issue a report based on a sampling of the VAV calculated loop performance metrics. The report shall indicate performance criteria, include the count of conforming and non-conforming boxes, list the non-conforming boxes along with their performance data, and shall also include graphical representations of performance.

   c. Promptly rectify all listed deficiencies and submit a document summarizing completion to the Engineer.

3.E PERFORMANCE VERIFICATION

1. The installing contractor shall perform a complete Performance Validation (PV) of the Building management system three times throughout the project:

   a. At project turnover to customer.

   b. At six (6) months of project operation.

c. At twelve (12) months of project operation or end of warranty.

2. Performance Verification shall include a complete and current Building Automation System site inventory including the following information at a minimum: a listing of all field and supervisory controllers with the following key attribute data; corresponding model numbers, firmware versions, available security updates, CPU and memory performance data, battery conditions, integrations, controlled equipment, and device and point counts.

3. Performance Verification shall include a complete written evaluation of system configuration and performance in the following categories:

   a. Security – The Security evaluation shall include information about controllers that require security updates and conformance of user accounts to latest security rules and best practices.

   b. Energy Performance – The Energy Performance and Savings evaluation shall identify opportunities through schedule and nightly setbacks, economizers, eliminating simultaneous heating and cooling and adding VSD to equipment.

   c. Comfort and Health – The Comfort and Health evaluation shall identify temperature, pressure, and carbon dioxide values that deviate from desired set points that could lead to occupant discomfort.

   d. Reliability – The Reliability evaluation shall identify overridden control points, control points creating excessive alarms, and opportunities to adding control points and trends to further enable system functionality.

   e. Standards – The Standards evaluation shall identify conformance to published standards for point count, network performance and protocol standards.

4. Provide all reports as specified on a new, USB compatible flash drive.

23 09 93 Sequence of Operation for HVAC Controls

Part 1 – Sequence of Operation

1.A Sequence of Operation

Part 2 – Points list

2.A Point Lists

Typical Points per HVAC Equipment, refer to plan schedules

Systems	**RTU/AHU's**					
Point	**Description**	**Type**	**Units**	**Trend**	**Alarm**	**Totalize**
DA-P	Discharge Static Pressure	AI	in WC	X		
DA-T	Discharge Air Temperature	AI	Deg F	X		
PH-T	Preheat Temperature	AI	Deg F	X		
SF-S	Supply Fan Status	BI	Off On	X	X	X
PH-O	Preheat Output	AO	%	X		
RH-O	Reheat Output	AO	%	X		
CLG-O	Cooling Output	AO	%	X		
SF-O	Supply Fan Output	AO	%	X		
SF-C	Supply Fan Command	BO	Off On	X		
PH-LCKO	Preheat Lockout Command	BO	Off On	X		
CLG-LCKO	Cooling Lockout Command	BO	Off On	X		
RH-LCKO	Reheat Lockout Command	BO	Off On	X		
DAT-SP	Discharge Temperature Setpoint	AO	Deg F	X		
PHT-SP	Preheat Temperature Setpoint	AO	Deg F	X		
DAP-SP	Discharge Static Pressure Setpoint	AO	in WC	X		

END OF SECTION

SECTION 23 23 00 - REFRIGERANT PIPING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 23 02 00, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

PART 2 - PRODUCTS

2.01 GENERAL

Provide for the systems as shown. Submit shop drawings of piping systems showing all traps, pipe sizes, and accessories; drawing to be marked "Approved", and signed by a representative of the Application Engineering Department of the condensing unit manufacturer. Pipe sizes shall be as recommended by unit manufacturer. Refer to piping schematic on drawings.

2.02 MATERIAL

A. PIPE: Copper ACR tubing.

B. FITTINGS: Wrought copper streamlined sweat fitting.

C. SOLDER: Sil-Fos, except on valves use solder recommended by valve manufacturer.

2.03 ACCESSORIES

All accessories shall be UL listed and rated in accordance with ARI Standard 710.

A. On systems 7-1/2 tons and larger, each separate refrigerant circuit shall have a separate filter dryer. Each filter dryer shall have a replaceable core and a three valve bypass. The filter drier shall be full line size and installed in the refrigerant liquid line. The filter shall have a minimum 4-3/4 inches diameter shell with removable flange and gasket. Flange shall be tapped for 1/4 inch FPT access valve. Size filter-drier for maximum 2.0 psi pressure drop at evaporator operating temperature. Similar to Mueller Brass Company model Drymaster micro-guard refillable filter series SD-485 through SD19217 or Sporlan catch-all.

