

**Informed Consent and Agreement
To Use Electronic Contract Documents and Signatures
("Consent and Agreement")
For Purposes of Signing a Contract with the City of Austin**

Please carefully review this Informed Consent and Agreement to Use Electronic Contract Documents and Signatures for purposes of signing a contract with the City of Austin.

If you consent and agree to electronically receive, review and sign the contract documents in the envelope subject to the terms below, check the "I consent to use Electronic Contract Documents and Signatures" box and then click the "Review Document" button below.

Why We Are Asking for Your Consent

The City of Austin ("City of Austin," "City," "we," "us," "our") must ask for and obtain your consent and agreement, on behalf of the professional engineering services, professional architectural services, construction services, or other firm or entity you represent ("Consultant," "Contractor," "you," "your") before using electronic contract documents and signatures in its relationship with you in order to create and execute, using electronic signature, the electronic contract documents that make up your contract with the City of Austin. In order to for us to send you electronic contract documents and have you electronically sign the contract, rather than signing a paper contract by hand, we need your consent.

Your Consent and Agreement and What it Means

Your consent is optional. It is solely up to you whether or not to do so. If you want to use electronic contract documents and electronic signatures to sign contracts, then you must consent and agree to the terms and conditions relating to the system and process that we will use, as set forth below. We will ask for your consent each time we send you an envelope of electronic contract documents to sign.

By checking the "I consent to use Electronic Contract Documents and Signatures" box and then clicking the "Review Documents" button below, you will be giving us your informed consent and agreement to use the electronic contract documents and electronic contract signature system and process described below to electronically receive and review and electronically sign paperless contracts and related contract documents. You will be agreeing to be bound by any documents you electronically sign the same as if you had received a paper copy of the document and signed it by hand with an ink pen. If you do not agree to the terms of this Consent and Agreement, do not check the "I, agree..." box. Note that even if you agree now, in the future after receiving an electronic document, you will be able to choose whether or not to electronically sign that document or ask for a paper version to sign. You may also withdraw your consent as described below.

What Documents You will Receive Electronically to Sign

By agreeing to this Consent and Agreement you will receive, review and sign electronically the agreement or contract and any related contract documents presented for execution of the

contract when you click the “Review Document” button below. These electronic contract documents may include, but are not limited to the contract or agreement between you or your corporation or firm and the City of Austin. We may always, in our sole discretion, provide you with any document on paper, even if you have authorized electronic delivery.

Written Notice May NOT be Delivered Electronically

Sometimes the law, and our agreement with you, requires you to give us a written notice. You must still provide these notices to us on paper, unless we tell you how to deliver the notice to us electronically. You may not send correspondence or other communications through the DocuSign system. Only contracts with the City of Austin will be executed using DocuSign.

How you will Receive Electronic Contract Documents

We will place one or more electronic contract documents that make up the agreement or contract with the City of Austin, and which will require your signature, in an electronic envelope on the DocuSign system (as described below), and a link to the envelope will be emailed to you. You will access the envelope and electronic contract documents by clicking the link in the email, reviewing the documents, and, if you choose, electronically signing the contract using the DocuSign system. You are in control of whether to sign or not sign the document. You agree to immediately notify us if you receive any electronic document or information that appears to be in error or not intended for you.

Withdrawing Your Consent

We will ask you for this Consent and Agreement each time we present an envelope of one or more electronic contract documents for you to sign. Once you give your Consent and Agreement for an envelope, you cannot withdraw it for that envelope. You can, however, choose not to give your consent in the future when you are presented with subsequent envelopes. If you do this, you will be unable to proceed electronically and you may be required to use paper contract documents and signatures. If you give your Consent and Agreement for an envelope, although you may not withdraw it, you can still choose not to electronically sign any or all electronic contract documents in that envelope. Once you electronically sign a particular contract document, you cannot withdraw the Consent and Agreement for that document, but you can choose to not electronically sign any other documents included in the same envelope. In addition, before you complete an electronic signature of a document, you may cancel and exit the electronic signing process before clicking the “Confirm Signing” (or other similarly titled button) and closing your browser.

Getting Paper Documents

If instead of receiving and signing electronic contract documents, you would rather use paper contract documents, you should contact us at:

Capital Contracting Office
P.O. Box 1088
Austin, TX 78767
512-974-7181

or in person:

Capital Contracting Office
505 Barton Springs Rd., Ste. 330
Austin, TX 78704

We have entered into an agreement with DocuSign, Inc. (“DocuSign”) to make the DocuSign electronic signing system available to facilitate your receipt, review and electronic signature of the contract with the City of Austin. Your use of the DocuSign system may also be subject to DocuSign’s Terms of Use available at the DocuSign website at www.docusign.com. The City of Austin and DocuSign are not affiliated with each other. We are not responsible for the DocuSign system, and we disclaim any representations and all warranties regarding the DocuSign system. Your use of the DocuSign system is entirely your choice and solely your responsibility.

Hardware and Software Requirements

In order to receive electronic contract documents and electronically sign them, you will need access to a computer or mobile device with internet service and access to an email account.

Updating Your Email Address and Other Contact information

It is your responsibility to provide us with accurate and complete e-mail address and other contact information, and to maintain and update promptly any changes in this information. In addition, we may periodically ask you to confirm or update your email and any other information needed to contact you electronically. You may update your email address by contacting us at:

Capital Contracting Office
P.O. Box 1088
Austin, TX 78767
512-974-7181

As a local governmental entity, the City of Austin is subject to the Texas Public Information Act, Chapter 552 of the Texas Government Code. The Texas Public Information Act applies to information we receive from you as part of the electronic signature process.

The Effect of Your Consent and Agreement

By checking the “I consent to use Electronic Contract Document and Signatures” box and then clicking the “Review Documents” button below you are providing your electronic signature on this Agreement and indicating that you acknowledge, agree and demonstrate that:

- ***You have read this Consent and Agreement and understand it.***
- ***You consent to electronically receive and review, the electronic contract documents included in the electronic envelopes sent to you.***

- ***You consent to conducting business electronically for the purpose of executing the contract with the City of Austin.***
- ***Your electronic signature on any of the electronic contract documents, including this Consent and Agreement, will bind you and your firm to the contract the same as if you had signed a paper copy of the contract with an ink pen.***
- ***You represent that you are the person to which this email identity or profile is assigned.***
- ***You represent that you are the person duly authorized to sign and legally bind your company or firm to the contract with the City of Austin.***
- ***You agree that you will not allow any other person to use your email to electronically sign a contract with the City of Austin.***
- ***You understand that your e-signature is linked to a document and will become invalid if that document is changed or altered in any way.***
- ***You will not contest the validity or enforceability of any electronically signed contract because the document and your signature are in electronic form.***
- ***You understand that you should contact us to report any problem with your signing a contract or contract document.***
- ***Due to file size restrictions, certain contract documents may not be included in this DocuSign envelope. The following documents are incorporated into this Agreement by reference: SPECIFICATIONS (Divisions 1-17); Drawings, MBE/WBE Procurement Package; ROCIP Safety Manuals. These documents may be downloaded from Austin Finance Online (see link below) for a limited time but will be deleted one year after the solicitation response due date.***
- ***https://financeonline.austintexas.gov/afo/account_services/solicitation/solicitations.cfm?solcat=CON***



**CITY OF AUSTIN
PUBLIC WORKS DEPARTMENT**

**PROJECT MANUAL
Contract Documents and Technical Specifications**

VOLUME 1 of 2

**Walnut Creek WWTP Gas Scrubber Systems
Renewal**

**C.I.P. PROJECT NUMBER: 3023.066
Solicitation NUMBER: IFB 6100 CLMC940**

**CITY OF AUSTIN
Public Works Department
PO Box 1088
Austin, Texas 78767**

July, 18, 2022 (First Day of Ad)



The City of Austin is committed to compliance with the Americans with Disabilities Act. Reasonable modifications and equal access to communications will be provided upon request.

Bidding Requirements, Contract Forms and Conditions of the Contract

ADDENDUM
Section 00900

ADDENDUM NO. 01

Date July 27, 2022

City of Austin

Project Name: Walnut Creek WWTP Gas Scrubber Systems Renewal

C.I.P. No.: 3023.066 IFB No.: CLMC940

This Addendum forms a part of the Contract and corrects or modifies original Bid Documents, issued on July 18, 2022. **Acknowledge receipt of this addendum in space provided on bid form.** Failure to do so may subject bidder to disqualification.

A. Project Manual Revisions:

1. Table of Contents:

Replace

SS01311 06/01/2021 Coordination with Owner's Operation

with the following

SS01311 07/26/2022 Coordination with Owner's Operation

2. Section 00020, Invitation for Bids

Replace 3, [Bid Opening Link Click here.](#)

With the following

[Bid Opening Link Click here.](#)

3. Section 01730, Operations and Maintenance Data

Replace 1.2, B with the following:

Asset Management Tracking Form: CONTRACTOR shall provide a completed COA Asset Management Tracking Form. A sample Asset Management Tracking Form is included as Attachment B. CONTRACTOR shall coordinate with the OWNER and request the latest version of the form prior to completing the information. The OWNER will provide the form in an editable, electronic version for use by the CONTRACTOR. Provide data for all tagged equipment and components.

1. In addition to the information shown in Attachment B, the CONTRACTOR shall provide the installation cost and the Manufacturer's expected useful life for each line item in the Attachment.

Add 1.3, A with the following:

15. Asset Management Tracking Form

Replace Attachment B with the following:

Attachment B, on page 3 of this Addendum No. 01

4. **Replace** Section SS01311 06/01/2021 Coordination with Owner's Operation
With new Section SS01311 07/26/2022 Coordination with Owner's Operation

B. Drawing Revisions:

None

This addendum consists of 18 page(s)/sheet(s).

Gabriel Castaño

Digitally signed by Gabriel Castaño
DN: cn=Gabriel Castaño, o=City of Austin - Public Works
Department, ou=Project Management Division,
email=gabriel.castano@austintexas.gov, c=US
Date: 2022.07.27 11:39:33 -05'00'

Approved by OWNER



7/28/2022



Approved by ENGINEER/ARCHITECT

END

COORDINATION WITH OWNER'S OPERATIONSSection SS01311

PART 1 -- GENERAL**1.1 DESCRIPTION**

- A.** Regulatory requirements for the plant mandate continuous and adequate protection in the event of a chlorine or sulfur dioxide (SO₂) leak. The intent of this Section is to provide CONTRACTOR a sequence to perform the Work in such a manner that continuous, uninterrupted operation and all essential Plant services and facilities are maintained operational throughout the construction period.
- B.** The suggested sequence of operations and sequence of operations restrictions in this Section identifies selected project components only and is not intended to identify all project Work or constraints, interrelationships, or sequentially required Work. The elements shown are intended to outline milestones and certain order-of-precedence relationships for key events.
- C.** The construction Work will require interfaces with existing facilities. Perform all such Work in coordination with the Owner.
- D.** Contract times, as well as liquidated damages for failure to substantially complete the Schedule of Completion specified in this Section, are defined in Division 1 of these Contract Documents.

1.2 RELATED WORK

- A.** General Requirements Section 01010 - Summary of Work
- B.** Special Specification SS11260 – Emergency Chlorine Gas Scrubbing System and Existing Sulfur Dioxide Gas Scrubbing System Improvements, and Temporary Emergency Chlorine Gas Scrubber
- C.** Special Specification SS13390 - Packaged Control Systems
- D.** Special Specifications SS16200 - Wiring (600 Volts and Below)
- E.** Special Specifications SS16250 - Boxes and Cabinets
- F.** Special Specifications SS16300 - Wiring Devices
- G.** Special Specifications SS16600 - Disconnect Switches and Enclosed Circuit Breakers
- H.** Plans and Project Manual for the "Walnut Creek WWTP Gas Scrubber System Renewal" (Project).

1.3 COORDINATION WITH OWNER'S OPERATIONS

- A.** The suggested sequence of operations (below) has been assembled to maintain Plant operations during construction. The operational status of new or existing units other than the designated units shall not be interrupted by CONTRACTOR during the specified time periods. New units may only be used after the specified testing is completed and the units are accepted for use by the Owner, in writing. Work not specifically covered in the sequence may, in general, be done at any time during the Contract period, subject to the operating requirements outlined in this Section. All references to days in this Section are consecutive calendar days.
- B.** Except for the shutdown durations specified in this Section, CONTRACTOR's means and methods shall be implemented such that the existing plant shall remain in continuous satisfactory operation during the entire construction period. Work shall

Special Specifications

be so scheduled and conducted by CONTRACTOR such that it shall not impede any treatment process, create potential hazards to operating equipment and Plant personnel, reduce the quality of the treated water, or cause other nuisances. In performing the Work shown and specified, CONTRACTOR shall plan and schedule the Work to meet both the constraints outlined in this Section and Plant operating requirements.

- C.** CONTRACTOR has the option of providing additional temporary facilities that can eliminate a constraint provided it is done without additional cost to the Owner, presents no safety hazards, and provided that all requirements of these Specifications are fulfilled.
- D.** CONTRACTOR shall be responsible for coordinating all shutdowns with the Owner. CONTRACTOR shall, whenever possible, combine discrete shutdown procedures identified in this Section or by CONTRACTOR into a single shutdown when the duration of the shutdowns or the Work requirements allow such combining to occur on a unit process or work area. The intent of combining procedures is to minimize the impacts upon Plant operations and processes by limiting the number of shutdowns required.
- E.** CONTRACTOR shall not shut off or disconnect any operating system of the plant unless approved by the Owner in writing. All Plant equipment operations and shutdowns shall be executed by the Owner, unless otherwise noted. CONTRACTOR shall seal Owner operated gates and valves to prevent unnecessary leakage. After CONTRACTOR's Work has been completed, CONTRACTOR shall remove the seal to the satisfaction of the Owner.
- F.** This Section of the Specifications contains several references to equipment, piping, material, and appurtenances to be removed or reinstalled. CONTRACTOR shall also refer to the Drawings and applicable Specification Sections, for definition of the equipment, piping, material, and appurtenances to be removed, turned over to the Owner and stored onsite, or to become the property of CONTRACTOR and removed from the site.

1.4 GENERAL CONSTRAINTS

- A.** Load limits on Access Roads: Existing and new underground facilities, such as electrical duct banks, pipelines, etc., in, under, and crossing plant roads, have been designed for a maximum wheel load of AASHTO H-20. CONTRACTOR shall not exceed this weight limit and shall provide means of protecting the underground facilities.
- B.** Access to Plant Site: An unobstructed traffic route through all plant gates shall always be maintained.
- C.** Safety Barriers: CONTRACTOR shall place safety barriers around unsafe areas located around operational areas accessible to Plant personnel.
- D.** Personnel Access: Treatment Plant personnel shall have access to all areas which remain in operation throughout the construction period.
- E.** Potable Water System: The existing potable water system shall be kept in operation at all times.
- F.** Non-potable System: The existing non-potable water system shall be kept in operation at all times.

Special Specifications

- G.** Plumbing Facilities: Sanitary facilities in the existing structures shall be operational at all times for Plant operating personnel, unless otherwise specified below. All other building plumbing systems, such as roof and floor drains, pumping, etc., shall be maintained for all structures.
- H.** Storm drainage: Storm drainage on the site shall be operational at all times, unless otherwise specified below.
- I.** Building Heating and Ventilating: In CONTRACTOR's Work areas and areas affected by CONTRACTOR's operations, building heating and ventilating shall be both provided and maintained in structures, including pipe galleries.
- J.** Power, Light and Communication Systems: Electric power, lighting service, and communication systems shall be maintained in uninterrupted operation in all areas.
- K.** Sump Pumps and Sumps: All existing sumps shall be maintained in an operable condition with either existing pumps or temporary pumps provided by CONTRACTOR. CONTRACTOR is required to provide their own sump pumps in the event that additional pumping is needed to maintain the work area. If construction debris causes existing sump pumps to break down, Contractor shall provide and install an equivalent replacement pump. Interim piping, power, and controls shall be provided by CONTRACTOR, as required by the construction sequence and as directed by the Owner.
- L.** Seal and Service Water Piping: A supply of service and seal water and the necessary connections to existing equipment shall be maintained during construction, unless otherwise specified below. Interim piping shall be provided by CONTRACTOR, as required.
- M.** Draining Process Pipes and Conduits
 - 1. Unless otherwise specified, the contents of pipes and conduits undergoing modifications shall be transferred to the plant drain system using hoses, piping, or pumps.
 - 2. If a drain is not available on the pipe to be drained, then a wet tap shall be made by CONTRACTOR using a tapping saddle and valve approved by the Owner. No uncontrolled spillage of a pipe's contents shall be allowed.
 - 3. Any spillage shall be brought to the Owner's attention immediately. CONTRACTOR shall wash down any spillage to floor drains, sumps, and sump pump discharge piping and then flush out by the system to prevent clogging and septic odors. If spillage is not suitable for drainage system as determined by Owner, CONTRACTOR shall remove spillage by other method such as Vactor truck, as approved by the Owner.
- N.** Temporary Partitions and Enclosures: CONTRACTOR shall provide temporary partitions and enclosures necessary to maintain dust-free, heated and ventilated spaces in all areas which are adjacent to this Work and which must be kept operational as required by Plant.
- O.** CONTRACTOR shall schedule all startups for Monday through Thursday. No startups will be allowed on Friday, Saturday, and Sunday.

1.5 SCHEDULED SHUTDOWNS

- A.** A shutdown shall be defined as a portion of the normal operation of a plant unit that has to be suspended or taken out of service in order to perform the specified Work.

Special Specifications

- B.** The Work required herein that may interrupt the normal plant operations shall be accomplished at such times that will be convenient to the Owner.
- C.** For each shutdown, CONTRACTOR shall compile an inventory of materials, labor, tools, and equipment required to perform tasks, an estimate of the time required, and a written description of steps required to complete all tasks. The inventory, the estimate, and written procedures shall be submitted to the Owner for review 14 calendar days prior to the proposed start date of the shutdown. Prefabrication of all piping and other assemblies shall be completed, to the greatest degree possible, prior to any shutdowns. CONTRACTOR shall then request, in writing from the Owner, schedule approval for each shutdown at least 14 calendar days prior to the proposed shutdown date.
- D.** All Work requiring the plant to be out of service shall be performed during the scheduled shutdowns shown. It should be noted Plant staff shall continue to perform administrative, operation, and maintenance functions during shutdowns.
- E.** Lockout-Tagout: CONTRACTOR shall lock out and/or tag circuit breakers, switches, or other de-energizing means, operated by the Owner and shall check cables, wires, pipes, etc. to be sure that they are de-energized before Work begins. Submit copy of Lockout – Tagout program to Owner for approval prior to starting Work. Upon completion of the Work, CONTRACTOR shall remove the locks and tags and notify the Owner that the facilities are available for use.
- F.** Contractor shall coordinate temporary power wiring, conduit routing and removal with Owner

1.6 UNSCHEDULED SHUTDOWNS

- A.** If CONTRACTOR's Work causes an unscheduled shutdown of the facilities, CONTRACTOR shall notify the Owner immediately. CONTRACTOR shall perform Work as directed by the Owner and shall permit Owner's personnel to work with CONTRACTOR's personnel, as required, to re-establish satisfactory operation.
- B.** Unscheduled shutdowns and/or interruptions that result in fines levied by the U.S. Environmental Protection Agency or Texas Commission on Environmental Quality shall be the responsibility of CONTRACTOR if it is demonstrated that CONTRACTOR was negligent in his Work or did not exercise proper precautions in the conduct of his Work.

1.7 OVERTIME

- A.** All overtime Work by CONTRACTOR necessary to conform to the requirements of this Section and related Sections shall be performed by CONTRACTOR, at no cost to the Owner and shall be performed in accordance with the General Conditions. CONTRACTOR shall make no claims for extra compensation as a result thereof.

1.8 SUGGESTED CONSTRUCTION SEQUENCE

- A.** Contractor shall submit a construction sequencing plan demonstrating the erection and installation sequence of project equipment and materials as well as the completion sequence of units, systems or subsystems based on the suggested construction sequence. The construction sequence is developed based on the minimization of interference with engineering, procurement and operations activities and the interface with interdisciplinary activities at the site. The construction sequencing plan should prioritize the items that are required in the event of a SO₂ or chlorine leak.

Special Specifications

- B.** The following is a suggested sequence of Work. Items are suggested to occur in the order listed and may occur concurrently to optimize the construction quality and schedule. The CONTRACTOR may suggest a different sequence and submit the modified sequence for approval from the Engineer.
1. Establish the staging area as indicated in the Plans and provide tree protection per Owner standards. Provide silt fence as indicated in the Plans.
 2. CONTRACTOR shall procure and install the temporary hypo dosing system in place and tested prior to demolition and installation of Chlorine Gas Scrubbing System.
 - a. Operation of Temporary Hypo Dosing System is permitted ONLY for NINETY (90) calendar days.
 - b. The contractor shall supply sodium hypochlorite to fill 4 sodium hypochlorite tanks for testing and initial startup of sodium hypochlorite system. During the permitted (90) days stated above, procurement of sodium hypochlorite will be by AW Operations. If the contractor takes longer than 90 days to complete the work; the contractor will be back charged for the sodium hypochlorite material usage on a daily basis.
 3. Chlorine Building

During any work at Chlorine Building either Emergency Chlorine Gas Scrubbing System or Temporary Hypo Dosing System shall be operational.