B. On systems less than 7-1/2 tons, the filter dryer shall be the sealed type sizes as above. One drier per refrigerant circuit.

C. Liquid-Moisture Indicator shall be installed in liquid refrigerant line full line size similar to Mueller Brass Company model "Vuemaster" with soldered ends.

D. Thermostatic expansion valve shall have adjustable super heat and be as manufactured by Sporlan.

2.04 EVACUATION

Evacuate moisture completely by applying a commercial vacuum pump for a minimum of 24 hours. Moisture indicator shall indicate a completely moisture-free condition at time of final inspection. The vacuum pump shall run until the system indicates a maximum of 35 degrees FDB. The system shall be flushed with the operating refrigerant and the vacuum pump connected and rerun to repeat the evacuation. Evaluation shall be performed under supervision of the Engineer.

2.05 REFRIGERANT AND OIL

A. Contractor shall leave the refrigeration system with a full charge of refrigerant and oil and shall be responsible for the maintenance of a full charge of refrigerant and oil in the systems for a period of one year from date of acceptance.

B. Should any leaks in the refrigeration system occur during the guarantee period, the Contractor shall eliminate such leaks and recharge system to a full charge of refrigerant and oil at no cost to the Owner.

PART 3 - EXECUTION

3.01 All equipment and piping shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.

END OF SECTION

SECTION 23 62 13 - AIR COOLED CONDENSING UNITS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 23 02 00, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

PART 2 - PRODUCTS

2.01 AIR-COOLED CONDENSING UNITS

A. Air-cooled condensing unit shall be designed for use with split system having a remote direct-expansion (DX) cooling coil mounted in evaporator fan unit. Capacity shall be as called for on the drawings when matched to the appropriate evaporator coil.

B. Condensing unit shall consist of high-efficiency hermetic compressor, air-cooled condenser with quiet fan, factory wired controls, R-410 refrigerant and refrigeration circuit and valves.

C. Cabinet shall be heavy-gauge galvanized steel with bonding primer and baked-enamel finish coat. The entire cabinet shall be protected from rust.

D. Compressor shall be protected from excessive current and temperatures and shall be provided with a thermostatically controlled crankcase heater to operate only when needed for protection of the compressor. Compressor shall be spring-mounted on rubber isolators. Compressor shall be located in compartment isolated from condenser fan and coil. Provide a high-capacity dryer in the system to remove moisture and dirt.

E. Condenser fan shall be directly connected to a weather-protected, quiet, high-efficiency motor. Fan guard shall be provided and shall be protected from rust by PVC finish. Condenser coil shall be aluminum fin with copper tube.

F. Connections for refrigerant suction and liquid lines shall be extended outside the cabinet and provided with service valves with gauge connections.

G. Power connections shall be made to the connectors located inside the electrical connection box.

H. Standard operating and safety controls shall include high-pressure switch, low pressure switch, compressor overload service, and solid-state timed-off control.

I. All components (parts and labor) of the sealed refrigeration circuit shall be warranted by the manufacturer for five years.

2.02 AUXILIARY EQUIPMENT

A. Auxiliary equipment shall consist of refrigerant lines prepared for the unit involved. These lines shall be cleaned, dried, and pressurized at the factory.

B. Low ambient kit to allow operation at outside temperature below 35 deg. F (2 deg. C) shall be provided.

C. Expansion valve shall be provided with the evaporator coil.

D. Provide thermostat to match the requirements of the job. Thermostat shall provide subbase with Heat-Cool-Off and Fan On-Auto switch. See section on controls for other related requirements.

E. Provide polyethylene structural base designed for that service and intended to support the unit and eliminate vibration transmission.

F. Provide hard-start kit with unit.

G. Provide guards for condenser coils.

2.03 ACCEPTABLE MANUFACTURERS

A. Condensing unit shall be the make and model number shown on the drawings or acceptable equivalents by Lennox, Carrier, York, or Trane.

PART 3 - EXECUTION

3.01 All HVAC equipment shall be installed as per manufacturers printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturers requirements.

3.03 INSTALLATION

A. Install the condensing unit on proper foundation as shown on the drawings, and in location that will not restrict the air entry or discharge from the unit.

B. Install refrigerant lines as recommended by the manufacturer, taking care not to lose the refrigerant charge contained in the lines, or allow air to enter the lines or equipment. Locate the lines in such a way as to not obstruct access to the condensing unit or other equipment. Lines located under ground or under concrete shall be installed in a PVC pipe conduit for protection.

C. Provide electrical connections as required by the applicable codes. Provide control wiring required. All power wiring and control wiring shall be in conduit and located so as not to obstruct access to the unit or other equipment.

3.04 TESTING

A. Operate the condensing unit and the system to assure that unit is operating properly and without excessive noise and vibration.

B. Read and record the power draw and the refrigeration suction and liquid pressures as required by Balancing and Test, Section 23 05 93.

END OF SECTION

SECTION 23 81 36 - ROOFTOP HEATING AND COOLING UNITS ELECTRIC COOLING - ELECTRIC HEAT

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 15050, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

PART 2 - PRODUCTS

2.01 ROOFTOP UNIT

A. Rooftop unit shall be packaged and include electric cooling and electric heat with capacity and steps of cooling and heating as shown on the drawings.

B. Unit shall be factory-charged and tested, shall be UL-labeled and ARI-certified by Standard 210 and 270, and shall be AGA-certified.

C. Unit casing shall be heavy-gauge galvanized steel or heavy-gauge aluminum with protective coat of baked enamel. Weatherproof access panels shall be provided for access to all parts requiring service.

D. Compressor(s) shall be sealed or serviceable hermetic type and shall be resiliently mounted to avoid vibration and noise. Compressor shall be provided with anti-slugging protection, crankcase heater, and time delay on recycling of the compressor. Two internal compressor motor thermal cutouts and a hot gas cutout shall protect the compressor in addition to high-pressure and low-pressure safeties. Standard controls shall permit operation down to 35 deg. F (2 deg. C) and compressor shall be locked out below this temperature.

E. Condenser fan(s) shall be direct-driven on the shaft of the slow-speed motor, which shall be designed to operate exposed to the weather.

F. Condenser coils shall have a sub-cooling section.

G. Refrigerant circuit shall include filter dryer, moisture indicator, sight glass, and gauge ports.

H. Filter rack shall be provided for filters 2 in. thick and shall filter both outdoor air and return air. See Section 15885 of these Specifications for type of filters and the number of filter changes to be furnished with the equipment.

I. Evaporator fan shall be quiet-type centrifugal blower, directly connected to an adjustable-speed motor or belt driven with an adjustable-pitch pulley on the motor.

J. Electric heat section shall be installed in the unit and served by the same power source as the rest of the unit. Only one power feed shall be required for the unit.

2.02 ACCESSORY EQUIPMENT

A. Unit shall be provided with hot gas reheat dehumidification option. Hot gas reheat coil shall be located on the leaving air side of the evaporator coil and fully piped and circuited at the factory. Provide a wall mounted humidity sensor to control activation of the hot gas reheat. Sensor shall be adjustable for humidity levels between 40-60% relative humidity.

A. Condenser coil guards shall be provided.

B. Roof mounting frame shall be provided for all units mounted on the floor. Frame shall be approved by the National Roofing Contractors Association. Provide all necessary flashing and counterflashing.

C. Provide "power saver" dampers and controls to provide "free cooling" from 0 to 100% outdoor air (OA) when the outside air humidity and temperature are acceptable. Provide OA, return air, and relief air dampers in a factory-provided enclosure. All air shall be filtered and bird screen shall be installed.

D. A solid state enthalpy changeover control shall determine the capability of the outside air to provide free cooling. The control package shall include a differential enthalpy sensor in the return air duct to compare the enthalpy of the outside air and return air and use the air with the lowest enthalpy for free cooling or assisting the mechanical cooling. The cooling control sequence is as follows:
1. The changeover control determines if the outdoor air is suitable for free cooling.
2. The space thermostat determines if cooling is needed in the building. If so:
3. The actuator modulates the outdoor air and return air dampers to maintain the desired mixed air temperature.
4. The second cooling stage of the space thermostat energizes the compressor to assist the economizer if required.
5. If the outdoor air is not suitable for free cooling, the outdoor air damper remains in the minimum ventilation position and the compressor is energized when space cooling is required.

E. Provide a warm-up thermostat to prevent the OA dampers from opening if the return air temperature is below the set point (65 deg. F) (18 deg. C).

F. Provide necessary controls for operation of the compressor below the normal temperature of the compressor cutout. Operation shall be permitted down to temperature specified on drawings.

G. Provide factory-trained service person to check out the system, calibrate the controls, and see that the RTU is operating properly. The service person making the settings shall make a written report to the engineer and the owner with all set points listed for future reference.