 - a. Demolition at Chlorine Building
 - 1) Disconnect and remove existing fans EF-1 and EF-2 and associated duct work per Plans.
 - a) Disconnect cable/wire from existing fans EF-1 and EF-2.
 - b) Disconnect conduit/wire per Plans.
 - c) Disconnect and remove motor overload relay (Device 49) heaters/circuit protector/circuit breakers (Completed under MCC OP-MCC-001 section).
 - d) Remove existing fans EF-1 and EF-2.
 - 2) Disconnect and remove existing exhaust fans EF-5 and EF-6, and associated duct work in the chlorine feed room per Plans.
 - a) Disconnect cable/wire from existing fans EF-5 and EF-6.
 - b) Disconnect conduit/wire per Plans.
 - c) Remove existing fans EF-5 and EF-6.
 - 3) Disconnect and remove existing supply fan O-F-14 and associated ductwork in chlorine feed room per Plans.
 - a) Disconnect cable/wire from existing supply fan O-F-14.
 - b) Disconnect and remove cable/wire per Plans (servicing O-F-1, O-F-14 and UH-1) in the circuit breaker panel O-H-1 and CS01-LP-01 EF-4.
 - c) Remove existing supply fan O-F-14.
 - 4) Disconnect and remove existing air handling unit AHU-1 and associated condensing unit OP-DS-CU1.

Special Specifications

- a) Disconnect cable/wire from the existing air handling unit AHU-1 that is to be replaced by the proposed air handling unit OAHU-1 at the Operations Station and disconnect switch (completed under 480V MCC OP-MCC-002A section).
 - b) Disconnect conduit/wire (conduit/wire tagged CS01-CU1-C routing from condensing unit CU-1) from termination box for the existing unit AHU-1. Reconnect conduit/wire with the proposed termination box. Remove the existing unit AHU-1 at the Operations Station. Test and reuse existing intake louver and refrigerant piping.
 - c) Disconnect cable/wire from MCC to the existing condensing unit OP-DS-CU1 that is to be replaced by proposed condensing unit CU-OAHU-1 at the Chlorine Building and disconnect switch (completed under MCC OP-MCC-002A section), and demolish the existing unit (tag to be field verified).
- 5) Disconnect and remove existing unit heater UH-1, thermostat and ductwork. Disconnect conduit/wire to unit heater UH-1 per Plans. Remove device labels on the interior and exterior of the starter bucket. Re-tag the starter bucket as spare. Existing starter shall remain for future use. Disconnect and remove associated control devices and all cable/wire per Plans (completed under the MCC OP-MCC-002A section).
 - 6) Disconnect existing unit heater UH-1at the Chlorine Building from existing gas piping. Remove existing unit heaters UH-1; remove associated thermostat and ductwork (Chlorine Feed Room and Chlorine Storage Room).
 - 7) Disconnect and remove existing unit heater UH-2, thermostat and ductwork.
 - a) Disconnect conduit/wire to unit heater UH-2 per Plans. Remove device labels on the interior and exterior of the starter bucket. Re-tag the starter bucket as spare. Existing starter shall remain for future use. Disconnect and remove associated control devices and all cable/wire per Plans (completed under the MCC OP-MCC-002A section).
 - b) Disconnect existing unit heater UH-2 (Operations Station) at the Chlorine Building from existing gas piping. Remove existing unit heaters UH-2; remove associated thermostat and ductwork (Chlorine Feed Room and Chlorine Storage Room).
 - 8) Demolish conduit/wire from equipment (OF-14, UH-2, AHU-1, OF-1, and OF-2) on the roof of the Operations Building as indicated in the Plans. Demolish and remove OF-14, OF-1, and OF-2.
 - 9) Disconnect and remove enclosed circuit breaker at condensing unit CU-AHU-001. Reconnect the conduit/wire from the circuit breaker to motor control center.
 - 10) Demolish existing door and frame in the Chlorine Building per Plans.
- b. Renovation at Chlorine Building
 - 1) Install new exhaust fan OF-1, OF-2, EF-1 and EF-2, and associated FRP ductwork at the Chlorine Building per Plans.

Special Specifications

- a) Furnish and install enclosed circuit breaker DS-EF1, DS-EF2 on wall of the Chlorine Storage Room (EF-1, EF-2). Route conduit/wire to motor control center OP-MCC-001 in ceiling space. Furnish and install conduit sealing fitting as last conduit body prior to entering 480V MCC room.
 - 2) Install new outside air unit and condensing unit CU-OAHU-1 at the Chlorine Building per Plans. Include a carbon filter section. Reuse existing refrigerant piping. Provide unit with programmable thermostat with day of week and time of day adjustment. Reconnect existing gas line.
 - a) Furnish and install proposed conduit/wire between proposed CU-OAHU-1 and make all final connections with MCCs OP-MCC-002A and OP-MCC-001. Furnish and install replacement overload heater and motor circuit protector as indicated in the Plans.
 - 3) Install 120V two position isolation damper interlocked with scrubber. Unit to shut down and isolation damper to close when scrubber is engaged. Provide new 120 V damper actuators at the Chlorine Building to be interlocked with the scrubber system. Damper to remain closed during normal operation and open during an event.
 - 4) Install 10-inch FRP duct for scrubbing chlorine feed room and connect to existing 21-inch FRP duct.
 - 5) Install new FRP doors and frame with tempered glass at the Chlorine Building.
 - 6) Install new FRP doors and frames with tempered glass per Plans.
4. Operation Building
- a. Demolition at Operations Building Boiler Room
 - 1) Demolish the old hot water piping and pumps in the Operations Building boiler room per Plans.
 - a) Remove boiler gas piping back to main branch and cap with a blind flange per Plans.
 - 2) Demolition at Operations Building MCCs OP-MCC-002A and OP-MCC-001.
 - 3) Disconnect and remove MCC Starter Bucket, control devices and all control cable/wire per Plans per Plans.
 - 4) Disconnect and remove all exposed conduit, pull/junction/outlet boxes, wiring device, supports, cable/wire, etc. per Plans. Coordinate with mechanical/HVAC contractor for demolition of exhaust fans and unit heaters.
 - a) Disconnect and remove cable/wires per Plans (the starter buckets serving the existing OF-2 and UH-2). Remove existing tag on face of MCC and replace with tag labelled "spare".
 - b) Disconnect and remove load (serving the existing EF-1, EF-2, OAHU-1, OP-CU-001) as indicated in the Plans; conduit/wire to remain and be reconnected during renovation activities.

Special Specifications

- c) Disconnect cable/wire from existing air handling unit OAHU-1 (Operations Station) and disconnect switch (See demolition sequence at Chlorine Building).
 - d) Disconnect cable/wire from MCC to the existing condensing unit CU-OAHU-1 and disconnect switch.
 - e) Disconnect conduit/wire to unit heater UH-2 per Plans (OP-MCC-001). Remove device labels on the interior and exterior of the starter bucket. Re-tag the starter bucket as spare. Existing starter shall remain for future use. Disconnect and remove associated control devices and all cable/wire per Plans.
 - f) Disconnect cable/wire from existing fans OF-2. Disconnect and remove existing fan OF-2, and conduit/wire per Plans. Disconnect and remove motor overload relay (Device 49) heaters/circuit protector/circuit breakers at the existing 480V motor control center OP-MCC-002A.
 - g) Disconnect and remove enclosed circuit breaker serving the existing condensing unit CU-AHU-001. Conduit/wire to MCC to remain and be reconnected.
 - h) Remove device labels on the interior and exterior of the spare starter bucket.
 - i) Disconnect and remove cable/wire per Plans (serving OF-2, O-F-14, O-F-1, UH-1, EF-4, and DS01-FCP-03) in the circuit breaker panel O-H-1, CS01-LP-01, and DS01-FCP-03.
- b. Renovation at Operations Building**
- 1) Furnish and install proposed new supply air fan with filter and gas fired furnace SF-1 per Plans.
 - a) Provide a new 4-inch concrete housekeeping pad per Plans.
 - b) Install new supply air fan SF-1 with filter and gas fired furnace at the Boiler Room/Mechanical Room. Install motors, control panel, and associated instrumentation for SF-1.
 - c) Install new ductwork for SF-1 and connect intake to existing ventilation ductwork, coming up from Boiler Room, ducting into Chlorine Storage Room. Unit SF-1 to shut down when the proposed chlorine gas scrubber is engaged. Isolation damper to close through the on-board controller when unit is shut down.
 - 2) MCCs OP-MCC-002A and OP-MCC-001.
 - a) Furnish and install proposed conduit/wire between equipment (proposed OF-1, OF-2, OAHU-1, CU-OAHU-1, EF-1, and EF-2) at Chlorine Building and make all final connections with MCCs OP-MCC-002A and OP-MCC-001. Furnish and install replacement overload heater and motor circuit protector as indicated in the Plans.
 - b) Make modification to MCCs OP-MCC-002A and OP-MCC-001 per Plans.

Special Specifications

- c) Furnish and install enclosed circuit breaker DS-SF1 on wall of the Mechanical Room (SF-1). Route conduit/wire to motor control center OP-MCC-002A in ceiling space.
 - d) Furnish and install enclosed circuit breakers DS-OF2 and DS-OF1. Route conduit/wire to MCC OP-MCC-002A in ceiling space. Furnish and install conduit sealing fitting as last conduit body prior to entering 480 V MCC room.
 - e) Furnish and install proposed conduit/wire from the proposed air filter system PPU-001 at Mechanical Room/Boiler Room and make all final connections with MCC OP-MCC-001. Furnish and install replacement overload heater and motor circuit protector as indicated in the Plans.
 - f) Route conduit/wire to motor control center OP-CP-LPU2 in ceiling space.
- 3) Install the new pure air chemical filtration system PFU-4000 at the boiler room.
5. Emergency Chlorine Gas Scrubbing System
- 1) CONTRACTOR shall demolition the existing scrubber, and install, start-up and commission the new gas scrubber within 90 days permitted operation of Temporary Hypo Dosing System.
 - 2) Conduct preparatory meeting with Owner a minimum of 10 days in advance of the planned scrubber demolition. Coordinate with Owner 20 minimum working days in advance prior to scrubber demolition.
 - 3) Remove all caustic from inside the scrubber and drain all liquids from the existing chlorine scrubber (by Plant staff). Turn off and cap the existing caustic soda line between the existing scrubber and the existing caustic feed equipment. Remove caustic soda lines supports. Remove duct to the existing scrubber. Cap the existing 1-inch chlorine gas relief line as indicated in the Plans.
 - 4) Disconnect and remove existing chlorine scrubber packaged control panel and all associated field conduit/wire, supports, etc. per Plans. Coordinate demolition of control devices associated with the caustic storage and feed systems with process/mechanical.
 - 5) Disconnect and remove existing chlorine scrubber blowers and motors from field instruments conduits and wires. Demolish and remove the existing chlorine emergency web scrubber, fan, pump motor, and duct per Plans.
 - 6) Construct concrete pad extension for the proposed chlorine scrubber as indicated in the Plans.
 - 7) Install the emergency chlorine dry scrubber on the extended concrete pad, including scrubber vessel, blower, motor, packaged control panel DCL-CP-CLSC1, air flow meter, differential pressure gauge, and switch as indicated in the Plans.
 - 8) Furnish and install the packaged control system for proposed emergency chlorine gas scrubber per Plans and Project Manual. Make all final

Special Specifications

connections per the recommendations and wiring diagrams provided by the equipment manufactures.

- 9) Size, furnish and install all conduit/wire and all necessary related hardware to interconnect all packaged system sub-components with the proposed control panel per Plans.
- 10) Install and complete all electrical and instrumentation for proposed chlorine emergency gas scrubber.
 - a) Provide general electrical and instrumentation integration of new and reinstalled equipment with the Walnut Creek WWTP system.
 - b) Connect the 21-inch chlorine RFP feed line with the proposed Emergency Chlorine Gas Scrubber. Demolish, remove, and relocate excess and unused piping, valves, fittings, conduit that may be in the way of installation.
 - c) Test the Emergency Chlorine Gas Scrubbing System per SS01670 and submit a certified testing report for approval.

6. De-chlorination Building

a. Demolition at De-chlorination Building

- 1) Owner will switch to an alternate de-chlorination method using sodium bisulfite prior to work commencing. Contractor coordinates with the Owner prior to the construction at the De-chlorination Building.
- 2) Demolition at existing 480V MCCs DS01-MCC-01 and DS01-MCC-02 located in the electrical room of De-chlorination Building. Coordinate with mechanical/HVAC contractor for demolition of exhaust fans and unit heaters.
 - a) Disconnect and remove MCC starter bucket, control devices, and all control cable/wire per Plans for condensing unit CU-1, exhaust fan EF-3, and Unit Heater UH-3 per Plans.
 - b) Disconnect and remove all exposed conduit, pull/junction/outlet boxes, wiring device, supports, cable/wire, etc. per Plans.
 - c) Remove equipment tags/labels from the interior and exterior of the circuit breaker MCC bucket per Plans. Circuit breaker shall be reused during renovation activities.
 - d) Disconnect cable/wire from circuit breaker. Disconnect and remove all exposed conduit, pull/junction/outlet boxes, wiring devices, supports, etc. per Plans.
 - e) Disconnect and remove control panel DS01-ECP-01 per Plans. Disconnect and remove all power and control components, power and control wiring, and all associated exposed conduits/raceways and related supports associated with HAVC equipment per Plans.
 - f) Disconnect conduit/wire to unit heater UH-3 per Plans. Remove device labels on the interior and exterior of the starter bucket. Remove existing tag on face of MCC and replace with tag labelled "spare." Re-tag the starter bucket as spare. Existing starter shall remain for future use. Disconnect and remove associated control

Special Specifications

devices and all cable/wire per Plans. Coordinate with the equipment demolition at the De-chlorination Building.

- g)** Disconnect and remove load (serving the existing CU-1 and AHU-1) as indicated in the Plans; conduit/wire to remain and be reconnected during renovation activities.
 - h)** Disconnect and remove cable/wires per Plans (serving the existing EF-3). Remove existing tag on face of MCC, starter bucket to be re-purposed during renovation activities.
 - i)** Disconnect cable/wire between the existing air handling unit AHU-1 and switch per Plans. Disconnect conduit/wire from CU-1. Disconnect cable/wire between the existing condensing unit CU-1 and switch per Plans. Disconnect conduit/wire (tagged DS01-CU1-C routing from condensing unit CU-1) from the existing termination box for AHU-1. Reconnect conduit/wire with the proposed termination box. Coordinate with the equipment demolition at the De-chlorination Building.
 - j)** Disconnect and remove exposed conduit/wire between existing chlorine scrubber control panel and motor control centers per Plans (MCC DS01-MCC-02). Coordinate with work at Emergency Chlorine Gas Scrubbing System.
 - k)** Disconnect conduit/wire from SO₂ scrubber control panel, and the existing cable/wire will be reconnected to the proposed SO₂ scrubber control panel (MCC DS01-MCC-02). Coordinate with work at Existing Emergency Chlorine Gas Scrubbing System.
- 3)** Demolish and remove the existing AHU-1 and CU-1 Per Plans.
- a)** Remove the existing duct furnace for AHU-1 and disconnect from existing gas line. Test and Reuse existing duct connection and refrigerant piping.
 - b)** Conduit/wire routes from air handler unit AHU-1 to condensing unit CU-1. Disconnect and remove all power and control component power and control wiring, and all associated exposed conduit/raceways and related supports associates with HAVC equipment per Plans.
 - c)** Disconnect and remove enclosed circuit breaker at condensing unit CU-AHU-001. Reconnect the conduit/wire from the circuit breaker to motor control center.
- 4)** Remove two existing exhaust fans EF-3 and EF-4 on the east wall of the De-chlorination Building. Cap existing exhaust fan penetration.
- a)** EF-3 Conduit/wire continues to motor control enter DS01-MCC-02.
 - b)** Disconnect and remove all power and control components, power and control wiring and all associated exposed conduits/raceways and related supports associated with HAVC equipment per Plans per Plans.
 - c)** Disconnect and remove existing fan EF-3 and conduit/wire per Plans per Plans. Remove device labels on the interior and exterior of the

Special Specifications

starter bucket. Existing starter shall remain for future use (work completed under MCC DS01-MCC-02).

- 5) Remove existing unit heater UH-3, gas piping, thermostat, and ductwork.
 - 6) Disconnect and remove motor overload relay (device 49) heaters/circuit protector/circuit breaker at existing 480 V motor control centers DS01-MCC-01 and DS01-MCC-02 (see Plans sheet E-20 for details).
 - 7) Demolish and remove existing HVAC equipment EF-2, EF-3, OF-2, CU-AHU-001. Disconnect and remove motor overload relay (device 49) heaters/circuit protector/circuit breaker. Remove exposed conduit and all wire per Plans.
 - 8) Remove device labels on the interior and exterior of the starter bucket. Existing starter shall be repurposed as part of the work. Refer to drawing E-19 for additional information.
- b. Renovations at De-chlorination Building**
- 1) Renovation at MCCs DS01-MCC-01 and DS01-MCC-02
 - a) Furnish and install proposed conduit/wire between equipment (proposed CU-1 and Emergency Chlorine Gas Scrubber) on the east of De-chlorination Building and make all final connections with MCCs DS01-MCC-0 and DS01-MCC-02. Furnish and install replacement overload heater and motor circuit protector as indicated in the Plans.
 - b) Furnish and install panel schedule as indicated in the Plans (Circuit breaker panel schedules O-H-1, DS01-LP-01, and CS01-LP-01).
 - c) Make modifications to MCCs DS01-MCC-01 and DS01-MCC-02 in the Electrical Room of the De-chlorination Building. Modify and re-tag starter buckets as indicated in the Plans.
 - d) Furnish and install proposed conduit/wire between proposed AHU-1, EF-4, and SF-5 at De-chlorination Building and make all final connections with MCCs DS01-MCC-0 and DS01-MCC-02. Furnish and install replacement overload heater and motor circuit protector as indicated in the Plans. Existing starter shall be reused to serve the proposed exhaust fan EF-4. Furnish and install proposed breaker in the existing motor control center to serve proposed supply fan SF-5. Terminate conduit/wire to proposed SO₂ scrubber control panel. Furnish and install receptacle for SF-5. Furnish and install enclosed. Route conduit/wire from SF-5 and EF-4 to MCC DS01-MCC-02 in ceiling space. Route conduit/wire from SF-5 to control panel DS01-LCP-01.
 - 2) Install 10-inch FRP duct for scrubbing sulfonation room, and connect to existing 21-inch FRP duct.
 - 3) Install new duct furnace as noted in split system schedule, and reconnect to existing gas line.
 - 4) Install new split system AHU-1 and CU-1 at the De-chlorination Building. Reuse existing duct connections and refrigerant piping. AHU-1 to be

Special Specifications

interlocked with SO₂ scrubber system. Isolation damper to close through on-board controller when scrubber is engaged.

- 5) Install new exhaust fan EF-4 and FRP ductwork, duct down to within 12 inches of the finished floor. Fan to be interlocked with the existing SO₂ scrubber, unit to shut down when scrubber is engaged.
- 6) Install new supply air fan SF-5 with filter and gas fired furnace at the de-chlorination building as indicated in the Plans. Install new duct furnace as noted in split system schedule. Reconnect to existing gas line. Unit to shut down when scrubber is engaged. Isolation damper to close through the one board controller when unit is shut down. Duct through wall to enlarged existing intake penetration as noted in the Plans.
- 7) Install new wall penetration and louver within 12 inches of the finished floor at the east side of the de-chlorination building.
- 8) Furnish and install proposed cable/wire to connect to the existing instruments and relocated existing SO₂ scrubber fan motor.
- 9) Make modifications to MCCs DS01-MCC-01 and DS01-MCC-02 in the Electrical Room of the De-chlorination Building. Modify and re-tag starter buckets as indicated in the Plans (work completed under MCCs DS01-MCC-01 and DS01-MCC-02 section).
- 10) Install Sulfur Dioxide Vacuum Regulator Bypass Pipes per Plans.
- 11) Install drip legs for sulfur dioxide cylinder per Plans.

7. Existing Emergency Sulfur Dioxide Gas Scrubbing System

- 1) The contractor shall extend the concrete pad and procure all equipment and materials associated with sulfur dioxide scrubber blower improvement prior to shutdown of existing sulfur dioxide scrubber. Contractor shall use all means and methods to minimize the sulfur dioxide scrubber shutdown period. Contractor shall submit a sequencing plan including the required shutdown period for engineers' approval. The work for sulfur dioxide scrubber blower improvement must be completed within 3 weeks from shutdown of sulfur dioxide scrubber.
- 2) Conduct preparatory meeting with Owner a minimum of 10 days in advance of the planned demolition. Coordinate with Owner minimum 20 days prior to demolition.
- 3) Switch to using liquid sodium bisulfite for de-chlorination (by Others).
- 4) Relocate the existing blower and motor. Install the proposed blower and motor per Plans.
- 5) Disconnect conduit/wire from SO₂ scrubber control panel, and the existing cable/wire will be reconnected to the proposed SO₂ scrubber control panel (completed under MCC DS01-MCC-02). Terminate field wire to existing terminal block control panel DS01-LCP-01. Terminate existing field wire to the electrical control panel of the existing SO₂ scrubber. Disconnect fan motor and remove conduit/wire between motor and control panel. Fan motor to be located during renovation activities. Demolish SO₂ scrubber unit control panel.

Special Specifications

- 6) Extend conduit/wiring from SO₂ scrubber unit control panel to the individual component within the scrubber system and make all final connections. Finish and install a conduit body on end of existing conduit system partially removed during demolition. Terminate existing field wire to proposed control panel. Furnish and install proposed cable/wire to connect to existing instruments and relocated fan motor.
 - 7) Provide general electrical and instrumentation integration of new and reinstalled equipment with the plant system. Test the existing Emergency Sulfur Dioxide Gas Scrubbing System and submit a certified testing report for approval prior to its disconnecting the existing scrubber from the liquid sodium bisulfite supply system.
8. Other items to be addressed:
- 1) These following items may be implemented as required and in time/order convenient to the CONTRACTOR in the construction sequence. They require interlock with existing logic. The controls interlock shall be such that all wire, conduit, and control equipment is installed first prior to incurring any down time of existing control system. For each item, the down time shall be no greater than 4 hours in interconnecting proposed controls with existing control logic. HVAC units may be down for a duration not to exceed 8 hours. Coordinate all down times with Owner and obtain Owner approval.
 - 2) Install and complete electrical and controls for proposed emergency push button control stations.
 - 3) Install and complete electrical and controls for proposed louvers.
 - 4) Install and complete all electrical and instrumentation for remaining HVAC work.

1.9 CONSTRUCTION SEQUENCE RESTRICTIONS

- A. Electrical and control improvements related to actuator replacement must be installed and tested prior to actuator replacement.
- B. Gas scrubber unit shall be out of service for the minimum amount of time practical for installation and testing of new equipment. Total time of shutdown for scrubber change out shall be limited to 3 days.
- C. Any equipment or process outage shall be requested in writing to the Owner and Engineer for approval at least 14 days in advance.

1.10 MAINTENANCE OF PLANT OPERATIONS SCHEDULE

- A. CONTRACTOR shall develop a detailed description of the complete sequence of construction. The sequence shall be submitted to the Owner and Engineer for review and approval 30 days following the Effective Date of the Agreement.
- B. The procedures contained herein were developed based upon available information. This list does not address all required operations, but only those anticipated to be of significant impact to Plant operations.
- C. CONTRACTOR is required to make all tie-ins, connections, and replacements necessary to perform the Work.

Special Specifications

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

PART 4 -- MEASUREMENT AND PAYMENT

There is no separate measurement and payment for Work performed under this Section as part of the base bid. Include cost of same in Contract price bid for work of which this is a component part.

END

Bidding Requirements, Contract Forms and Conditions of the Contract

ADDENDUM
Section 00900

ADDENDUM NO. 02

Date August 16, 2022

City of Austin

Project Name: Walnut Creek WWTP Gas Scrubber Systems Renewal

C.I.P. No.: 3023.066 IFB No.: CLMC940

This Addendum forms a part of the Contract and corrects or modifies original Bid Documents, issued on July 18, 2022. **Acknowledge receipt of this addendum in space provided on bid form.** Failure to do so may subject bidder to disqualification.

A. Project Manual Revisions:

1. Section 00020, Invitation for Bids

Replace

ALL BIDS AND COMPLIANCE PLANS ARE DUE PRIOR TO (Austin time) 2:00 PM ON AUGUST 25, 2022. BIDS WILL BE OPENED AT (Austin time) 3:00 PM ON AUGUST 25, 2022.

with the following

ALL BIDS AND COMPLIANCE PLANS ARE DUE PRIOR TO (Austin time) 2:00 PM ON September 1, 2022. BIDS WILL BE OPENED AT (Austin time) 3:00 PM ON September 1, 2022.

2. Addendum #01, Dated 7-27-22, #2, Section 00020, Invitation for Bids

Replace

[Bid Opening Link Click here.](#)

With the following

[Bid Opening Link Click here.](#)

3. Section 0810, Supplemental General Conditions

Delete 13.7.1 and **Replace** with the following (changes to the text are identified by underlining):

If within two years after the date of Substantial Completion or such longer period of time as may be prescribed by laws or regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of

the Contract Documents (e.g. paragraph 14.11.2), any Work, including work performed after the Substantial Completion date, is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions:

- (i) correct such defective Work, or, if it has been rejected by OWNER, remove it from the site and replace it with Work that is not defective, and
- (ii) (ii) satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom.

If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected or the rejected Work removed and replaced, and all claims, costs, losses and damages caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR. The warranty period will be deemed to be renewed and recommenced in connection with the completed items of Work requiring correction.

4. Addendum #01, Dated 7-27-22, #04, SS01311 Coordination with Owner's Operation

Replace 1.8, B, 2, b

with the following

The contractor shall fill 4 sodium hypochlorite tanks with potable water for testing of sodium hypochlorite system. During the permitted (90) days stated above and initial startup, procurement of sodium hypochlorite will be by AW Operations. If the contractor takes longer than 90 days to complete the work; the contractor will be back charged for the sodium hypochlorite material usage on a daily basis.

B. Drawing Revisions:

Drawing E-36, Sheet 61 of 83

REMOVE in its entirety and **REPLACE** with the attached.

This addendum consists of 3 page(s)/sheet(s).

Gabriel Castaño

Digitally signed by Gabriel Castaño
DN: cn=Gabriel Castaño, o=City of Austin - Public Works Department, ou=Project Management Division, email=gabriel.castaño@austintexas.gov, c=US
Date: 2022.08.16 08:43:31 -0500

Approved by OWNER

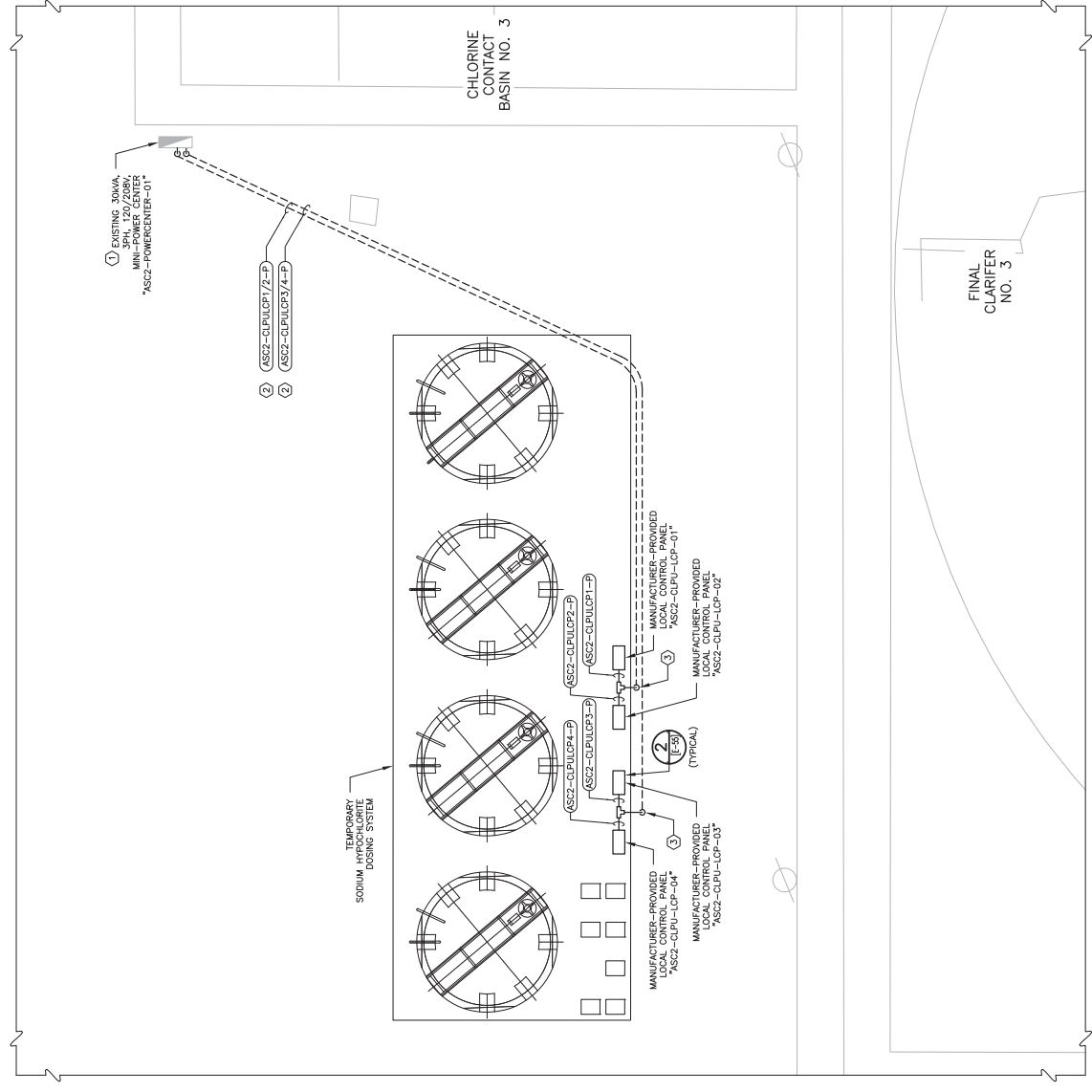
ZEE AI

Digitally signed by ZEE AI
DN: cn=ZEE AI, email=ai@zaingroup.com, o="Zain North America, Inc.", ou=ZEE AI
Location: Richardson
Reason: I am approving this document
Contact info: Zee AI
Date: 2022.08.18 09:03:03 -0500

Approved by ENGINEER/ARCHITECT

END





- KEY NOTES:**
- 1 EXISTING 30KVA. MINI-POWER CENTER IS TAGGED "ASO1-LP-02". CONTRACTOR SHALL FURNISH AND INSTALL PHENOLIC NAME PLATE PER SPECIFICATIONS. PHENOLIC NAME PLATE SHALL BE IDENTICAL TO "ASO2-POWERCENTER-01" REFER TO PANEL SCHEDULE ON DRAWING NO. [E-30] FOR ADDITIONAL INFORMATION.
 - 2 PROPOSED CONDUIT/WIRE TURNS DOWN TO PROPOSED UNDERGROUND DUCT BANK. PROPOSED TEMPORARY DUCT BANK SHALL CONSIST OF THE REQUIRED QUANTITY OF PROPOSED CONDUITS ENGAGED IN SUITABLE BACKFILL MATERIAL PER SPECIFICATIONS. SPACE CONDUITS PER THE DETAILS ON DRAWING NO. [E-58]. CONTRACTOR SHALL ENSURE MINIMUM SOIL COVER OF 24" GRADE ACROSS THE ENTIRE LENGTH OF THE DUCT BANK. INCREASE SOIL COVER AS NEEDED PER FIELD CONDITIONS OF THE REQUIREMENTS OF THE MANUFACTURER'S INSTRUCTIONS. CONTRACTOR SHALL DISCONNECT AND REMOVE THIS UNDERGROUND DUCT BANK AND ASSOCIATED WIRING FROM THE TEMPORARY SODIUM HYPOCHLORITE SYSTEM.
 - 3 CONDUIT/WIRE TURNS UP FROM THE UNDERGROUND DUCT BANK ADJACENT TO PROPOSED TEMPORARY SODIUM HYPOCHLORITE DOSING SYSTEM. CONDUIT/WIRE CONTINUE EXPOSED TO TEMPORARY SODIUM HYPOCHLORITE DOSING SYSTEM. CONTRACTOR SHALL PROVIDE A CONTROL PANEL. COORDINATE FINAL EQUIPMENT LOCATION AND CONDUIT ENTRANCE LOCATION WITH PROCESS/MECHANICAL PRIOR TO RENOVATION ACTIVITIES. CONTRACTOR SHALL PROVIDE DETAILS PER DETAILS ON DRAWING NO. [E-52] AND MAKE ALL FINAL CONNECTIONS.

REV.	NO.	DATE	REVISION DESCRIPTION
1		8/11/2022	APPROXIM. NO. 2



CITY OF AUSTIN
WALNUT CREEK WWT
GAS SCRUBBER SYSTEM RENEWAL
PARTIAL SITE PLAN (1 OF 2) - PROPOSED

ATKINS
11811 DOMINION BOULEVARD, SUITE 500
FORT WORTH, TEXAS 76135
TYPE FILE: RD, PLAT

NOTES	NAME	DATE
SURVEY BY	N/A	
DRAWN BY	HEL	
CHECKED BY	HEL	
DESIGNED BY	HEL	
REVIEWED BY	HEL	
SCALE:	AS SHOWN	N/A
CADD REF. NO.:	100057315	
CADD DIR.:		

SHEET NUMBER	E-36
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TEXAS REGISTERED ENGINEERING FIRM
E-2428

N
PLANT NORTH

**TEMPORARY SODIUM HYPOCHLORITE DOSING SYSTEM
AT CHLORINE CONTACT BASIN NO. 3**
SCALE: 1" = 5'

Bidding Requirements, Contract Forms and Conditions of the Contract

ADDENDUM
Section 00900

ADDENDUM NO. 3

Date August 16, 2022

City of Austin

Project Name Walnut Creek WWTP Gas Scrubber Systems Renewal

C.I.P. No. 3023.066 IFB No.: CLMC940

This Addendum forms a part of the Contract and corrects or modifies original Bid Documents, issued on July 18, 2022. **Acknowledge receipt of this addendum in space provided on the bid form.** Failure to do so may subject the bidder to disqualification.

A. Project Manual Volume 2 Revisions:

- Add
 - Pages Good Faith Efforts Instructions
 - Post-Award Instructions
 - MBE/WBE Compliance Plan (Appendix A)
 - Letter to Potential Subcontractors (Appendix B)

This addendum consists of 15 pages

**Fernando Ivan
Quinones**

Digitally signed by Fernando Ivan
Quinones
Date: 2022.08.16 16:09:20 -05'00'

Approved by OWNER

Approved by ENGINEER/ARCHITECT (as applicable per license requirements)

END

GOOD FAITH EFFORTS INSTRUCTIONS
(See *Appendices B and D*)

The Bidder has a responsibility to make a portion of the work available to MBE/WBE subcontractors so as to facilitate meeting the goals or subgoals. If the Bidder cannot achieve the goals or subgoals, documentation of the Bidder's Good Faith Efforts to achieve the goals or subgoals must be submitted at the same time as the MBE/WBE Compliance Plan. The SMBR Director will review the documentation provided and determine if the Bidder made sufficient Good Faith Efforts. That there may be some additional costs involved in soliciting and using MBEs and WBEs is not a sufficient reason for a Bidder's failure to meet the goals and subgoals, as long as such costs are reasonable. However, a Bidder is not required to accept a higher quote from a subcontractor in order to meet a goal or subgoal.

Contacting Potential MBE/WBE Subcontractors

The City has determined the scopes of work for this project and provided an Availability List of all the MBE and WBE firms certified to perform those scopes. The *Availability List* (Appendix D) is included with the solicitation documents and has two sections: *Vendors Within the Significant Local Business Presence (SLBP) Area* and *Vendors Outside the Significant Local Business Presence (SLBP) Area*. As part of Good Faith Efforts, Bidders **must** contact **all** firms listed in the *Vendors Within the SLBP Area* section. Please note that every firm on the Availability List – outside the SLBP – is City-certified as an MBE or WBE for purposes of meeting the project goals, and Bidders are encouraged to contact all the firms. If a Bidder identifies an additional scope of work for this project not identified in the solicitation, the Bidder must request from SMBR an Availability List for that scope of work and contact all firms, if any, on such list. The SMBR Director determines whether the Bidder has made sufficient Good Faith Efforts if goals or subgoals are not met.

The City neither warrants the capacity or availability of any Firm, nor does the City guarantee the performance of any Firm indicated on the availability list.

The availability list is sorted in numerical sequence by National Institute of Governmental Purchasing (NIGP) Commodity Code. It includes all certified MBE/WBE vendors for the scopes of work identified by the City as being potentially applicable to this project. However, the availability list is not a comprehensive identification of all areas of potential subcontracting opportunities. If a Bidder identifies one or more work areas that are appropriate subcontracting opportunities that not included on the availability list, the Bidder shall contact SMBR to request the availability list for MBE and WBE Firms in those areas. Requests for supplemental availability lists will be evaluated as a part of the Bidder's Good Faith Efforts to meet the goals.

If the Bidder believes any of the work areas on the availability list are not applicable to the project's scope of work or if the Bidder believes that the lists are inaccurate, the Bidder shall notify the authorized contact person of the concern immediately and prior to submission of the response to the solicitation. All Bidders will be notified in writing of any inaccuracy by addendum to the solicitation. Concerns about a particular MBEs/WBE's certification status may be addressed to SMBR at SMBRComplianceDocuments@austintexas.gov. If the Bidder wants to use a certified subcontractor that does not appear on this list, Bidder may request from SMBR or visit www.austintexas.gov/certified_vendors_directory proof of certification and the specific work areas for which the subcontractor has been certified.

Appendix B provides a format for collecting required information from the subcontractors on the *Availability List*. The information must be obtained at least seven (7) business days prior to the submission of the *MBE/WBE Compliance Plan*; alternate formats may be acceptable as long as they gather the same required information. Included with the solicitation documents is an alphabetized list containing the names and addresses of the MBE/WBE Firms listed on the Appendix D. This list is in label format and is designed to facilitate the printing of mailing labels.

The following codes are used on the availability lists:

F	Female	M	Male
AA/B	African American	H	Hispanic
A/NA	Asian/Native American	W/C	Caucasian
LOC	A firm's two-digit location code (e.g., SL or TX)	AU	Austin
SL	Significant Local Business Presence (SLBP)	TX	Outside SLBP
MBE	A firm certified as a Minority-owned Business Enterprise	WBE	A firm certified as a Woman-owned Business Enterprise
MWB	A firm certified as both a Minority-owned & Woman-owned Business Enterprise	WMB	A firm certified as both a Woman-owned & Minority-owned Business Enterprise
MWDB	A firm certified as a Minority-owned, Woman-owned, and Disadvantaged Business Enterprise	WMDB	A firm certified as a Woman-owned, Minority-owned, and Disadvantaged Business Enterprise

Good Faith Efforts Review

If goals are not met, SMBR will examine the *MBE/WBE Compliance Plan* and the Good Faith Efforts documentation submitted with the *MBE/WBE Compliance Plan* to ensure that the Bidder made Good Faith Efforts to meet the project goals or subgoals. In determining whether the Bidder has made Good Faith Efforts, SMBR will consider, at a minimum, the Bidder's efforts to do the following:

- (A) Solicit certified MBE/WBE subcontractors with a Significant Local Business Presence (SLBP) and request a response from those interested subcontractors who believe they have the capability to perform the work of the contract through at least two reasonable, available, and verifiable means. The Bidder must solicit this interest more than seven (7) business days prior to submission of the *MBE/WBE Compliance Plan* to allow sufficient time for the MBEs or WBEs to respond. (The date bids/proposals are due to the City should not be included in the seven-day solicitation criteria.) The Bidder must state a specific and verifiable reason for not contacting each certified Firm with a significant local business presence.
- (B) Provide interested MBEs/WBEs with adequate information about the plans, specifications, and requirements of the contract, including addenda, in a timely manner, to assist them in responding and submitting a proposal.
- (C) Negotiate in good faith with interested MBEs/WBEs that have submitted bids/proposals to the Bidder. An MBE/WBE that has submitted a bid to a Bidder but has not been contacted within five (5) business days of submission of the bid may contact SMBR to request a meeting with the Bidder. Evidence of good faith negotiation includes the names, addresses, and telephone numbers of MBEs/WBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for MBEs/WBEs to perform the work. Bid shopping is prohibited.
- (D) Select portions of the work to be performed by MBEs/WBEs in order to increase the likelihood that the MBE/WBE goals or subgoals will be met. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate MBE/WBE participation, even when the Bidder might otherwise prefer to perform these work items with its own forces.

- (E) Publish solicitation notice in a local publication (i.e. newspaper, trade association publication, or via electronic/social media).
- (F) Use the services of available community organizations; minority persons/women consultants' or groups in the applicable field for the type of work described in this solicitation; local, state, and federal minority persons/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of MBEs/WBEs.
- (G) Seek guidance from SMBR on any questions regarding compliance with this section.

The following factors may also be considered by SMBR in determining compliance through good faith efforts; however, they are not intended to be a mandatory checklist, nor are they intended to be exclusive or exhaustive:

- (A) Whether the Bidder made efforts to assist interested MBEs/WBEs in obtaining bonding, lines of credit, or insurance as required by the City or consultant.
- (B) Whether the Bidder made efforts to assist interested MBEs/WBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.

In assessing minimum good faith efforts, SMBR may consider whether the Bidder sought assistance from SMBR on any questions related to compliance with this section. In addition, SMBR may also consider the performance of other Bidders successfully meeting the goals.

The ability or desire of a Bidder to perform the work of a contract with its own organization does not relieve the Bidder of the responsibility to make Good Faith Efforts.

Bidders may reject MBE/WBEs as unqualified only following thorough investigation of their capabilities. The MBE/WBE's membership or lack of membership in specific groups, organizations, or associations, and political or social affiliations (for example union or non-union employee status), are not legitimate causes for the rejection or non-solicitation of bids/proposals in the Bidder's efforts to meet the project goals or subgoals.

At a minimum, the following should be submitted to support Good Faith Effort documentation (documentation is not limited to this list):

- Fax logs, emails, and/or copies of documents sent to firms within the SLBP area
- Copies of written correspondence to certified firms (include names, addresses, and other identifying information)
- Phone logs with responses (*Phone contacts, alone, will not be sufficient.*)
- Lists and copies of letters sent by mail, hand delivered, or e-mailed
- Breakdown of negotiations made with certified firms
- Copies of advertisements with local newspapers, trade associations, Chambers of Commerce and/or any other public media
- Other communications regarding contacts with trade associations and Chambers of Commerce

The following additional Good Faith Efforts factors may also be considered:

- Copies of emails or phone logs regarding assistance in bonding, lines of credit, or insurance (as required by City or Consultant)
- Copies of emails or phone logs regarding assistance in obtaining equipment, supplies, materials, or services
- Copies of all proposals received in response to Bidder contacting other Firms

POST-AWARD INSTRUCTIONS **(See Appendix C)**

Confirmation Letters

All Bidders are required to include copies of the confirmation letters received from subcontractors, confirming the Subcontractors' willingness to provide services should the contract be awarded.

Changes to the *MBE/WBE Compliance Plan* including additions, deletions, contract changes, or substitutions of subcontractors are permitted only after contract execution and only with prior written approval of SMBR. Request for changes to the *MBE/WBE Compliance Plan* must be submitted on the Request for Change of *MBE/WBE Compliance Plan* Form for all levels of subcontracting and must be approved by the SMBR Director prior to adding, deleting, changing or substituting any subcontractor.