H. Rooftop units mounted on slabs or other fixed locations shall be provided with adapters for end discharge and return to the unit.

I. Provide thermostat and other controls required to produce the control functions called for.

2.03 ACCEPTABLE MANUFACTURERS

A. Roof top unit shall be the make and model number shown on the schedule on the drawings, or acceptable equivalents are Trane, Carrier, Daiken.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install the curb as required by the job conditions and as recommended by the manufacturer, and install proper flashing and counterflashing. See details on the drawings.

B. Set the unit in place, taking care to protect the adjacent roofing, and connect the supply and return ductwork.

C. Make electrical connections, taking care that these do not block access to any part of the equipment requiring service.

D. Have the factory service person check out the unit and make a written report. Place the unit in service.

E. Connect full size condensate drain pipe to roof top unit and extend to nearest drain, pipe shall be schedule 40 galvanized with malleable iron fittings.

3.02 BALANCING AND TEST

A. Operate the roof top unit and check for proper supply air quantity, noise, and proper operation.

B. Report the airflow, static pressure, voltage and current draw of each item, refrigerant pressure readings, etc., as required by Section 23 05 93 of these Specifications. This system is not complete until these readings have been made, submitted to the engineer, and accepted.

END OF SECTION

SECTION 23 82 19 - FAN COIL UNIT

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 23 02 00, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

PART 2 - PRODUCTS

2.01 FAN COIL UNITS

Fan coil units shall be factory built, manufactured as scheduled on drawings. Carrier, York, Trane or McQuay shall be considered as equal, if they comply with the specification and schedule. Special Note: Contractor shall field verify exact clearances required for air handling units. Units shall be field located as required and shop drawings shall indicate final location for approval by Architect/Engineer.

A. Furnish and install fan coil units of the type, capacities, ratings and drive motor horsepower shown on the drawings.

B. Units shall be factory fabricated, draw-thru type, and shall have fan section, cooling coil section, condensate drain pan, adjustable blower drive with motor on resilient mounted base, vee-belts with guard, filter section, and mixing box (if scheduled) assembled as integrated air handling units.

C. REQUIREMENTS:
1. Mill-galvanized steel, rigidly framed, braced, and reinforced; access panels each side of unit; minimum panel ga. - 18; minimum weight formed framing member 14 ga.
2. Fan section, cooling coil section, and outlet frame throats shall be internally insulated at the factory with 1" thick, 3/4 PCF density, Neoprene coated fiberglass cemented in place with water-proof adhesive, having fire-retardant characteristics in accordance with NFPA 90A.
3. Drain pan shall be not lighter than 14 ga.; extend completely under the coil section and be all-galvanized, foam insulated pan with drain connections.
4. When the fan coil unit is installed above an accessible ceiling, the unit shall incorporate a secondary drain pan. The secondary pan shall be fabricated from galvanized sheet metal, 16 gauge minimum with cross breaking sloped towards a drain. The sides shall be a minimum 2" tall and the corners shall be soldered watertight. The top edge shall have a 1/4" hem to provide additional rigidity and the secondary pan shall be supported at a minimum of six points. The pan shall extend on all sides a minimum of 3" beyond the sides of the unit casing. Route the secondary drain piping to a conspicuous location or install a float switch at the low point in the secondary pan. The secondary pan should be sloped a minimum

of 1/8" per foot and supported so that the unit is not in contact with the bottom of the secondary pan.

5. The fan section, including wheels, shafts, bearings, drive, etc., shall be statically and dynamically balanced as an assembly, and the shaft shall not pass through the first critical speed, while accelerating from rest to operating speed. Submittal data shall state the first critical shaft speed. Shaft bearings shall be of vacuum de-gassed steel, and shall be selected for 200,000 hours average life.
6. Coil shall be as hereinafter specified.

2.02 COILS

A. Cooling coils shall be cartridge type and, when mounted in air handling units, shall be removable from either end. Coils shall be constructed of copper tubes with aluminum fins and shall be designed for even distribution of air across the face of the coils; air shall not pass around coil frames: Coils shall have same end connection for DX or chilled water piping.

B. DX refrigerant coils shall be counter-flow refrigerant to air, shall have inlet and outlet connections permanently marked shall have thermostatic expansion valves with adjustable super heat.

C. Maximum face velocity across cooling coils shall be 500 FPM, unless noted otherwise on schedule.

PART 3 - EXECUTION

3.01 All HVAC equipment shall be installed as per manufacturers printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturers requirements.

END OF SECTION