Post-Award Monitoring

The City will monitor post-award compliance information regarding the use of certified MBE/WBE Firm(s) listed on the *MBE/WBE Compliance Plan*. The Bidder will be required to submit post award reports detailing the utilization of all subcontractors. The reports and other information regarding post-award compliance will be discussed with the successful Bidder. The following information on Payment Verification, Change Order/Contract Amendments, and Progressive Sanctions provides an overview of some of the post-award monitoring process.

▪ Payment Verification

Bidders are advised that the contract resulting from this solicitation includes a subcontractor payments clause. This clause requires all subcontractors to be paid within ten (10) calendar days from the date that the Bidder has been paid by the City for invoices submitted by subcontractors.

The Bidder shall submit a *Subcontractor/Supplier Awards and Expenditures Report* to the project manager and/or contract administrator at the time specified by the managing department. The report shall be in the format required by the City and shall include all awards and payments to subcontractors for goods and services provided under the contract during the previous month. This report may be used by the City to verify utilization of and payment to MBEs and WBEs.

The Bidder and/or any subcontractor whose subcontracts are being counted toward the MBE/WBE requirements shall allow the City access to records relating to the contract, including but not limited to, subcontracts, payroll records, tax information, and accounting records, for the purpose of determining whether the MBEs/WBEs are performing the scheduled subcontract work.

In determining achievement of MBE/WBE goals, the participation of an MBE/WBE subcontractor shall not be counted until the amount being counted toward the goal has been paid.

▪ Change Order/Contract Amendments

The goals on this contract shall also apply to change orders that require work beyond the scope(s) of trades originally required to accomplish the project. The Bidder is required to make Good Faith Efforts to obtain MBE/WBE participation for additional scopes of work.

Change orders that do not alter the type of trades originally required to accomplish the project may be undertaken using the subcontractors already under contract to the Bidder. Project managers will have automatic SMBR approval

to authorize any change order that **increases** the contract amount for an **existing** certified subcontractor and is **within** the existing scope being performed by that subcontractor.

▪ **Progressive Sanctions**

The successful Bidder's MBE/WBE Compliance Plan will be incorporated into the resulting contract with the City and shall be considered part of the consultant's performance requirements. Progressive sanctions may be imposed for failure to comply with Chapter 2-9A of the City Code, including:

- Providing false or misleading information in Good Faith Efforts documentation, post award compliance, or other Program operations;
- Substituting Subcontractors without first receiving approval for such substitutions, which may include the addition of an unapproved Subcontractor and failure to use a Subcontractor listed in the approved MBE/WBE Compliance Plan ; and
- Failure to comply with the approved MBE/WBE Compliance Plan without an approved Request for Change, an approved Change Order, or other approved change to the Contract.

Please refer to Section 2-9A-25 of the City Code and SMBR Rule 11.5 for additional information.

MBE/WBE COMPLIANCE PLAN

All applicable sections must be completed and submitted by the due date and time as indicated in the solicitation documents.

The Bidder/Respondent by submitting and signing this solicitation’s 0300 form, understand and agree that the MBE/WBE Compliance Plan submitted as a part of the bid/proposal shall become a part of the contract with the City of Austin. The Bidder/Respondent further understand that the City of Austin’s Minority-owned and Women-owned Business Enterprise Procurement Program Ordinance) and the Small and Minority Business Resources Department (SMBR) Rules shall apply.

Section I — Project Identification and Goals

Project Name	Walnut Creek WWTP Gas Scrubber Svstems Renewal
Solicitation Number	IFB 6100 CLMC940

Project Goals or Subgoals		
Combined MBE/WBE		%
MBE		%
African American	1.65	%
Hispanic	3.11	%
Asian/Native American	0.86	%
WBE	1.21	%

Section II — Bidder Company Information

Company Name	
Address	
City, State Zip	
Phone	
Fax	E-Mail
Name of Contact Person	
Is your company registered on Vendor Connection?	Yes <input type="checkbox"/> <i>If yes, provide Vendor Code _____</i> No <input type="checkbox"/> All vendors; Subconsultants and consultants must register with COA’s Vendor Connect prior to award. See Link for registration information at www.austintexas.gov/vendor_registration
Is your company COA M/WBE certified?	Yes <input type="checkbox"/> No <input type="checkbox"/> <i>(If yes, please indicate type below)</i> 1. MBE <input type="checkbox"/> WBE <input type="checkbox"/> MBE/WBE <input type="checkbox"/> Joint Venture <input type="checkbox"/> 2. AA <input type="checkbox"/> H <input type="checkbox"/> A/NA <input type="checkbox"/> WBE <input type="checkbox"/>

City of Austin SMBR Use Only

*I have reviewed this Compliance Plan and found that the Bidder **HAS** **HAS NOT** complied as per the City Code Chapter 2-9A through GFE.*

Reviewing Counselor _____ Date _____

*I have reviewed this Compliance Plan and have found the Bidder **COMPLIANT** **NON-COMPLIANT***

Director /Assistant Director _____ Date _____

Section III — MBE/WBE Compliance Plan Summary

Directions:

- For each subcontractor listed in Sections IV, V, VI or VII, fill in all blanks (if applicable).
- For project participation numbers use an EXACT number.
- Goal percentages should be based on the Base Bid amount only. Allowances are not included.
- Alternates are not recorded on this MBE/WBE Compliance Plan.
- If bidder is a certified MBE/WBE, include participation details in the Bidder box ONLY.
- MBE/WBE Compliance Plans not complying with these requirements shall be rejected as non-responsive.

Is the stated project goal of the solicitation met? (If no, attach documentation of Good Faith Efforts) Yes No

PROPOSED PARTICIPATION GOALS

Use this section to calculate participation.

Include all details including the total dollar amount and percentage for each category where applicable.

MBE/WBE Project Goal		Bidder Participation Goal	
African American	1.65 %	\$	%
Hispanic	3.11 %	\$	%
Asian/Native American	0.86 %	\$	%
WBE	1.21 %	\$	%
MBE	%	\$	%
MBE/WBE Combined	%	\$	%
Non-Certified		\$	%
Total Subcontractor Amount		\$	%
Bidder's Own Participation (less any subcontracted amount) Are you counting your own participation toward the goals? (if yes, indicate below) <input type="checkbox"/> AA <input type="checkbox"/> HIS <input type="checkbox"/> A/NA <input type="checkbox"/> WBE <input type="checkbox"/> MBE		\$	%

Base Bid Amount (*Subs + Bidder amount*) \$ _____ 100 %

For SMBR Use Only:

Verified participation for each category:

African-American _____ % Hispanic _____ % Asian/Native American _____ % WBE _____ %

MBE _____ % WBE _____ % Combined MBE/WBE _____ %

Prime _____ % Non-Certified _____ %

Section IV — Disclosure of MBE and WBE Subcontractors
(Duplicate as Needed)

Note:

- Fill in all the blanks (use “none” or “N/A” where appropriate).
- Fill in names of MBE/WBE certified Firms as registered with City of Austin Vendor Connection.
- Select either MBE or WBE for dually certified firms to indicate which certification will count towards the MBE or WBE goal.
- List only the scopes of work that you intend the subcontractor to perform. Do not list all scopes a subcontractor can perform.
- Contact SMBR to request an availability list of certified Firms for additional scopes of work that were not included on the original availability list.

Name of MBE/WBE Certified Firm		
City of Austin Certification Data	<input type="checkbox"/> MBE <input type="checkbox"/> WBE	Gender/ Ethnicity:
City Of Austin Vendor Code		
Address/ City / State / Zip		
Contact Person & Phone		
Fax & Email Address		
Commodity Codes		
Commodity Codes Descriptions		
Amount of Subcontract	\$	%

Name of MBE/WBE Certified Firm		
City of Austin Certification Data	<input type="checkbox"/> MBE <input type="checkbox"/> WBE	Gender/ Ethnicity:
City Of Austin Vendor Code		
Address/ City / State / Zip		
Contact Person & Phone #		
Fax & Email Address		
Commodity Codes		
Commodity Codes Descriptions		
Amount of Subcontract	\$	%

Name of MBE/WBE Certified Firm		
City of Austin Certification Data	<input type="checkbox"/> MBE <input type="checkbox"/> WBE	Gender/ Ethnicity:
City Of Austin Vendor Code		
Address/ City / State / Zip		
Contact Person & Phone #		
Fax & Email Address		
Commodity Codes		
Commodity Codes Descriptions		
Amount of Subcontract	\$	%

Name of MBE/WBE Certified Firm		
City of Austin Certification Data	<input type="checkbox"/> MBE <input type="checkbox"/> WBE	Gender/ Ethnicity:
City Of Austin Vendor Code		
Address/ City / State / Zip		
Contact Person & Phone #		
Fax & Email Address		
Commodity Codes		
Commodity Codes Descriptions		
Amount of Subcontract	\$	%

Section V — Disclosure of Non-Certified Subcontractors
(Duplicate as Needed)

Note:

- Fill in all the blanks (use “none” or “N/A” where appropriate).
- MBE/WBE Compliance Plans not complying with these requirements shall be rejected as non-responsive.
- Fill in names of Non-Certified Subcontractors as registered with the City of Austin.
- List only the scopes of work that you intend the subcontractor to perform. Do not list all scopes a subcontractor can perform.

Are Goals Met? Yes No If no, state reason(s) below and attach documentation:

Name of Non-Certified Subcontractor		
City Of Austin Vendor Code		
Address/ City / State / Zip		
Contact Person & Phone #		
Fax & Email Address		
Commodity Codes		
Commodity Codes Descriptions		
Amount of Subcontract	\$	%
Reason Certified Firm not used		
Name of Non-Certified Subcontractor		
City Of Austin Vendor Code		
Address/ City / State / Zip		
Contact Person & Phone #		
Fax & Email Address		
Commodity Codes		
Commodity Codes Descriptions		
Amount of Subcontract	\$	%
Reason Certified Firm not used		
Name of Non-Certified Subcontractor		
City Of Austin Vendor Code		
Address/ City / State / Zip		
Contact Person & Phone #		
Fax & Email Address		
Commodity Codes		
Commodity Codes Descriptions		
Amount of Subcontract	\$	%
First-Level Subcontractor		
Reason Certified Firm not used		
Name of Non-Certified Subcontractor		
City Of Austin Vendor Code		
Address/ City / State / Zip		
Contact Person & Phone #		
Fax & Email Address		
Commodity Codes		
Commodity Codes Descriptions		
Amount of Subcontract	\$	%
First-Level Subcontractor		
Reason Certified Firm not used		

Section VI — Disclosure of Second-Level Subcontractors
(Duplicate as Needed)

Note:

- Fill in all the blanks (use “none” or “N/A” where appropriate).
- MBE/WBE Compliance Plans not complying with these requirements shall be rejected as non-responsive.
- Fill in names of Second-Level Subcontractors as registered with the City of Austin.
- List only the scopes of work that you intend the subcontractor to perform. Do not list all scopes a subcontractor can perform.

Name of Second-Level Subcontractor	
City of Austin Certification	<input type="checkbox"/> No <input type="checkbox"/> MBE <input type="checkbox"/> WBE Gender/ Ethnicity:
City Of Austin Vendor Code	
Address/ City / State / Zip	
Contact Person & Phone #	
Fax & Email Address	
Commodity Codes	
Commodity Codes Descriptions	
Amount of Subcontract	\$ _____ %
First-Level Subcontractor	
Name of Second-Level Subcontractor	
City of Austin Certification (choose one)	<input type="checkbox"/> No <input type="checkbox"/> MBE <input type="checkbox"/> WBE Gender/ Ethnicity:
City Of Austin Vendor Code	
Address/ City / State / Zip	
Contact Person & Phone #	
Fax & Email Address	
Commodity Codes	
Commodity Codes Descriptions	
Amount of Subcontract	\$ _____ %
First-Level Subcontractor	
Name of Second-Level Subcontractor	
City of Austin Certification (choose one)	<input type="checkbox"/> No <input type="checkbox"/> MBE <input type="checkbox"/> WBE Gender/ Ethnicity:
City Of Austin Vendor Code	
Address/ City / State / Zip	
Contact Person & Phone #	
Fax & Email Address	
Commodity Codes	
Commodity Codes Descriptions	
Amount of Subcontract	\$ _____ %
First-Level Subcontractor	
First-Level Subcontractor	
Name of Second-Level Subcontractor	
City of Austin Certification (choose one)	<input type="checkbox"/> No <input type="checkbox"/> MBE <input type="checkbox"/> WBE Gender/ Ethnicity:
City Of Austin Vendor Code	
Address/ City / State / Zip	
Contact Person & Phone #	
Fax & Email Address	
Commodity Codes	
Commodity Codes Descriptions	
Amount of Subcontract	\$ _____ %
First-Level Subcontractor	

Section VII – Disclosure of Primary and Alternate Trucking Subcontractors
(Duplicate as Needed)

Note:

- Fill in all the blanks (use “none” or “N/A” where appropriate).
- MBE/WBE Compliance Plans not complying with these requirements shall be rejected as non-responsive.
- List only the scopes of work that you intend the subcontractor to perform. Do not list all scopes a subcontractor can perform.
- Fill in names of Primary and Alternate Trucking Subcontractors as registered with the City of Austin.

Primary Trucking Subcontractor	
City of Austin Certification	<input type="checkbox"/> No <input type="checkbox"/> MBE <input type="checkbox"/> WBE Gender/ Ethnicity:
City Of Austin Vendor Code	
Address/ City / State / Zip	
Contact Person	Phone:
Commodity Codes	
Commodity Codes Descriptions	
Amount of Subcontract	\$ _____ %

Alternate Trucking Subcontractor	
City of Austin Certification	<input type="checkbox"/> No <input type="checkbox"/> MBE <input type="checkbox"/> WBE Gender/ Ethnicity:
City Of Austin Vendor Code	
Address/ City / State / Zip	
Contact Person	Phone:
Commodity Codes	
Commodity Codes Descriptions	

Alternate Trucking Subcontractor	
City of Austin Certification	<input type="checkbox"/> No <input type="checkbox"/> MBE <input type="checkbox"/> WBE Gender/ Ethnicity:
City Of Austin Vendor Code	
Address/ City / State / Zip	
Contact Person	Phone:
Commodity Codes	
Commodity Codes Descriptions	

Alternate Trucking Subcontractor	
City of Austin Certification	<input type="checkbox"/> No <input type="checkbox"/> MBE <input type="checkbox"/> WBE Gender/ Ethnicity:
City Of Austin Vendor Code	
Address/ City / State / Zip	
Contact Person	Phone:
Commodity Codes	
Commodity Codes Descriptions	

Alternate Trucking Subcontractor	
City of Austin Certification	<input type="checkbox"/> No <input type="checkbox"/> MBE <input type="checkbox"/> WBE Gender/ Ethnicity:
City Of Austin Vendor Code	
Address/ City / State / Zip	
Contact Person	Phone:
Commodity Codes	
Commodity Codes Descriptions	

Section VIII — MBE/WBE Compliance Plan Check List

Is each stated project goal of the solicitation met?

Yes No

(If no, complete and submit Section VIII Compliance Plan Check List)

If the goals or subgoals were not achieved, all questions in Section VIII **must** be completed and **Good Faith Efforts documentation must be submitted with the MBE/WBE Compliance Plan.** The completion and submission of this form is not required if the above question is answered *Yes*.

Is the following documentation attached to support good faith effort requirements to achieve goals or subgoals?		
<ul style="list-style-type: none"> • Copy of written solicitation sent to MBE/WBEs in SLBP area 7 business days prior to the submission of this Compliance Plan 	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<ul style="list-style-type: none"> • Two separate methods of notices sent to MBE/WBEs in SLBP area Indicate notice types: fax transmittals emails phone log letters 	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<ul style="list-style-type: none"> • Copy of advertisements placed in local publication 	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<ul style="list-style-type: none"> • Copy of notices sent to Minority and Women organizations 	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<ul style="list-style-type: none"> • Documentation that demonstrates additional GFEs: <ul style="list-style-type: none"> ○ Efforts to assist interested MBEs/WBEs in obtaining bonding, lines of credit, or insurance as required by the City or contractor ○ Efforts to assist interested MBEs/WBEs in obtaining necessary equipment, supplies, materials, or related assistance or services ○ Efforts made to reach agreements with the MBE/WBEs who responded to Bidder's written notice 	Yes <input type="checkbox"/>	No <input type="checkbox"/>

Were additional elements of work identified to achieve the goals or subgoals? Yes No

If yes, please explain: _____

Was SMBR contacted for assistance? Yes No

If yes, complete following:

Contact Person: _____

Date of Contact: _____

Summary of Request: _____

Were Minority or Women organizations contacted for additional assistance? Yes No

If yes, complete following:

Organization(s): _____

Date of Contact: _____

Summary of Request _____

LETTER TO POTENTIAL SUBCONTRACTORS

_____ is soliciting Minority- and Women-Owned Business Enterprise participation for the following City of Austin project. Solicitation documents are available at our office or at One Texas Center, 505 Barton Springs Road, 10th Floor, Suite 1045 C-Congress Room or at www.austintexas.gov/vendor_registration

Solicitation Name: _____
Solicitation Number: _____
Location of Pre-bid Conference _____

Response Due Date and Time: _____

This Project Includes the Following Scopes of Service:

- Asbestos Abatement
- Carpentry
- Carpeting
- Concrete
- Demolition Services
- Doors and Frames
- Drilling
- Drywall
- Electrical
- Excavation Services
- Fabricated Steel
- Flooring
- Glazing Services
- Hardware
- Heavy Construction Equipment
- Other _____
- HVAC
- Insulation
- Lab and Field-Testing Services
- Landscaping
- Masonry
- Millwork
- Painting
- Paving and Resurfacing
- Plumbing
- Roofing
- Stone
- Tile
- Weather and Waterproofing
- Welding
- Windows
- Other _____

Contact our office for detailed information on the scopes of services to be subcontracted and the relevant terms and conditions of the contract.

Contact: _____ at _____ or _____
(Name) (Telephone) (Fax)

(Email)

All Responses MUST be received by: _____

CONFIRMATION LETTER

Name of Prime Contractor: _____

Address: _____

Telephone: (____) _____ Fax: (____) _____ Proposed Contract Amount: \$ _____
Street City State Zip Code

Project/Solicitation Number: _____

Project Name: _____

Type of Agreement (*check one*): Lump Sum Unit Price Commodity

Period of Performance: _____ Level of Subcontracting (*check one*): 1st 2nd 3rd

Legal Name of Subcontractor*: _____

Subcontractor* City Of Austin : _____

Address: _____

Telephone: (____) _____ Fax: (____) _____ Proposed Subcontract Amount: \$ _____
Street City State Zip Code

Commodity Code and description of work to be performed by Subcontractor Firm:

The Prime Contractor and the Subcontractor listed above agree that the Prime Contractor has provided the Subcontractor with a copy of the City's prevailing wage requirements

Prime Contractor

Subcontractor: (Includes Suppliers, Manufacturers, Alternates)

Legal Name of Firm, as registered with the City of Austin

Legal Name of Firm, as registered with the City of Austin

Signature

Signature

Print Name

Print Name

Title

Title

Date

Date

STATE OF _____

STATE OF _____

COUNTY OF _____

COUNTY OF _____

SUBSCRIBED AND SWORN TO before me on the _____ day of _____, 20____

SUBSCRIBED AND SWORN TO before me on the _____ day of _____, 20____

Notary Republic

Notary Republic

City of Austin

Standard Contract Documents

Table of Contents

Document Number	Date	Title
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VOLUME 1 OF 2

INTRODUCTORY INFORMATION

	06/27/2022	Table of Contents
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BIDDING REQUIREMENTS, CONTRACT FORMS, & CONDITIONS OF THE CONTRACT

Pre-Bid Information

00020	09/21/2021	Invitation for Bids
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Instructions to Bidders

00100	05/06/2022	Instruction to Bidders
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Bid Forms

00300L	09/01/2021	Bid Form-Lump Sum
	04/03/2020	Total Bid Form

Supplements to Bid Forms

00400	04/30/2019	Statement of Bidders Experience
00405	03/30/2018	Certificate of Non-Suspension or Debarment
00410	09/17/2018	Statement of Bidder's Safety Experience
00440	09/02/2021	Affidavit - Prohibited Activities

Agreement Form

00500	02/04/2020	Agreement (SAMPLE)
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Bonds and Certificates

00610	02/04/2020	Performance Bond
00620	02/04/2020	Payment Bond
00630	10/22/2019	Non-Discrimination and Non-retaliation
00631	03/30/2018	Title VI Assurances Appendix A
00632	03/30/2018	Title VI Assurances Appendix E
00650	06/08/2018	Certificate of Insurance
00670	01/11/2019	Sales Tax Exemption Certificate
00680	03/30/2018	Non-Use of Asbestos Affidavit (Prior to Construction)
00681	03/30/2018	Non-Use of Asbestos Affidavit (After Construction)

General Conditions

00700	12/04/2020	General Conditions
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Supplementary Conditions

00810	05/06/2022	Supplemental General Conditions
00830	02/04/2020	Wage Rates and Payroll Reporting
00830BC	06/27/2022	Wage Rates Building Construction
00840	09/01/2021	Construction Training Program

Addenda

00900	05/10/2021	Addendum Sample
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City of Austin

Standard Contract Documents

Table of Contents

Security

SP-1070 05/12/2021 Facility Security Procedure for Contractors

SPECIFICATIONS**Division 1 - General Requirements**

01010	08/28/2020	Summary of Work
01020	03/30/2018	Allowances
01025	09/17/2018	Measurement and Payment
01095	07/21/2003	Reference Standards and Definitions
01200	05/06/2022	Project Meetings
01300	05/06/2022	Submittals
01310	09/15/2018	Progress Schedules
01353	04/29/2020	Construction Equipment Emissions Reduction Plan
01380	08/09/2012	Construction Photography & Videos
01500	08/28/2020	Temporary Facilities
01505	08/12/2019	Construction and Demolition Waste Management
01510	06/29/2018	Construction Indoor Air Quality Management Plan
01550	08/09/2012	Public Safety and Convenience
01600	10/29/2013	General Equipment Requirements
01730	06/24/2019	Operation and Maintenance Data
01900	03/12/2012	Prohibition of Asbestos Containing Materials
01900a	06/05/2006	Statement of Non-Inclusion of Asbestos Containing Material (E/A Prior to Design)
01900b	06/05/2006	Statement of Non-Inclusion of Asbestos Containing Material (E/A After Design)

Division 2-15 Not Used**City Standard Technical Specifications**

403S	09/26/2012	Concrete for Structures
405S	11/13/2007	Concrete Admixtures
406S	09/26/2012	Reinforcing Steel
411S	11/13/2007	Surface Finishes for Concrete
610S	12/17/2018	Preservation of Trees and Other Vegetation
641S	06/21/2007	Stabilized Construction Entrance
642S	09/01/2011	Silt Fence
700S	09/26/2012	Mobilization

Special Specifications

SS00500	06/09/2021	Chemical Dosing System Purchase
SS01311	06/01/2021	Coordination with Owner's Operation
SS01433	06/24/2019	Manufacturer Services
SS01670	06/24/2019	Startup and Testing
SS01784	04/27/2022	Warranties
SS08120	06/24/2019	Fiberglass Reinforced Door and Door Frame Systems
SS08710	06/24/2019	Finish Hardware
SS11260	06/01/2021	Emergency Chlorine Gas Scrubbing System, Existing Sulfur dioxide Gas Scrubbing System Improvements
SS11540	11/15/2021	Dosing Pump

City of Austin

Standard Contract Documents

Table of Contents

SS13201	06/09/2021	High Density Cross-linked Polyethylene Storage Tanks
SS13390	01/17/2022	Packaged Control Systems
SS14630	06/24/2019	Free-standing Workstation Bridge Crane
SS15650	06/23/2021	Chlorinated Polyvinyl Chloride (CPVC) pipeline, fittings, and valves
SS16121	01/17/2022	Modifications to Existing 480 Volt Motor Control Centers
SS16150	01/17/2022	Raceways, Fittings and Supports
SS16200	01/17/2022	Wiring (600 Volts and Below)
SS16250	01/17/2022	Boxes and Cabinets
SS16300	01/17/2022	Wiring Devices
SS16522	01/17/2022	480 Volt Manual Transfer Switches
SS16540	01/17/2022	Field Control Stations
SS16550	01/17/2022	Grounding
SS16600	01/17/2022	Disconnect Switches and Enclosed Circuit Breakers
SS16800	01/17/2022	Calibration, Testing and Settings
SS17100	01/17/2022	Process Instrumentation and Control Systems (PICS)
SS17200	01/17/2022	Instrumentation and Controls Cabinets and Associated Equipment
SS23311	02/25/2019	Fiberglass Reinforced Plastic Ductwork
SS230500	01/17/2022	Common Work Results for HVAC
SS230529	01/17/2022	Hangers and Supports for HVAC Piping and Equipment
SS230593	01/17/2022	Testing, Adjusting, and Balancing for HVAC
SS230700	01/17/2022	HVAC Insulation
SS232300	01/17/2022	Refrigerant Piping
SS233113	01/17/2022	Metal Ducts
SS233116	01/17/2022	Nonmetal Ducts
SS233300	01/17/2022	Air Duct Accessories
SS233423	01/17/2022	HVAC Fans
SS235416.13	01/17/2022	Gas Fired Furnaces
SS237433	01/17/2022	Dedicated Outdoor Air Units
SS238127	01/17/2022	Split System Air Conditioners

VOLUME 2 OF 2

04/27/2022 MBE/WBE Procurement Program Package

END

Bidding Requirements, Contract Forms and Conditions of the Contract**INVITATION FOR BIDS**

Section 00020

1. OVERVIEW AND PROJECT INFORMATION

Following is a summary of information for this Project. Bidder is cautioned to refer to other sections of the Project Manual, Drawings and Addenda (Bid Documents) for further details.

The City of Austin, hereafter called OWNER, is requesting Bids for furnishing all labor, materials, equipment, supervision, and incidentals, and for performing all Work required for the following:

Project:	Walnut Creek WWTP Gas Scrubber System Renewal
Located at:	7113 Farm to Market 969, Austin, TX 78724
CIP ID No.:	3023.066
Solicitation No.:	IFB 6100 CLMC940

The Work consists of the following:

1. Remove and replace the existing emergency chlorine gas scrubber as indicated in the plans. Utilize existing electrical, instrumentation, and duct infrastructure.
2. Improvements at chlorination room – Extend scrubbing duct and replace three (3) doors as indicated in the Plans.
3. Ventilation improvements at sulfur dioxide building – Replace air handling/condensing unit, FRP exhaust distribution system, and exhaust fans.
4. Furnish and install a backup blower for the existing sulfur dioxide scrubber per Plans.
5. Furnish and install an electrical control panel for the existing sulfur dioxide scrubber per Plans.
6. Ventilation improvements at chlorination building – Replace air handling unit, FRP exhaust distribution system, exhaust fans, and wall louvers.
7. Miscellaneous Improvements at the chlorination building and de-chlorination buildings as indicated in the Plans.
8. Electrical & Instrumentation – Provide the necessary wiring and connections to support implementation of the scrubber renewal and ventilation improvements described above.
9. Furnish and install temporary sodium hypochlorite storage and pumping system

2. BID DOCUMENTS

Bid Documents are obtained through the City's Vendor Connection website, log on https://financeonline.austintexas.gov/afo/account_services/solicitation/solicitations.cfm. A complete set of Bid Documents, including all sections of the Project Manual and Drawings, are included in the attachments section of each solicitation.

All addenda and answers to Bidders' questions will also be posted in the attachments section for each solicitation on the City's Vendor Connection website.

3. SUBMISSION OF BIDS

Sealed Bids may be submitted to the Capital Contracting Office Bid Opening Desk located at One Texas Center, 505 Barton Springs Rd., Suite 365, Austin, Texas 78704, or may be submitted electronically (see [eResponse](#) Instructions).

Bidding Requirements, Contract Forms and Conditions of the Contract

Sealed Bid may be mailed using address below:

Address for US Mail (If mailed to the physical address, the proposal will be returned unopened)	
City of Austin	
Capital Contracting Office	
P. O. Box 1088	
Austin, Texas 78767-8845	

NOTE: Bids must either be received and time stamped in the Capital Contracting Office prior to the Due Date and Time or submitted electronically via Austin Finance Online. The time of record for those electronically submitted is the time received in Austin Finance OnLine. It is the responsibility of the Offeror to ensure that their Bid arrives at the reception desk in the Capital Contracting Office or electronically prior to the time and date indicated. Arrival at the City's mailroom, mail terminal, or post office box will not constitute the Proposal arriving on time.

ALL BIDS AND COMPLIANCE PLANS ARE DUE PRIOR TO (Austin time) 2:00 PM ON AUGUST 25, 2022.

BIDS WILL BE OPENED AT (Austin time) 3:00 PM ON AUGUST 25, 2022.

[Bid Opening Link Click here.](#)

ALL BIDS AND COMPLIANCE PLANS NOT RECEIVED PRIOR TO THE DATE AND TIME SET FORTH ABOVE WILL NOT BE ACCEPTED FOR CONSIDERATION. The time stamp clock in SUITE 365 is the time of record and is verified with www.time.gov, the official U.S. time. For Bids submitted electronically via Austin Finance Online, the time of record is the time received in Austin Finance Online.

4. VENDOR REGISTRATION AND NON-DISCRIMINATION

To create, edit, or submit an eResponse Bid, you must be logged in to your vendor account as the primary contact. You are eligible to submit an eResponse Bid after creating a user account and providing the business information of your organization. All CONTRACTORS must be registered to do business with OWNER prior to the Contract Award. All Subcontractors must be registered with the OWNER prior to execution of a contract. Prime Contractors are responsible for ensuring that their Subcontractors are registered as vendors with the City of Austin. Registration can be done through the OWNER's on-line Vendor Registration system. Log onto and follow directions:

https://financeonline.austintexas.gov/afo/afo_content.cfm?s=17.

The City of Austin, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

Bidding Requirements, Contract Forms and Conditions of the Contract**5. MBE/WBE PROCUREMENT PROGRAM**

All City procurements are subject to the City's Minority-Owned and Women-Owned Business Enterprise Procurement Program found at Chapter 2-9-A of the City Code, as amended. The Program provides Minority-Owned and Women-Owned Business Enterprises (MBEs/WBEs) or Disadvantaged Business Enterprises (DBEs) full opportunity to participate in all City contracts. Goals for MBE/WBE or DBE participation are stated for each solicitation. Information on achieving the goals or documenting good faith efforts to achieve the goals are contained in the MBE/WBE Procurement Program Package or DBE Procurement Program Package attached to the solicitation. When goals are established, Bidders are required to complete and return the MBE/WBE or DBE Compliance Plan with their Bid. If a Compliance Plan is not submitted prior to the date and time set forth in the solicitation, the Bid will not be accepted for consideration. (See Section 00820 for MBE/WBE requirements on "no goal" solicitations.)

6. BID GUARANTY

All Bids shall be accompanied by an acceptable Bid guaranty in an amount of not less than five percent (5%) of the total Bid, as specified in Section 00100, Instructions to Bidders.

7. BONDS AND INSURANCE

Performance and payment bonds when required shall be executed on forms furnished by OWNER. Each bond shall be issued in an amount of one hundred percent (100%) of the Contract Amount by a solvent corporate surety company authorized to do business in the State of Texas, and shall meet any other requirements established by law or by OWNER pursuant to applicable law.

Minimum insurance requirements are specified in Section 00810, Supplemental General Conditions.

8. WAGE COMPLIANCE

Minimum wage rates have been established and are specified in Section 00830, Wage Rates and Payroll Reporting.

9. CONTRACT TIME

Contract Time is of the essence and all Work shall be substantially completed within THREE HUNDRED SIXTY (360) Calendar Days after date specified in the Notice to Proceed, in accordance with the Bid Form, Section 00300.

Final completion shall be achieved within THIRTY (30) Calendar Days after substantial completion.

Liquidated damages are THREE THOUSAND FIVE HUNDRED TWENTY(\$3520) per Calendar Day for failure to substantially complete the work and ONE THOUSAND EIGHT HUNDRED SIXTY (\$1860) per Calendar Day for failure to achieve final completion within THIRTY (30) Calendar Days after substantial completion, in accordance with the Bid Form, Section 00300.

Bidding Requirements, Contract Forms and Conditions of the Contract

10. OWNER'S RIGHTS

OWNER reserves the right to reject any or all Bids and to waive any minor informality in any Bid or solicitation procedure (a minor informality is one that does not affect the competitiveness of the Bid).

11. PRE-BID CONFERENCE

A non-mandatory in-person Pre-Bid Conference will be held on **Friday, July 29, 2022** at **9:30AM** (Austin time), at Walnut Creek Wastewater Treatment Plant 7113 FM 969, Austin, TX 78724. Room/Suit Admin Building Conference Room.

A non-mandatory in-person site visit will be held on **Friday, July 29, 2022** at **10:30AM** (Austin time), at Walnut Creek Wastewater Treatment Plant 7113 FM 969, Austin, TX 78724.

Attendance is not mandatory unless otherwise stated. Bidders must attend any mandatory Pre-Bid Conference and are encouraged to attend any non-mandatory Pre-Bid Conference to ensure their understanding of OWNER's bidding and contracting requirements, particularly MBE/WBE or DBE Procurement Program requirements. If the Pre-Bid Conference is mandatory the Bidder must arrive and sign-in within fifteen (15) minutes of the scheduled start time of the meeting, otherwise the Bidder will not be allowed to submit a Bid for the project.

12. ANTI-LOBBYING AND PROCUREMENT

On June 14, 2018, the Austin City Council adopted Ordinance No. 20180614-056 replacing Chapter 2.7, Article 6 of the City Code relating to Anti-Lobbying and Procurement. The policy defined in this Code applies to Solicitations for goods and/or services requiring City Council approval under City Charter Article VII, Section 15 (Purchase Procedures). The City requires Offerors submitting Offers on this Solicitation to certify that the Offeror has not in any way directly or indirectly had communication restricted in the ordinance section 2-7-104 during the No-Lobbying Period as defined in the Ordinance. The text of the City Ordinance is posted on the Internet at:

https://assets.austintexas.gov/purchase/downloads/New_ALO_Ordinance_No_20180614-056.pdf

13. AUTHORIZED CONTACT PERSONS

The persons listed below may be contacted for information regarding the Invitation for Bid.

PROJECT MANAGER: Gabriel Castano, PE, PMP, phone 512-974-2937, email: Gabriel.castano@austintexas.gov

CAPITAL CONTRACTING OFFICE CONTACT: Ivan Quinones , phone: 512-974-7207, email: ivan.quinones@austintexas.gov

SMALL & MINORITY BUSINESS RESOURCES DEPARTMENT CONTACT: Amy Amaya, phone: 512-974-7605, email: amy.amaya@austintexas.gov

END

Bidding Requirements, Contract Forms and Conditions of the Contract**INSTRUCTIONS TO BIDDERS**

Section 00100

1. PREPARATION OF BID

1.1 Bid Documents. Each Bidder must prepare its Bid on forms furnished by OWNER or as otherwise specified or permitted. Blank spaces for each item in Bid form must be filled. Bidder must submit a price for each item in Bid. In case of conflict between unit prices and extensions, unit prices shall govern. The Bid must be executed in the complete and correct legal name of individual, partnership, firm, corporation or other legal entity constituting the Bidder.

1.2 Vendor Registration. To create, edit, or submit an eResponse Bid, you must be logged in to your vendor account as the primary contact. You are eligible to submit an eResponse Bid after creating a user account and providing the business information of your organization. All CONTRACTORS must be registered to do business with OWNER prior to Contract Award. All Subcontractors must be registered with the OWNER prior to execution of a contract. Prime Contractors are responsible for ensuring that their Subcontractors are registered as vendors with the City of Austin. Registration can be done through the OWNER's on-line Vendor Registration system. Log onto https://financeonline.austintexas.gov/afo/afo_content.cfm?s=17 and follow the directions.

1.3 Pre-Bid Conference. Unless otherwise notified, Bidders must attend the Pre-Bid Conference to ensure their understanding of OWNER's bidding and contracting requirements, particularly MBE/WBE Procurement Program requirements.

1.4 Sales Tax Exemption. The Owner is a tax-exempt organization as defined by Chapter 11 of the Property Tax Code of Texas. Bid prices shall not include sales tax on materials, supplies, or equipment that are incorporated into the real property interest of the OWNER or are otherwise completely used and consumed in the performance of the Contract. OWNER will furnish CONTRACTOR with a Sales Tax Exemption Certificate to be issued to Suppliers in lieu of the tax.

1.5 Minimum Wages. Workers on Project shall be paid not less than wage rates, including fringe benefits, as published by the Department of Labor (DOL) for Building Construction and Heavy and Highway Trades "AS APPLICABLE" and/or the minimum wage required by City of Austin Ordinance No. 20160324-015, whichever is higher. The Total Minimum Wage required can be met using any combination of cash and non-cash qualified fringe benefits provided the cash component meets or exceeds the minimum wage required.

1.6 Addenda. Bidder shall be knowledgeable of all Addenda issued and shall acknowledge all Addenda in spaces provided on Bid form. Further information regarding the Bid documents and the Project may be obtained from the Project Manager listed at the end of Section 00020, Invitation for Bids.

1.7 Required Items. Bids must include all specified items in this section and be submitted in accordance with paragraph No. 7 below. Any additional requirement to the bid submittal is specified in Section 00820. Any corrections to a Bid shall be initialed by the person signing the Bid.

1.8 Professional Services. Bidders must secure any required professional services that are defined as professional services under the Professional Services Procurement Act, Chapter 2254 of the Texas Government Code (for example: registered professional land

Bidding Requirements, Contract Forms and Conditions of the Contract

surveyors and professional engineers) using the qualifications based selection process prescribed by that chapter. (Note: It is a violation of State Law to solicit Bids for professional services.)

1.9 Further Information. Prospective Bidders desiring further information or interpretation of Project Manual or Drawings must make a written request for such information to OWNER addressed to the Authorized Contact Person listed in Section 00020 no later than seven (7) Working Days before Bid opening. Interpretation of Project Manual or Drawings will be made by Addendum only and obtained through the City's Vendor Connection website. Log on to:

https://financeonline.austintexas.gov/afo/account_services/solicitation/solicitations.cfm.

Any verbal communications will not be binding on the OWNER.

1.10 Anti-Lobbying and Procurement. Article 6, Chapter 2-7, City Code, repealed and replaced effective on June 25, 2018, prohibits lobbying activities or representations by Offerors during the No Lobbying Period as defined in the Ordinance.

1.10.1. FINDINGS; PURPOSE.

(A) The council finds that persons who enter a competitive process for a city contract voluntarily agree to abide by the terms of the competitive process, including the provisions of this article.

(B) The council finds that it is in the City's interest:

- (i) to provide the most fair, equitable, and competitive process possible for selection among potential vendors in order to acquire the best and most competitive goods and services; and
- (ii) to further compliance with State law procurement requirements.

(C) The council intends that:

- (i) each response is considered on the same basis as all others; and
- (ii) respondents have equal access to information regarding a solicitation, and the same opportunity to present information regarding the solicitation for consideration by the City.

1.10.2. APPLICABILITY.

(A) This article applies to all solicitations except:

- (i) City social service funding;
- (ii) City cultural arts funding;
- (iii) federal, state or City block grant funding;
- (iv) the sale or rental of real property;
- (v) interlocal contracts or agreements; and
- (vi) solicitations specifically exempted from this article by council.

(B) Absent an affirmative determination by the council, the purchasing officer has the discretion to apply this article to any other competitive process.

(C) City Code Section 1-1-99 (*Offenses; General Penalty*) does not apply to this article.

1.10.3. DEFINITIONS.

In this article:

(A) AGENT means a person authorized by a respondent to act for or in place of the respondent in order to communicate on behalf of that respondent. Each of the following is presumed to be an agent:

Bidding Requirements, Contract Forms and Conditions of the Contract

- (i) a current full-time or part-time employee, owner, director, officer, member, or manager of a respondent;
- (ii) a person related within the first degree of consanguinity or affinity to a current fulltime or part-time employee, owner, director, officer, member, or manager of a respondent;
- (iii) a person related within the first degree of consanguinity or affinity to the respondent, if a respondent is an individual person; and Section 0200 V2, Solicitation Instructions 4 Rev. 06-26-2018
- (iv) a lobbyist, attorney, or other legal representative of the respondent that has been retained by the respondent with respect to the subject matter of either the solicitation or the respondent's response to the solicitation.

(B) AUTHORIZED CONTACT PERSON means a City employee designated in a City solicitation as the point of contact for all purposes for that solicitation.

(C) CITY EMPLOYEE is defined in Section 2-7-2 (*Definitions*), and further includes an independent contractor hired by the City with respect to the solicitation.

(D) CITY OFFICIAL is defined in Section 2-7-2 (*Definitions*).

(E) NO-LOBBYING PERIOD means the period of time beginning at the date and time a solicitation is published and continuing through the earliest of the following:

- (i) the date the last contract resulting from the solicitation is signed;
- (ii) 60 days following council authorization of the last contract resulting from the solicitation; or
- (iii) cancellation of the solicitation by the City

(F) PURCHASING OFFICER means the City employee authorized to carry out the purchasing and procurement functions and authority of the City.

(G) RESPONSE means a written offer or submission in reply to a solicitation.

(H) RESPONDENT means a person or entity that has timely submitted or subsequently timely submits a response to a City solicitation, even if that person subsequently withdraws its response or has been disqualified by the City for any reason. Respondent includes:

- (i) a subsidiary or parent of a respondent;
- (ii) a joint enterprise, joint venture, or partnership with an interest in a response and in which a respondent is a member or is otherwise involved, including any partner in such joint enterprise, joint venture, or partnership; and
- (iii) a subcontractor to a respondent in connection with that respondent's response.

(I) SOLICITATION means an opportunity to compete to conduct business with the City that requires council approval under City Charter Article VII Section 15 (*Purchase Procedure*), and includes, without limitation:

- (i) an invitation for bids;
- (ii) a request for proposals;
- (iii) a request for qualifications;
- (iv) a notice of funding availability; and
- (v) any other competitive solicitation process for which the purchasing officer, in the purchasing officer's sole discretion, affirmatively determines this article should apply in accordance with Section 2-B.

1.10.4. RESTRICTION ON LOBBYING.

Bidding Requirements, Contract Forms and Conditions of the Contract

Subject to the exclusions in Section 5 (*Permitted Communications*), during a no-lobbying period,

(A) a respondent or an agent shall not communicate directly with a City official or a City employee, or both in order to:

- (i) provide substantive information about any respondent or response with respect to the solicitation to which the communication relates;
- (ii) encourage the City to reject one or more of the responses to the solicitation to which the communication relates;
- (iii) convey a complaint about the solicitation to which the communication relates; or
- (iv) ask any City official or City employee to favor or oppose, recommend or not recommend, vote for or against, consider or not consider, or take action or refrain from taking action on any vote, decision, or agenda item regarding the solicitation to which the communication relates.

(B) a City official shall not contact or communicate with a respondent regarding a response or the solicitation to which the no-lobbying period applies;

(C) a City employee, other than the authorized contact person, shall not contact or communicate with a respondent regarding a response or the solicitation to which the no-lobbying period applies.

1.10.5. PERMITTED COMMUNICATIONS.

The following communications are permitted under this article at any time:

(A) any communication between a respondent or agent and any authorized contact person, including, without limitation and in accordance with regulation, any complaint concerning the solicitation;

(B) any communication between a respondent or agent and any person to the extent the communication relates solely to an existing contract between a respondent and the City, even when the scope, products, or services of the current contract are the same or similar to those contained in an active solicitation;

(C) any communication between a respondent or an agent and a City employee to the extent the communication relates solely to a non-substantive, procedural matter related to a response or solicitation;

(D) any communication required by or made during the course of a formal protest hearing related to a solicitation;

(E) any communication between a respondent or an agent and the City's Small & Minority Business Resources Department, that solely relates to compliance with Chapters 2-9A through 2-9D (*Minority-Owned and Women-Owned Business Enterprise Procurement Program*) of the City Code;

(F) any communication between an attorney representing a respondent and an attorney authorized to represent the City, to the extent the communication is permitted by the Texas Disciplinary Rules of Professional Conduct;

(G) any communication made by a respondent or an agent to the applicable governing body during the course of a meeting properly noticed and held under Texas Government Code Chapter 551 (*Open Meetings Act*);

(H) any communication between a respondent or an agent and a City employee whose official responsibility encompasses the setting of minimum insurance requirements for the solicitation to which the communication relates, to the extent the communication relates solely to the insurance requirements established by the City in the solicitation; and

Bidding Requirements, Contract Forms and Conditions of the Contract

(I) any contribution or expenditure as defined in Chapter 2-2 (*Campaign Finance*).

1.10.6. MODIFICATION OF RESTRICTION.

The purchasing officer may waive, modify, or reduce the requirements in Section 4 (*Restrictions on Lobbying*) in order to allow respondents to communicate with a City employee or a City official other than the authorized contact person when the purchasing officer determines, in writing, that the solicitation must be conducted in an expedited manner, including but not limited to a solicitation conducted for reasons of health or safety under the shortest schedule possible with no extensions. Any such modification authorized by the purchasing officer shall be stated in the solicitation.

1.10.7. NOTICE.

(A) Each solicitation shall include a notice advising respondents and prospective respondents:

- (i) of the requirements of this article;
- (ii) that any communication initiated by a City employee or City official, other than the authorized contact person, during the no-lobbying period regarding a response or the solicitation may result in a violation of Section 4(A) if the respondent subsequently lobbies that City employee or City official.

(B) The purchasing officer, or a City employee designated by the purchasing officer, shall provide weekly written notice, accessible to all City employees and City officials, of each solicitation for which the no-lobbying period is in effect.

1.10.8. DISCLOSURE OF VIOLATION.

A City official or a City employee other than the authorized contact person that becomes aware of a violation of Section 4 (*Restrictions on Lobbying*) shall notify the authorized contact person in writing as soon as practicable.

1.10.9. ENFORCEMENT.

(A) A respondent that has been disqualified pursuant to Section 10(A) (*Disqualification; Contract Voidable*) may appeal such disqualification to a subcommittee that is less than a quorum of the Ethics Review Commission established in Chapter 2-7, Article 2 (*Ethics Review Commission*), whose decision on appeal shall be final and binding. Any appeal must be filed in the manner prescribed by the Ethics Review Commission within 5 calendar days of the notice given by the purchasing officer pursuant to Section 10(B).

(B) The purchasing officer shall waive a violation of Section 4(A) if the violation was solely the result of communications initiated by a City official or a City employee other than the authorized contact person.

(C) The purchasing officer has the authority to enforce this article through rules promulgated in accordance with Chapter 1-2 (*Adoption of Rules*), which at a minimum shall include a notice and protest process for respondents disqualified pursuant to Section 10 (*Disqualification; Contract Voidable*), including:

- (1) written notice of the disqualification imposed pursuant to Section 10 (*Disqualification; Contract Voidable*);
- (2) written notice of the right to protest the disqualification imposed; and
- (3) written notice of the right to request an impartial hearing process.

Bidding Requirements, Contract Forms and Conditions of the Contract

1.10.10. DISQUALIFICATION; CONTRACT VOIDABLE.

(A) If the purchasing officer finds that a respondent has violated Section 2-7-104(1), the respondent is disqualified from participating in the solicitation to which the violation related.

(B) The purchasing officer shall promptly provide written notice of disqualification to a disqualified respondent.

(C) If a respondent is disqualified from participating in a solicitation as a result of violating Section 2-7-104(1) and the solicitation is cancelled for any reason, that respondent is also disqualified from submitting a response to any reissue of the same or similar solicitation for the same or similar project. For the purposes of this section, the purchasing officer may determine whether any particular solicitation constitutes a "same or similar solicitation for the same or similar project".

(D) If a respondent violates Section 104(1) and is awarded a contract resulting from the solicitation to which the violation relates, the City may void that contract.

(E) Respondents that violate Section 2-7-104(1) three or more times during a five year period may be subject to debarment from participating in any new contracts with the City for a period of up to three years.

1.11 City's Minority-Owned and Women-Owned Business Enterprise / Disadvantaged Business Enterprise (MBE/WBE or DBE) Program Requirements. Good Faith Efforts. When a bidder cannot achieve the MBE/WBE or DBE goals or subgoals established for the project, the bidder must document its Good Faith Efforts to meet the goals or subgoals. Good Faith Effort evaluations will consider, at a minimum, the bidder's efforts to do the following:

1.11.1 Soliciting through at least two reasonable, available and verifiable means MBEs/WBEs within the Significant Local Business Presence boundaries at least seven (7) business days prior to the bid opening date to allow the MBEs/WBEs or DBEs to respond to the bid.

1.11.2 Providing interested MBEs/WBEs or DBEs adequate information about the bid documents and requirements, including addenda, in a timely manner to assist them in responding to the bid.

1.11.3 Negotiating in good faith with interested MBEs/WBEs DBEs that have submitted bids to the bidder.

1.11.4 Publishing notice in a local publication such as a newspaper, trade association publication or via electronic/social media.

1.11.5 Not rejecting MBEs/WBEs or DBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities.

1.11.6 Making economically feasible portions of the work available to MBE/WBE or DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available MBE/WBE or DBE subcontractors and suppliers, so as to facilitate meeting the goals or subgoals.

1.11.7 The ability or desire of the bidder to perform the project work with its own organization does not relieve the bidder of the responsibility to make Good Faith Efforts.

Bidding Requirements, Contract Forms and Conditions of the Contract

1.11.8 Bidders are not required to accept higher quotes in order to meet the goals or subgoals.

1.11.9 Effectively using the services of Minority Person/Women community organizations; Minority Person/Women Contractors groups; local, state and federal Minority Person/Women business assistance offices; and other organizations to provide assistance in solicitation and utilization of MBEs, WBEs and/or DBEs.

1.11.10 In assessing minimum Good Faith Efforts, the OWNER may consider (1) whether the bidder sought guidance from the City of Austin Small and Minority Business Resources Department (SMBR) on any question regarding compliance with these requirements; and (2) the performance of other bidders in meeting the goals.

For additional information, refer to the MBE/WBE or DBE Compliance Program Requirements Volume of the Project Manual.

Bid shopping is not allowed in conjunction with this solicitation and may result in the disqualification of prospective bidders and subcontractors.

2. ESTIMATES OF QUANTITIES (UNIT PRICE CONTRACTS ONLY)

Quantities listed in unit price Bid form are to be considered approximate quantities and will be used only for comparison of Bids. Payment to CONTRACTOR will be made only for actual quantities of Work performed or materials furnished in accordance with Contract and it is understood that quantities may be increased or decreased as provided in Section 00700, General Conditions, and as may be modified by Section 00810, Supplemental General Conditions.

3. DRAWINGS, PROJECT MANUAL AND SITE (S) OF WORK

Before submitting a Bid, the Bidder shall carefully examine the Bid Documents, site(s) of the proposed Work, soils, and other conditions that may affect the performance of the Work to satisfy the Bidder as to character, quality and quantities of Work to be performed and materials to be furnished. By submitting a Bid, the Bidder will be deemed to have certified that the Bidder has complied with these requirements. If, during preparation of the Bid, the Bidder discovers any suspected discrepancies or errors, the Bidder must immediately notify the Authorized Contact Person in writing of the suspected discrepancy or error. Failure to provide written notice of any suspected discrepancies or errors may be cause for rejection of the Bid.

4. BID GUARANTY

All Bids shall be accompanied by a Bid guaranty in an amount of not less than five percent (5%) of the total Bid. Bid guaranty will be a Bid bond with Power of Attorney attached, issued by a solvent surety authorized under laws of the State of Texas and acceptable to OWNER. For Bidders electing to submit Bids and Bid Guaranties electronically via Austin Finance Online, Bid Guaranties will be verified by the Owner prior to bid certification and electronic copies of Bid Guaranties will not be returned to Bidders.

The Bid guaranty accompanying the Bid of the three (3) apparent low Bidders will be retained until Contract is awarded and successful Bidder executes Contract and furnishes required bonds and insurance, after which Bid guaranties will be returned to the Bidders. All other

Bidding Requirements, Contract Forms and Conditions of the Contract

Bid guaranties will be returned after Bid certification. In the event that the Bidder to whom the Contract is awarded fails to execute the Contract within five (5) working days of receipt of a complete set of Contract Documents whether in electronic or hard copy form, the Bidder agrees that the OWNER in its discretion may rescind the initial award and award the Contract to the next lowest responsible Bidder.

5. PERFORMANCE AND PAYMENT BONDS

When performance and/or payment bonds are required, each shall be issued in an amount equal to the Contract Amount as security for the faithful performance and/or payment of all Contractor's obligations under the Contract Documents. Performance and payment bonds shall be issued by a solvent corporate surety authorized to do business in the State of Texas, and shall meet any other requirements established by law or by OWNER pursuant to applicable law.

6. CONSIDERATION OF BID AMOUNT

For purpose of award, after Bids are opened, reviewed, and certified, the total amount of the Bid, including accepted Bid alternates, will be considered the amount of the Bid. Certified Bid tabulations will be made available to the public through the City's Vendor Connection website, log on

https://financeonline.austintexas.gov/afo/account_services/solicitation/solicitations.cfm.

OWNER reserves the right to reject any or all Bids and to waive any minor informality in any Bid or solicitation procedure (a minor informality is one that does not affect the competitiveness of the Bids).

7. SUBMISSION OF BID

Each Bid must be completed and signed by person(s) authorized to bind individual, partnership, firm, corporation, or any other legal entity submitting the Bid, and, shall include the following in one envelope or electronically via Austin Finance Online eResponse:

7.1 One copy of Bid form (Section 00300L or 00300U) completed and signed.

7.2 Acknowledgment of receipt of Addenda issued in spaces provided in Bid form.

7.3 Required Bid guaranty (copy of Bid guaranty if submitted electronically via Austin Finance Online).

7.4 Required Information indicated in Drawings or Project Manual as specified in Section 00820.

7.5 One copy of Total Bid Form if bid is submitted electronically via Austin Finance Online.

Bid must be accompanied by an MBE/WBE or DBE Compliance Plan. Compliance Plans will either be submitted separately, in a second envelope or electronically via Austin Finance Online, prior to the date and time set forth in Section 00020, Invitation for Bids. The Compliance Plan forms are included in the MBE/WBE Procurement Program Package or DBE Procurement Program Package (a separately bound volume).

Bid shall include all specified items in this section submitted electronically via Austin Finance Online, or may be submitted to the Capital Contracting Office in a sealed envelope, clearly identified on outside as a Bid to OWNER, with Bidder's company name and address, project

Bidding Requirements, Contract Forms and Conditions of the Contract

name, bid due date/time, signed acknowledgement of the number of Addenda received and authorized signature. Failure to submit Bid appropriately may subject Bidder to disqualification.

Sealed Bids may be mailed using the address below:

Address for US Mail (If mailed to the physical address, the proposal will be returned unopened)
City of Austin
Capital Contracting Office
P. O. Box 1088
Austin, Texas 78767-1088

NOTE: Bids must either be received and time stamped in the Capital Contracting Office prior to the Due Date and Time or submitted electronically via Austin Finance Online. The time of record for those electronically submitted is the time received in Austin Finance OnLine. It is the responsibility of the Offeror to ensure that their Bid arrives at the reception desk in the Capital Contracting Office or electronically prior to the time and date indicated. Arrival at the City's mailroom, mail terminal, or post office box will not constitute the Proposal arriving on time.

It is the sole responsibility of the Bidder to ensure timely delivery of Bid. OWNER will not be responsible for failure of service on the part of the U.S. Post Office, courier services, or any other form of delivery service chosen by the Bidder. (See Section 00820, Modifications to Bidding Requirements and Contract Forms, for modifications to solicitations without MBE/WBE or DBE goals.)

In submitting its Bid, Bidder certifies that it has not lobbied the City or its officials, managers, employees, consultants, or contractors in such a manner as to influence or to attempt to influence the bidding process. In the event it reasonably appears that the Bidder influenced or attempted to influence the bidding process, the City may, in its discretion, reject the Bid.

8. WITHDRAWAL OF BID

A Sealed Bid may be withdrawn by a Bidder, provided an authorized individual of the Bidder submits a written request to withdraw the Bid prior to the time set for opening the Bids. For withdrawal of electronic bids see eResponse Instructions.

9. REJECTION OF BIDS

9.1 The following **will** be cause to reject a Bid:

9.1.1 Failure to submit Section 00300 (Bid Form) and signed by an individual empowered to bind the Bidder.

9.1.2 Bids which are not accompanied by acceptable Bid guaranty, with Power of Attorney attached, or a letter certifying the Bidder's ability to be bonded, from a surety company, in accordance with Paragraph 4 above.

9.1.3 More than one Bid for same Work from an individual, firm, partnership or corporation.

Bidding Requirements, Contract Forms and Conditions of the Contract

9.1.4 Evidence of collusion among Bidders.

9.1.5 Sworn testimony or discovery in pending litigation with OWNER which discloses misconduct or willful refusal by contractor to comply with subject contract or instructions of OWNER.

9.1.6 Failure to submit MBE/WBE or DBE Compliance Plan in accordance with the separately bound volume titled MBE/WBE Procurement Program Package or DBE Procurement Program Package.

9.1.7 Failure to have an authorized agent of the Bidder attend the mandatory Pre-Bid Conference, if applicable.

9.1.8 Bids received from a Bidder who has been debarred or suspended by OWNER's Purchasing Officer.

9.1.9 Bids received from a Bidder when Bidder or principals are currently debarred or suspended by Federal, State or City governmental agencies. (Applicable for Bid amounts equal to or in excess of \$25,000.00).

9.1.10 Bids received from a Bidder, who is identified on a list maintained by the Texas Comptroller of Public Accounts as a company known to have contracts with or provide supplies or services to a foreign terrorist organization, unless otherwise exempted from sanctions by the United States government.

9.2 The following **may** be cause to reject a Bid:

9.2.1 Poor performance in execution of work under a previous City of Austin contract.

9.2.2 Failure to achieve reasonable progress on an existing City of Austin contract.

9.2.3 Default on previous contracts or failure to execute Contract after award.

9.2.4 Evidence of failure to pay Subcontractors, Suppliers or employees in accordance with Contract requirements.

9.2.5 Bids containing omissions, alterations of form, additions, qualifications or conditions not called for by OWNER, or incomplete Bids may be rejected. In any case of ambiguity or lack of clarity in the Bid, OWNER reserves right to determine most advantageous Bid or to reject the Bid.

9.2.6 Failure to acknowledge receipt of Addenda.

9.2.7 Failure to submit any of the items specified below in paragraph 11, "Submission of Post Bid Information".

9.2.8 Failure to identify a dollar amount (price) of a unit price(s) in the 00300U including all Bid Alternates in the Bid Form 00300U or 00300L.

9.2.9 Failure to submit post-Bid information within the allotted time(s) (see paragraph 11 for post-Bid requirements).

Bidding Requirements, Contract Forms and Conditions of the Contract

9.2.10 Failure to timely execute Contract after award.

9.2.11 Previous environmental violations resulting in fines or citations by a governmental entity (i.e. U.S. Environmental Protection Agency, Texas Commission on Environmental Quality, etc.).

9.2.12 Safety record as set forth in Section 00410, Statement of Bidder's Safety Experience.

9.2.13 Failure of Bidder to demonstrate the minimum experience required as specified in Section 00400 if that Section is included in the bidding documents.

9.2.14 Evidence of Bidder's lack of sufficient resources, workforce, equipment or supervision, if required by inclusion of appropriate attachments in Section 00400.

9.2.15 Evidence of poor performance on previous Projects as documented in Owner's project performance evaluations.

9.2.16 Unbalanced Unit Price Bid: "Unbalanced Bid" means a Bid, which includes a Bid that is based on unit prices which are significantly less than cost for some Bid items and significantly more than cost for others. This may be evidenced by submission of unit price Bid items where the cost are significantly higher/lower than the cost of the same Bid items submitted by other Bidders on the project.

10. PROTEST PROCEDURES

The OWNER's Chief Procurement Officer or designee has the authority to settle or resolve any claim of an alleged deficiency or protest. The procedures for notifying the City of an alleged deficiency or filing a protest are listed below. If you fail to comply with any of these requirements, the Chief Procurement Officer or designee may dismiss your complaint or protest.

10.1 Protest regarding the Solicitation (Pre-Submittal of Bid Protest). Any protest regarding the Solicitation by the City shall be filed no later than five (5) days prior to the due date and time for Bids. Any protest filed after that date which raises issues regarding the Solicitation will not be considered.

10.2 Protests regarding the evaluation of Bids. Any protest regarding the evaluation of Bids by the City shall be filed with the City no later than five (5) days after the notification of award recommendation is posted on Austin Finance Online, or notification that the protestor's status as a Bidder has changed, such as notification that a Bid has been found to be non-responsive or a Bidder has been found to be non-responsible. Any protest filed after such date which raises issues regarding the evaluation will not be considered. Bidders may only protest the evaluation of their Bid.

10.3 Protest Regarding Award of Contract (Post-Award Protest). Any protest regarding the award of the contract shall be filed no later than ten (10) days after the date of award. Any protest regarding the award of the contract filed after such date will not be considered.

10.3.1 You shall submit your protest in writing and it shall include the following information: (i) your name, address, telephone, and email address; (ii) the Solicitation number; (iii) the specific facts and/or law upon which the protest of the Solicitation or the award is based, including all pertinent documents and evidence thereto; and (iv) the form of relief requested.

10.3.2 Your protest shall be concise and presented logically and factually to help with

Bidding Requirements, Contract Forms and Conditions of the Contract

the City's review.

- 10.3.3** When the City receives a timely written protest, the Chief Procurement Officer or designee will determine whether the grounds for your protest are sufficient. If the Chief Procurement Officer or designee decides that the grounds are sufficient, the Chief Procurement Officer or designee will schedule a protest hearing, usually within five (5) working days. If the Chief Procurement Officer or designee determines that your grounds are insufficient, the City will notify you of that decision in writing.
- 10.3.4** The protest hearing is informal and is not subject to the Open Meetings Act. The purpose of the hearing is to give you a chance to present your case, it is not an adversarial proceeding. Those who may attend from the City are: representatives from the department that requested the purchase, the Department of Law, the Financial Services Department, and other appropriate City staff. You may bring a representative or anyone else that will present information to support the factual grounds for your protest with you to the hearing.
- 10.3.5** A decision will usually be made within fifteen (15) calendar days after the hearing.
- 10.3.6** The City will send you a copy of the hearing decision after the appropriate City staff has reviewed the decision.
- 10.3.7** When a protest is filed, the City usually will not make an award until a decision on the protest is made. However, the City will not delay an award if the City Manager or the Chief Procurement Officer or designee determines that the City urgently requires the supplies or Services to be purchased, or failure to make an award promptly will unduly delay delivery or performance. In those instances, the City will notify you and make every effort to resolve your protest before the award.

10.4 The protest shall be submitted in writing to the Authorized Contact Person – Capital Contracting Contact identified in the Invitation for Bids, Section 00020.

11. SUBMISSION OF POST BID INFORMATION

11.1 Prior to determination of the certified low Bidder, the three (3) apparent low Bidders must submit to OWNER the following information within three (3) business days of receipt of notice of apparent low Bidder status by the OWNER:

11.1.1 One copy of Attachments A-I and any other specifically designated Attachments of the Statement of Bidder's Experience (Section 00400), completed and signed. (Unless provided to the contrary in Section 00820 Modifications to Bidding Requirements and Contract Forms). (Note: OWNER reserves the right to solely determine whether the comparable experience documentation provided by the Bidder is sufficient and relevant to the Work described in the Contract Documents for the Bidder to be considered a responsible Bidder.)

11.1.2 One Copy of the Certificate of Non-Suspension or Debarment (Section 00405), completed and signed. (Applicable for Bid amounts equal to or in excess of \$25,000.00.)

11.1.3 One copy of Section 00410, Statement of Bidder's Safety Experience, including required attachments, completed and signed.

Bidding Requirements, Contract Forms and Conditions of the Contract

11.1.4 One copy of the Title VI Assurances Appendix A (Section 00631), completed and signed.

11.1.5 One copy of the Title VI Assurance Appendix E (Section 00632), completed and signed.

11.1.6 One copy of Exhibit A Federal Provisions (Section 00810A) completed and signed. (Federal projects only)

11.1.7 Such other information as is required to evaluate Bid or Bidder.

11.2 Upon notification of status as certified low Bidder, Bidder shall submit the following information to OWNER within three (3) business days:

11.2.1 Confirmation Letters between Bidder and all subcontractor(s) and all supplier(s) identified in the MBE/WBE Compliance Plan.

11.2.2 Section 00425A, Insurance Cost Form. For ROCIP projects.

11.2.3 Section 00425B, Contractor Affidavit of Receipt and Provision of ROCIP Information, and Subcontractor Affidavit of Receipt and Provision of ROCIP Information (for Subcontractor(s) of all tiers identified in the MBE/WBE Compliance Plan). For ROCIP projects.

11.2.4 Such other information as required. In addition, the Bidder acknowledges and agrees that the failure to timely provide the additional information required by this section will result in a determination that, for the purposes of this solicitation, the Bidder has not provided sufficient information for the OWNER to be able to determine that the Bidder is a responsible Bidder.

12. AWARD AND EXECUTION OF CONTRACT

OWNER will process Bids expeditiously. Award of Contract will be to the lowest, responsible Bidder meeting all requirements of the Bid Documents. OWNER may not award Contract to a nonresident Bidder unless the nonresident underbids the lowest Bid submitted by a responsible resident Bidder by an amount that is not less than the amount by which a resident Bidder would be required to underbid the nonresident Bidder to obtain a comparable contract in the state in which the nonresident's principal place of business is located.

Award of Contract will occur within the period identified on the Bid form, unless mutually agreed between the parties. Capital Contracting Officer shall submit recommendation for award to the City Council for those project awards requiring City Council action. Contract will be signed by City Manager or his/her designee after award and submission of required documentation by Bidder. Contract will not be binding upon OWNER until it has been executed by both parties. OWNER will process the Contract expeditiously. However, OWNER will not be liable for any delays prior to the award or execution of Contract.

Upon contract award, the selected Bidder must submit either their existing or an updated personnel policy (on letterhead) documenting conformity with City Code, Chapter 5-4, § 5-4-2. If the company does not submit a copy of their personnel policy incorporating the non-discrimination policy, the City of Austin Nondiscrimination Policy (Section 00630) will be considered the Bidder's nondiscrimination policy.

Bidding Requirements, Contract Forms and Conditions of the Contract

In any case of ambiguity or lack of clarity in the Bid, OWNER reserves the right to determine the most advantageous Bid or to reject the Bid.

Notwithstanding anything in this Section 00100 to the contrary, the OWNER may award a contract for construction services in an amount of less than \$100,000 to a bidder whose principal place of business is in the City of Austin and whose bid is within 5% of the lowest bid price received from a bidder whose principal place of business is not within the City of Austin, if the City finds that the local bidder offers the City the best combination of contract price and additional economic development opportunities for the City created by the contract award including the employment of resident of the City and increased tax revenues to the City.

13. PARTNERING

In order to complete the Work in a manner that is most beneficial to the OWNER and CONTRACTOR, OWNER and CONTRACTOR may form a "Partnering Team", which will include the E/A, and any major Subcontractors. This partnering relationship will draw on the strength of all parties to identify and achieve mutual goals. The objectives of this partnering relationship are effective and efficient communication and Contract performance, which is intended to ensure that the Project is completed within budget, on schedule, and in accordance with the Drawings and Specifications and other Contract requirements. While the partnering relationship will be multilateral in makeup and participation will be totally voluntary, the OWNER and CONTRACTOR agree to cooperate and use reasonable good faith efforts to discuss and resolve any and all Project issues and disputes. Section 01100, Special Project Procedures and/or Section 01200, Project Meetings contain additional information regarding the intent of the partnering relationship and responsibilities of the entities entering into the partnering charter.

14. ROCIP REQUIREMENTS

If the insurance on this Project will be under the Rolling Owner Controlled Insurance Program (ROCIP), the Bidder is directed to Section 00810, Supplemental General Conditions, Section 00820, Modifications to Bidding Requirements and Contract Forms, and the Project Safety Manual included with these contract documents for information and bidding requirements.

The Insurance Cost Form, Section 00425A must be accurately completed and submitted with the Bid to indicate insurance removed from Base Bid and Alternates. CONTRACTOR shall remove from the Bid the cost of insurance for the CONTRACTOR and Subcontractors of all tiers working on site.

The Rolling Owner Controlled Insurance Program Information, Section 00425 B, Contractor Affidavit of Receipt and Provision of ROCIP Information and Subcontractor Affidavit of Receipt and Provision of ROCIP Information for subcontractor(s) of all tiers identified in the MBE/WBE Compliance Plan must be accurately completed and submitted by the certified low bidder as a post bid submittal. Subcontractor Affidavits must be submitted throughout the duration of the Contract as Subcontractor(s) are added.

15. SIGNATURE REQUIREMENTS

The Bid and any subsequent supporting Bid documents and Contract must be executed in the Bidder's full name and legal entity status by an authorized representative of the Bidder.

Bidding Requirements, Contract Forms and Conditions of the Contract

Accordingly, a partnership/joint venture must file its partnership/joint venture agreement, a corporation must file its articles and bylaws, a limited liability company must file its certificate of organization and article of organization and regulations, and a limited partnership must file not only limited partnership agreement and the certificate of limited partnership, but also the documentation for its general partner, and any Bidder must file a copy of any assumed name certificate, or such limited portion of such documents reasonably establishing signature authority.

16. CONTRACTOR EVALUATION

The Owner will review and evaluate the Contractor's Work and performance on the Project and provide the Contractor with a written Contractor Evaluation Report in accordance with City of Austin Administrative Rule R161-13.37. Rule R161-13.37 provides an appeal process. <http://www.austintexas.gov/department/contract-management>

17. TEXAS ETHICS COMMISSION CERTIFICATE OF INTERESTED PARTIES DISCLOSURE FORM**17.1** Definitions:

17.1.1 "Interested Party" – means a person who has a controlling interest in a Business Entity with whom the Owner contacts 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.

17.1.2 "Business entity" - includes an entity through which business is conducted with a governmental entity or state agency, regardless of whether the entity is a for-profit or nonprofit entity. The term does not include a governmental entity or state agency.

17.2 As a condition to entering the Contract, the Business Entity constituting the successful Bidder must provide a Texas Ethics Commission Certificate of Interested Parties Form to the Owner at the time the Business Entity/Bidder submits the signed Contract to the Owner in full compliance with the following requirements under which the successful Bidder shall:

17.2.1 Go to the Ethics Commission's website (www.ethics.state.tx.us),

17.2.2 Complete the "Interested Parties" information, in accordance with the requirements of the Texas Ethics Commission Rules published at Title 1, Part 2, Chapter 46, of the Texas Administrative Code and available on the referenced website,

17.2.3 Include the City's contract identification number,

17.2.4 Include a short description of the goods or services to be used by the City,
and

17.2.5 Indicate whether each interested party has a controlling interest in the business entity, is an intermediary in the contract for which the disclosure is being filed, or both.

17.3 In accordance with the Commission Rules, the Certificate of Filing and completed Certificate of Interested Parties must be (i) printed, (ii) signed by an authorized agent of the business entity, and (iii) submitted to the City at the time of the submission of the signed

Bidding Requirements, Contract Forms and Conditions of the Contract

contract to the City. The City then must notify the Ethics Commission in electronic format of receipt of the document within 30 days of contracting and the Commission will make the disclosure of interested parties available to the public on its website.

END

Bidding Requirements, Contract Forms and Conditions of the Contract**LUMP SUM BID FORM**
Section 00300L

City Manager
Austin, Texas

The undersigned, in compliance with the Invitation for Bids for construction of the following Project for the city of Austin, Texas:

Solicitation No.:	IFB 6100 CLMC940
Project:	Walnut Creek WWTP Gas Scrubber System Renewal
CIP ID No.:	3023.066

Having examined the Project Manual, Drawings and Addenda, the site of the proposed Work and being familiar with all of the conditions surrounding construction of the proposed Project, having conducted all inquiries, tests and investigations deemed necessary and proper; hereby proposes to furnish all labor, permits, material, machinery, tools, supplies and equipment, and incidentals, and to perform all Work required for construction of the Project in accordance with the Project Manual, Drawings and Addenda within the time indicated.

BASE BID	\$6,275,000.⁰²
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- The "Base Bid" amount must be used in the MBE/WBE Compliance Plan Summary Page to determine subcontractor participation levels for the established MBE/WBE procurement goals.
- The "Base Bid" amount becomes the Bidder's "TOTAL BID" if allowances and/or alternates are not included.

ALLOWANCES:

Allowance No. 1:	Temporary Hypo Dosing System Operation	\$100,000
SUBTOTAL ALLOWANCES		\$100,000

BASE BID PLUS ALLOWANCES:		\$6,375,000.⁰²
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BID GUARANTY: A Bid guaranty must be enclosed with this Bid, as required in Section 00020, in the amount of not less than five percent (5%) of the total Bid. Following the Bid opening, submitted Bids may not be withdrawn for a period of one hundred twenty (120) Calendar Days. Award of Contract will occur within this period, unless mutually agreed between the parties. The Bid guaranty may become the property of the OWNER, or the OWNER may pursue any other action allowed by law, if:

- Bidder withdraws a submitted Bid within the period stated above;
- Bidder fails to submit the required post Bid information within the period specified in Section 00020 or 00100, or any mutually agreed extension of that period; or
- Bidder fails to execute the Contract and furnish the prescribed documentation (bonds, insurance, etc.) needed to complete execution of the Contract within five (5) Working Days after notice of award, or any mutually agreed extension of that period.

Bidding Requirements, Contract Forms and Conditions of the Contract

TIME OF COMPLETION: The undersigned Bidder agrees to commence work on the date specified in the written "Notice to Proceed" to be issued by the OWNER and to substantially complete construction of the improvements, as required by the Project Manual, Drawings and Addenda for the Work within THREE HUNDRED SIXTY (360) Calendar Days.

If a Substantial Completion date has been specified, the Bidder further agrees to reach Final Completion within THIRTY (30) Calendar Days after Substantial Completion as required by the Project Manual, Drawings and Addenda for the work.

The Bidder further agrees that should the Bidder fail to <substantially and> <finally> complete the Work within the number of days indicated in the Bid or as subsequently adjusted, Bidder shall pay the liquidated damages for each consecutive day thereafter as provided below; unless the OWNER elects to pursue any other action allowed by law.

WAIVER OF ATTORNEY FEES: In submitting the Bid, in consideration for the waiver of the Bidder's right to attorney's fees by the OWNER, the Bidder knowingly and intentionally agrees to and shall waive the right to attorney's fees under Section 271.153 of the Texas Local Government Code in any administrative proceeding, alternative dispute resolution proceeding, or litigation arising out of or connected to any Contract awarded pursuant to this solicitation process.

LIQUIDATED DAMAGES: The Bidder understands and agrees that the timely completion of the described Work is of the essence. The Bidder and OWNER further agree that the OWNER's actual damages for delay caused by failure to timely complete the Project are difficult, if not impossible to measure. However, with respect to the additional administrative and consultant costs to be incurred by OWNER, the reasonable estimate of such damages has been calculated and agreed to by OWNER and Bidder.

Therefore, the Bidder and the OWNER agree that for each and every Calendar Day the Work or any portion thereof, remains incomplete after the Substantial Completion date as established by the above paragraph, "Time of Completion", payment will be due to the Owner in the amount of THREE THOUSAND FIVE HUNDRED TWENTY dollars (\$3520) per Calendar Day as liquidated damages, not as a penalty, but for delay damages to the OWNER.

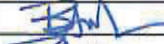


If both Substantial and Final Completion dates have been specified, the Bidder and the OWNER further agree that for each and every Calendar Day the Work or any portion thereof, remains incomplete after the Final Completion date as established by the above paragraph, "Time of Completion", payment will be due to the OWNER in the amount of ONE THOUSAND EIGHT HUNDRED SIXTY dollars (\$1860) per Calendar Day as liquidated damages, not as a penalty, but for delay damages to the OWNER. Such amount shall be deducted by the OWNER from any Contract payment due.

In the event of a default or breach by the CONTRACTOR and demand is made upon the surety to complete the project, in accordance with the Contract Documents, the surety shall be liable for liquidated damages pursuant to the Contract Documents in the same manner as the CONTRACTOR would have been.

MINOR INFORMALITY: OWNER reserves the right to reject any or all Bids and to waive any minor informality in any Bid or solicitation procedure (a minor informality is one that does not affect the competitiveness of the Bidders).

Bidding Requirements, Contract Forms and Conditions of the Contract

ADDENDUM: The undersigned acknowledges receipt of the following addenda:


Addendum No. 1 dated	July 28, 2022	Received	
Addendum No. 2 dated	August 16, 2022	Received	
Addendum No. 3 dated	August 16, 2022	Received	
Addendum No. 4 dated		Received	


BID DOCUMENT EXECUTION AND ACKNOWLEDGEMENT: The undersigned Bidder certifies that the Bidder has read and understands Section 00020 Invitation for Bids, Section 00100 Instructions to Bidders, and all other requirements applicable to the Bidding process provided in the Bid and Contract Documents.

BIDDER'S CERTIFICATION OF NON-COLLUSION, NON-CONFLICT OF INTEREST, AND ANTI-LOBBYING (Section 00440): The undersigned Bidder, by its signature, represents and certifies that it has read and can affirmatively swear and subscribe to the statements in Section 00440 Non-Collusion, Non-Conflict of Interest, and Anti-Lobbying Certification. If the Bidder cannot affirmatively swear and subscribe to any of the statements in Section 00440, Bidder represents and certifies that it has provided a detailed written explanation with its Bid on separate pages annexed hereto. The undersigned Bidder further certifies that it has not in any way directly or indirectly had communication restricted in the City Code Chapter 2-7, Article 6 (Anti-Lobbying and Procurement) during the No-Lobbying Period as defined in Chapter 2-7.

BIDDER'S CERTIFICATION AS TO NONRESIDENT PROVISIONS: Bidder must provide the following information in accordance with Vernon's Texas Statutes and Codes Annotated Government Code § 2252.002, as amended. A Texas Resident Bidder is a bidder whose principal place of business is in Texas and includes a Contractor whose ultimate parent company or majority owner has its principal place of business in Texas. The undersigned Bidder certifies that Bidder is a resident of _____ Texas _____ (Bidder must write in the blank the state of which Bidder is a resident).

Bidder will initial the blank set forth below to represent and certify that the Bidder has completed, executed, and enclosed the corresponding Bid Documents with the Bid.

 MBE/WBE Compliance Document

 One copy of Total Bid Form if Bid is submitted electronically via Austin Finance Online

 Bid Guaranty

The undersigned, by their signature, represents that they are submitting a binding offer and are authorized to bind the respondent to fully comply with the solicitation documents contained herein. The Respondent, by submitting and signing below, certifies that they have received and read all sections of the entire solicitation document including all revisions, addenda and documents incorporated by reference, and agree to be bound by the terms therein.

Corporate Secretary, *if Bidder is a Corporation

Matous Construction, Ltd.

Bidder

Bidding Requirements, Contract Forms and Conditions of the Contract

Email for Secretary

(Seal)

Bruce A. Matous 

Authorized Signature/Print Name

CEO

Title

September 1, 2022

Date

8602 State Highway 317

Belton, Texas 76513

Address

254-780-1400 254-780-2599

Telephone Number / FAX Number

bruce@matousconstruction.com

Email for Person Signing Bid

jessica@matousconstruction.com

Email for Bidder's Primary Contact Person

END

BID BOND TRAVELERS CASUALTY AND SURETY COMPANY OF AMERICA
Hartford, Connecticut 06183

KNOWN ALL BY THESE PRESENTS, That we, **Matous Construction, Ltd.**, as Principal, and Travelers Casualty and Surety Company of America, as Surety, are held and firmly bound unto **City of Austin**, as Obligees, in the sum of **Five Percent of the Greatest Amount Bid by Principal** Dollars (5% GABP) for the payment of which we bind ourselves, and our successors and assigns, jointly and severally, as provided herein.

WHEREAS, Principal has submitted or is about to submit a bid to the Obligees on a contract for **City of Austin; Solicitation Number: CLMC940; C.I.P. Project Number: ("Project"). 3023.066; Walnut Creek WWTP Gas Scrubber Systems Renewal**

NOW, THEREFORE, the condition of this bond is that if Obligees accept Principal's bid, and Principal enters into a contract with Obligees in conformance with the terms of the bid and provides such bond or bonds as may be specified in the bidding or contract documents, then this obligation shall be void; otherwise Principal and Surety will pay to Obligees the difference between the amount of Principal's bid and the amount for which Obligees shall in good faith contract with another person or entity to perform the work covered by Principal's bid, but in no event shall Surety's and Principal's liability exceed the penal sum of this bond.

Signed this 1st day of September, 2022.

Matous Construction, Ltd.
(Principal)

By:  _____

Travelers Casualty and Surety Company of America

By:  _____
Emily Mikeska, Attorney-in-Fact



Travelers Casualty and Surety Company of America
Travelers Casualty and Surety Company
St. Paul Fire and Marine Insurance Company

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company are corporations duly organized under the laws of the State of Connecticut (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint **Emily Mikeska** of **TEMPLE, Texas**, their true and lawful Attorney(s)-in-Fact to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed, and their corporate seals to be hereto affixed, this 21st day of April, 2021.



State of Connecticut

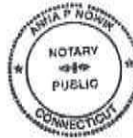
City of Hartford ss.

By: 
Robert L. Raney, Senior Vice President

On this the 21st day of April, 2021, before me personally appeared **Robert L. Raney**, who acknowledged himself to be the Senior Vice President of each of the Companies, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of said Companies by himself as a duly authorized officer.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

My Commission expires the 30th day of June, 2026




Anna P. Nowik, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of each of the Companies, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

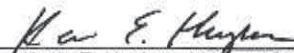
FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, **Kevin E. Hughes**, the undersigned, Assistant Secretary of each of the Companies, do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which remains in full force and effect.

Dated this 1st day of September, 2022




Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, please call us at 1-800-421-3880.
Please refer to the above-named Attorney(s)-in-Fact and the details of the bond to which this Power of Attorney is attached.

IMPORTANT NOTICE

To obtain information or make a complaint:

You may call Travelers Casualty and Surety Company of America and its affiliates' toll-free telephone number for information or to make a complaint at:

1-800-328-2189

You may contact the Texas Department of Insurance to obtain information on companies, coverages, rights or complaints at:

1-800-252-3439

You may write the Texas Department of Insurance:

P. O. Box 149104
Austin, TX 78714-9104
Fax: (512) 475-1771
Web: <http://www.tdi.state.tx.us>
E-mail: ConsumerProtection@tdi.state.tx.us

PREMIUM OR CLAIM DISPUTES:

Should you have a dispute concerning your premium or about a claim you should contact your Agent or Travelers first. If the dispute is not resolved, you may contact the Texas Department of Insurance.

ATTACH THIS NOTICE TO YOUR BOND:

This notice is for information only and does not become a part or condition of the attached document and is given to comply with Texas legal and regulatory requirements.

Bidding Requirements, Contract Forms and Conditions of the Contract**STATEMENT OF BIDDERS EXPERIENCE**

Section 00400

Project Name:	Walnut Creek WWTP Gas Scrubber System Renewal
Name of Bidder:	Matous Construction, Ltd.
Solicitation Number:	IFB 6100 CLMC940
CIP ID Number:	3023.066

Bidder must complete all Attachments to Section 00400 clearly and comprehensively. If necessary, responses may be continued on separately attached sheets.

To be considered a responsive and responsible bidder, the apparent three (3) low Bidders must complete and submit within three (3) working days of notification of low bidder status Attachments A through I in accordance with Article 11, Section 00100. Contractor Performance Evaluations for previous work with the City will be included in the assessment of the Bidder's experience. Any information in Attachments A through I and in the Contractor's Performance Evaluations that indicates the Bidder or a "Subcontractor" is not responsible or that might negatively impact a Bidder's ability to complete the Work within the Contract Time and for the Contract Price may result in the Bid being rejected.

The Bidder is responsible for the accuracy and completeness of all of the information provided by the Bidder or a proposed Subcontractor in response to this Invitation for Bids.

Bidding Requirements, Contract Forms and Conditions of the Contract

POST-BID SUBMITTALS

ATTACHMENT A – BIDDER’S INFORMATION

ATTACHMENT B – EXPERIENCE REQUIREMENTS (GENERAL CONTRACTOR)

ATTACHMENT C – PROJECT MANAGER AND SUPERINTENDENT EXPERIENCE

ATTACHMENT D – EXPERIENCE REQUIREMENTS (SPECIFIC CONSTRUCTION OR TECHNICAL EXPERIENCE)

ATTACHMENT E – AVAILABLE EQUIPMENT

ATTACHMENT F – AVAILABLE WORKFORCE

ATTACHMENT G – CURRENT PROJECTS

ATTACHMENT H – COMPLETED PROJECTS

ATTACHMENT I – BIDDER’S AUTHENTICATION

Bidding Requirements, Contract Forms and Conditions of the Contract**ATTACHMENT A
BIDDER'S INFORMATION**

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Solicitation Number:	CLMC940
CIP ID Number:	3023.066 (Walnut Creek WWTP Gas Scrubber System Renewal)

A.	Name of Bidder:	Matous Construction, Ltd.
B.	Bidder's Permanent Address:	8602 State Hwy 317, Belton, TX 76513
C.	Bidder's Phone Number:	(254) 780-1400
D.	Number of years in business under current company name:	24

(Note: Bidder must have been in existence for a minimum of one (1) year under its current company name. Changes in company name during the experience period are acceptable, if the continuity of the company can be demonstrated. Attach separate documentation, if applicable.)

If Bidder answers "Yes" for any of questions E through H, Bidder must attach separate sheets with a brief description or explanation of the answer and provide pertinent contact information (parties' names, addresses and telephone numbers).

E.	Has the Bidder ever defaulted on a contract?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
F.	Are there currently any pending judgements, claims, or lawsuits against the Bidder?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
G.	Does Bidder currently have any pending claims, judgements or lawsuits against any prior client?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
H.	Is the Bidder or its principals involved in any bankruptcy or reorganization proceedings?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Bidding Requirements, Contract Forms and Conditions of the Contract**ATTACHMENT B
EXPERIENCE REQUIREMENTS (GENERAL CONTRACTOR)**

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Solicitation Number:	CLMC940
CIP ID Number:	3023.066 (Walnut Creek WWTP Gas Scrubber System Renewal)

GENERAL CONTRACTOR EXPERIENCE:

Bidder must list and describe Bidder's (not proposed subcontractors') construction experience as a general contractor for a minimum of three (3) successfully completed projects of comparable size, scope and complexity to the Work described in the Contract Documents. Bidder should refer to the Section 01010 Summary of Work, subsection 1.2 Description of Work, to determine what is reasonably comparable. Decisions on "comparability" are at the complete discretion of the OWNER.

Bidder must have completed the projects within the past five (5) years.

Attention Bidder: Duplicate this form for each of the three (3) projects.

PROJECT NO. <u> 1 </u>	
Name of Project:	Hornsby Bend BMP – Side Stream Plant Relief
Location:	Austin, Texas
OWNER's Name and Address:	City of Austin, 625 East 10 th , Ste 700, Austin, TX
OWNER's Contact Person (Print):	Jules Parrish
Phone/Fax No.	512.974.9385
Initial Contract Price:	\$12,604,000
Final Contract Price:	\$13,219,090
Contract Start Date: <i>(Date of Notice to Proceed)</i>	3/11/2019
Contract Time:	Calendar Days: 834 Working Days:
Contract Substantial Completion Date:	6/22/2021
Actual Substantial Completion Date:	5/25/2021
If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each:	
Contract time added for additional work authorized by the Owner	
Project Description and why it is comparable to this Contract:	
Construction and rehabilitation of the Side Stream WWTP located at the Hornsby Bend BMF. Work included concrete, excavation, piping, valves, pumps, blowers, process equipment, electrical, and instrumentation. Start up and commissioning of facility.	

Bidding Requirements, Contract Forms and Conditions of the Contract**ATTACHMENT B
EXPERIENCE REQUIREMENTS (GENERAL CONTRACTOR)**

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Solicitation Number:	CLMC940
CIP ID Number:	3023.066 (Walnut Creek WWTP Gas Scrubber System Renewal)

GENERAL CONTRACTOR EXPERIENCE:

Bidder must list and describe Bidder's (not proposed subcontractors') construction experience as a general contractor for a minimum of three (3) successfully completed projects of comparable size, scope and complexity to the Work described in the Contract Documents. Bidder should refer to the Section 01010 Summary of Work, subsection 1.2 Description of Work, to determine what is reasonably comparable. Decisions on "comparability" are at the complete discretion of the OWNER.

Bidder must have completed the projects within the past five (5) years.

Attention Bidder: Duplicate this form for each of the three (3) projects.

PROJECT NO. <u> 2 </u>	
Name of Project:	0.2 MGD Wastewater Plant – Salado, Texas
Location:	Salado, Texas
OWNER's Name and Address:	Village of Salado, 301 N. Stagecoach, Salado, TX 76571
OWNER's Contact Person (Print):	Don Ferguson
Phone/Fax No.	254.947.5060
Initial Contract Price:	\$4,883,000
Final Contract Price:	\$5,008,520
Contract Start Date: <i>(Date of Notice to Proceed)</i>	12/20/2017
Contract Time:	Calendar Days: 471 Working Days:
Contract Substantial Completion Date:	4/5/2019
Actual Substantial Completion Date:	3/1/2019
If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each:	
Contract time added for additional work authorized by the Owner	
Project Description and why it is comparable to this Contract:	
New Construction of a Concentric Circular WWTP. Work consisted of welded steel tankage, process equipment, headworks, pumps, aeration equipment, blowers, sitework, electrical, and instrumentation.	

Bidding Requirements, Contract Forms and Conditions of the Contract**ATTACHMENT B
EXPERIENCE REQUIREMENTS (GENERAL CONTRACTOR)**

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Solicitation Number:	CLMC940
CIP ID Number:	3023.066 (Walnut Creek WWTP Gas Scrubber System Renewal)

GENERAL CONTRACTOR EXPERIENCE:

Bidder must list and describe Bidder's (not proposed subcontractors') construction experience as a general contractor for a minimum of three (3) successfully completed projects of comparable size, scope and complexity to the Work described in the Contract Documents. Bidder should refer to the Section 01010 Summary of Work, subsection 1.2 Description of Work, to determine what is reasonably comparable. Decisions on "comparability" are at the complete discretion of the OWNER.

Bidder must have completed the projects within the past five (5) years.

Attention Bidder: Duplicate this form for each of the three (3) projects.

PROJECT NO. <u> 3 </u>	
Name of Project:	2016 WWTP Improvements – Lago Vista
Location:	Lago Vista, Texas
OWNER's Name and Address:	City of Lago Vista, 5803 Thunderbird, Lago Vista, TX 78645
OWNER's Contact Person (Print):	Eric Belaj
Phone/Fax No.	512.599.4179
Initial Contract Price:	\$2,736,550
Final Contract Price:	\$2,830,788
Contract Start Date: <i>(Date of Notice to Proceed)</i>	9/09/2019
Contract Time:	Calendar Days: 465 Working Days:
Contract Substantial Completion Date:	12/20/2020
Actual Substantial Completion Date:	10/08/2020
If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each:	
Contract time added for additional work authorized by Owner	
Project Description and why it is comparable to this Contract:	
Construction and rehabilitation of the existing WWTP. Work included concrete, excavation, piping, valves, process equipment, chemical feed, electrical, and instrumentation. Start up and commissioning of facility.	

Bidding Requirements, Contract Forms and Conditions of the Contract**ATTACHMENT B
EXPERIENCE REQUIREMENTS (GENERAL CONTRACTOR)**

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Solicitation Number:	CLMC940
CIP ID Number:	3023.066 (Walnut Creek WWTP Gas Scrubber System Renewal)

GENERAL CONTRACTOR EXPERIENCE:

Bidder must list and describe Bidder's (not proposed subcontractors') construction experience as a general contractor for a minimum of three (3) successfully completed projects of comparable size, scope and complexity to the Work described in the Contract Documents. Bidder should refer to the Section 01010 Summary of Work, subsection 1.2 Description of Work, to determine what is reasonably comparable. Decisions on "comparability" are at the complete discretion of the OWNER.

Bidder must have completed the projects within the past five (5) years.

Attention Bidder: Duplicate this form for each of the three (3) projects.

PROJECT NO. <u> 4 </u>	
Name of Project:	Chlorine Storage Safety Improvements
Location:	Temple, Texas
OWNER's Name and Address:	City of Temple, 3210 E Ave H, Bldg C Temple, TX 76501
OWNER's Contact Person (Print):	Thomas D. Valle, PE
Phone/Fax No.	254.760.8498 TValle@kpaengineers.com
Initial Contract Price:	Not to Exceed \$933,000
Final Contract Price:	\$802,706
Contract Start Date: <i>(Date of Notice to Proceed)</i>	12/04/2017
Contract Time:	Calendar Days: 240 Working Days:
Contract Substantial Completion Date:	08/01/2018
Actual Substantial Completion Date:	07/13/2018
If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each:	
Contract time added for additional work authorized by Owner	
Project Description and why it is comparable to this Contract:	
Improvements to the Chlorine Storage facility, including installation of automatic shutoff valves and replacement of the chlorine scrubber.	

Bidding Requirements, Contract Forms and Conditions of the Contract**ATTACHMENT C
PROJECT MANAGER & SUPERINTENDENT EXPERIENCE**

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Name of Bidder:	Matous Construction
Solicitation Number:	CLMC940
CIP ID Number:	3023.066 (Walnut Creek WWTP Gas Scrubber System Renewal)

Bidder must attach resumes for the Project Manager and Superintendent who will be assigned to this project. The resumes must demonstrate that these individuals have worked on at least three (3) similar, successfully completed projects in the capacity of Project Manager or Superintendent, or other responsible supervisory capacity, as applicable, during the last 10 years.

Project Manager (name): Mike Psencik

Superintendent (name): Cory Jackson

Note: Attach Resumes & Experience



Mike L. Psencik
Vice President
Project Manager

Education

Associates Degree, Civil Engineering
Associates Degree, Construction Technology
Texas State Technical College

Professional Background

Mike Psencik is the son of the late Lee Roy Psencik. Mike was raised in the business by one of the best businessmen in the industry. He has taken after his father in many ways. He takes a very systematic approach as an estimator and project manager.

Mike currently serves as Vice President and Project Manager. He typically manages our more complex projects. He is very detail oriented and provides thirty years' experience to his projects. Mike visits his jobsites weekly and is well liked by owners, engineers, and plant operators.

Mike lives in Temple with his wife Cari and twin daughters. He enjoys traveling with his family, hunting and fishing.

Project Experience

- Ullrich WTP Lime Feed Loop
City of Austin, TX
\$ 11,492,611
- City of Cameron WWTP Phase I Solids Handling
City of Cameron, TX
\$ 1,288,004
- Hornsby Bend Side Stream Treatment Plant Relief
City of Austin, TX
\$ 13,219,090
- City of Lago Vista 2016 WWTP Improvements
City of Lago Vista, TX
\$ 2,830,788
- SAR WWTP Trains A&B Blower Replacement
City of Austin, TX
\$ 23,536,033
- 0.200 MGD Wastewater Treatment Plant
Village of Salado, TX
\$ 5,008,521
- S-308A Lime Handling Facility @ WTP No. 4
City of Austin, TX
\$ 8,248,516
- S-306 Washwater Recycle Facility @ WTP No. 4
City of Austin, TX
\$ 4,807,970
- Pump Station No. 7 Second Source to Main Contonment
American Water Operations & Maintenance Inc.
Fort Hood, TX
\$ 4,934,791
- 6MGD Membrane Water Treatment Plant
Brushy Creek Municipal Utility District
Round Rock, TX
\$ 14,598,909



MATOUS CONSTRUCTION, LTD.
8602 N. Hwy. 317
BELTON, TEXAS 76513
WWW.MATOUSCONSTRUCTION.COM
254.780.1400 (O) • 254.780.2599 (F)

Clean Water for a Better Tomorrow®

CORY A. JACKSON

SUPERINTENDENT

Statement of Qualifications

Matous Construction, Ltd. – Superintendent

2014 to Present

Project Management History

Ullrich Water Treatment Plant Lime Feed Loop The City of Austin Austin, Texas	\$ 11,492,611
Hornsby Bend Side Stream Plant Relief The City of Austin Austin, Texas	\$ 13,219,090
South Austin Regional WWTP Trains A&B Blower Replacement The City of Austin Austin, Texas	\$ 23,536,033
0.200 MGD Wastewater Treatment Plant Village of Salado Salado, Texas	\$ 4,869,364
City of Temple WTP Chlorine Storage Safety Improvements The City of Temple Temple, Texas	\$ 802,706
NW WWTP Improvements Phase II The City of Copperas Cove Copperas Cove, Texas	\$ 704,026
Sodium Hypochlorite Systems American Water Fort Hood, Texas	\$ 1,066,350
Water Plant Expansion Contract II The City of Marble Falls Marble Falls, Texas	\$ 921,665

Bidding Requirements, Contract Forms and Conditions of the Contract**ATTACHMENT D**

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

SPECIFIC CONSTRUCTION EXPERIENCE (GENERAL CONTRACTOR OR SUBCONTRACTOR PERFORMING THE WORK)

Bidder must provide the following project history information for each Construction Experience requirement listed below. OWNER may in its reasonable discretion deem the provided experience information insufficient and reject the Bid.

For each Construction Experience item listed below, list and describe the applicable Construction Experience for a minimum of three (3) successfully completed projects of comparable size, scope, and complexity to the Work described for this project. Comparability requirements may be spread among the three (3) projects per item submitted, e.g. One Project may demonstrate comparable size, another Project may demonstrate comparable scope and another may demonstrate comparable complexity. Decisions on "comparability" are at the complete discretion of the OWNER.

The Work must have been performed within the past five (5) years.

Bidder must provide all requested information in a complete, clear, and accurate manner. If necessary, additional information may be provided on separate attached sheets. Failure to provide any requested information may cause the Bid to be rejected by OWNER as non-responsive.

If the Bidder proposes to fulfill any specific construction experience requirement with subcontracted resources, the applicable Subcontractor must be included in the Bidder's Original MBE/WBE Compliance Plan. Failure to include subcontractors on the MBE/WBE Compliance Plan may render your bid non-responsive.

SPECIFIC CONSTRUCTION EXPERIENCE ITEMS REQUIRED:

- ITEM 1. Furnish and/or installation of dry gas scrubber system Improvements/modifications at water/wastewater treatment plants.
- ITEM 2. Furnish and/or installation of electrical instrumentation and control systems. Refer to Specification 17100 for specific requirements for instrumentation and control systems (ICS) contractor.
- ITEM 3. Furnish and/or installation of sodium hypochlorite storage and pumping system.

The Bidder shall complete and duplicate the following specific Construction Experience Form as required to provide the requested documentation for a minimum of three (3) successfully completed projects for each of the above specific Construction Experience requirements.

CONSTRUCTION EXPERIENCE DOCUMENTATION FORM	
EXPERIENCE ITEM NUMBER:	
Project Number:	
Does Bidder plan to self-perform this work?	<input type="checkbox"/> Yes <input type="checkbox"/> No

Bidding Requirements, Contract Forms and Conditions of the Contract

CONSTRUCTION EXPERIENCE DOCUMENTATION FORM	
EXPERIENCE ITEM NUMBER:	3
Project Number:	1
Does Bidder plan to self-perform this work?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If "NO", provide the following Subcontractor's information:	
Company's Address:	
Permanent Address:	
Phone No.	
# of years Subcontractor has been in business under current company name:	
Name of Project:	South Austin Regional WWTP - Tertiary Filters Improvements
Location:	Austin, Texas
OWNER's Name:	City of Austin - Austin Water
OWNER's Address:	625 East 10th, Ste 700, Austin, TX
OWNER's Contact Person (Print):	Steve Parks, P.E.
Phone/Fax No.:	512.974.3576
Initial Contract Price:	\$24,718,610
Final Contract Price:	\$25,952,594
Contract Start Date: <i>(Date of Notice to Proceed)</i>	3/8/2016
Contract Time:	Calendar Days: 1220 Working Days:
Contract Substantial Completion Date:	7/11/2019
Actual Substantial Completion Date:	10/23/2018
If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each:	
Contract time added for additional work as authorized by Owner.	
Project Description and why it is comparable to this Contract:	
<p>Work consisted of bypassing gravity sand filters at an existing wastewater treatment facility, then constructing and modifying the existing filters to disc filters. Work included demolition, large diameter steel piping and valves, pumps, coatings, disk filters, electrical, and instrumentation. A temporary filtration bypass system was designed, installed and maintained by Contractor. All mechanical work was self-performed. Close coordination was required between Contractor / Plant Staff to maintain continuous operation of plant during construction.</p>	

Bidding Requirements, Contract Forms and Conditions of the Contract

CONSTRUCTION EXPERIENCE DOCUMENTATION FORM	
EXPERIENCE ITEM NUMBER:	3
Project Number:	2
Does Bidder plan to self-perform this work?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If "NO", provide the following Subcontractor's information:	
Company's Address:	
Permanent Address:	
Phone No.	
# of years Subcontractor has been in business under current company name:	
Name of Project:	0.2 MGD Wastewater Plant - Salado, Texas
Location:	Salado, Texas
OWNER's Name:	Village of Salado
OWNER's Address:	301 N. Stagecoach Salado, Texas 7657
OWNER's Contact Person (Print):	Rick Kasberg (KPA Consulting Engineers)
Phone/Fax No.:	(254) 773-3731
Initial Contract Price:	\$4,883,000.00
Final Contract Price:	\$5,008,520.95
Contract Start Date: <i>(Date of Notice to Proceed)</i>	12/20/2017
Contract Time:	Calendar Days: 471 Working Days:
Contract Substantial Completion Date:	4/5/2019
Actual Substantial Completion Date:	3/1/2019
If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each:	
Contract time added for additional work authorized by the Owner.	
Project Description and why it is comparable to this Contract:	
New Construction of a Concentric Circular WWTP. Work consisted of welded steel tankage, process equipment, headworks, pumps, aeration equipment, blowers, sitework, electrical and instrumentation. All mechanical work was self-performed.	

New Construction of a Concentric Circular WWTP. Work consisted of welded steel tankage, process equipment, headworks, pumps, aeration equipment, blowers, sitework, electrical and instrumentation. All mechanical work was self-performed.

Bidding Requirements, Contract Forms and Conditions of the Contract

CONSTRUCTION EXPERIENCE DOCUMENTATION FORM	
EXPERIENCE ITEM NUMBER:	1
Project Number:	3
Does Bidder plan to self-perform this work?	<input checked="" type="radio"/> Yes <input type="radio"/> No
If "NO", provide the following Subcontractor's information:	
Company's Address:	
Permanent Address:	
Phone No.	
# of years Subcontractor has been in business under current company name:	
Name of Project:	Chlorine Storage Safety Improvements
Location:	Temple, Texas
OWNER's Name:	City of Temple
OWNER's Address:	4820 Parkside Dr, Temple, TX 76502
OWNER's Contact Person (Print):	Thomas D. Valle, PE
Phone/Fax No.:	254.760.8498
Initial Contract Price:	Not to Exceed \$933,000
Final Contract Price:	\$802,706
Contract Start Date: <i>(Date of Notice to Proceed)</i>	12/04/2017
Contract Time:	Calendar Days: 240 Working Days:
Contract Substantial Completion Date:	08/01/2018
Actual Substantial Completion Date:	07/13/2018
If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each:	
Contract time added for additional work authorized by Owner	
Project Description and why it is comparable to this Contract:	
Construction and rehabilitation of the existing Chlorine Storage facility. Work included, piping, installation of automatic shutoff valves and replacement of the chlorine scrubber. All mechanical work self performed by Contractor.	

Bidding Requirements, Contract Forms and Conditions of the Contract

CONSTRUCTION EXPERIENCE DOCUMENTATION FORM	
EXPERIENCE ITEM NUMBER:	1
Project Number:	4
Does Bidder plan to self-perform this work?	<input checked="" type="radio"/> Yes <input type="radio"/> No
If "NO", provide the following Subcontractor's information:	
Company's Address:	
Permanent Address:	
Phone No.	
# of years Subcontractor has been in business under current company name:	
Name of Project:	Sodium Hypochlorite Systems
Location:	Ft Hood, Texas
OWNER's Name:	American Water
OWNER's Address:	4653 72 nd St, Fort H
OWNER's Contact Person (Print):	Steve Radcliff
Phone/Fax No.:	254.213.0382
Initial Contract Price:	\$810,000
Final Contract Price:	\$822,000
Contract Start Date: <i>(Date of Notice to Proceed)</i>	10/08/2017
Contract Time:	Calendar Days: 180 Working Days:
Contract Substantial Completion Date:	05/01/2018
Actual Substantial Completion Date:	05/01/2018
If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each:	
Project Description and why it is comparable to this Contract:	
Construction and rehabilitation of the existing Pump Station Facility. Work included, piping, sodium hypochlorite system, process equipment, chemical feed. All mechanical work self performed by Contractor.	

Bidding Requirements, Contract Forms and Conditions of the Contract

CONSTRUCTION EXPERIENCE DOCUMENTATION FORM	
EXPERIENCE ITEM NUMBER:	1, 3
Project Number:	5
Does Bidder plan to self-perform this work?	<input checked="" type="radio"/> Yes <input type="radio"/> No
If "NO", provide the following Subcontractor's information:	
Company's Address:	
Permanent Address:	
Phone No.	
# of years Subcontractor has been in business under current company name:	
Name of Project:	Pump Station No. 7
Location:	Ft Hood, Texas
OWNER's Name:	American Water
OWNER's Address:	4653 72 nd St, Fort H
OWNER's Contact Person (Print):	Steve Radcliff
Phone/Fax No.:	254.213.0382
Initial Contract Price:	\$4,923,471
Final Contract Price:	\$4,934,791
Contract Start Date: <i>(Date of Notice to Proceed)</i>	10/08/2016
Contract Time:	Calendar Days: 455 Working Days:
Contract Substantial Completion Date:	02/15/2018
Actual Substantial Completion Date:	02/15/2018
If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each:	
Project Description and why it is comparable to this Contract:	
Construction of the new Pump Station Facility. Work included, piping, sodium hypochlorite system, process equipment, chemical feed and chlorine gas scrubber. All mechanical work self performed by Contractor.	

Bidding Requirements, Contract Forms and Conditions of the Contract

CONSTRUCTION EXPERIENCE DOCUMENTATION FORM	
EXPERIENCE ITEM NUMBER:	ITEM 2
Project Number:	6
Does Bidder plan to self-perform this work?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If "NO", provide the following Subcontractor's information: Control Panels USA Inc	
Company's Address:	16310 Bratton Lane, Bldg 1, Ste 100, Austin, Tx 78728
Permanent Address:	Same
Phone No.	(512) 863-3224
# of years Subcontractor has been in business under current company name:	21
Name of Project:	City of Austin S.A.R. WWTP Trains A & B Blower Replacement
Location:	Austin, Texas
OWNER's Name:	City of Austin
OWNER's Address:	505 Barton Springs Rd, Suite 760, Austin, Tx 78704
OWNER's Contact Person (Print):	Steve Parks, P.E.
Phone/Fax No.:	(512) 974-3578
Initial Contract Price:	\$647,000.00
Final Contract Price:	\$709,000.00
Contract Start Date: <i>(Date of Notice to Proceed)</i>	June 2016
Contract Time:	Calendar Days: 670 Working Days:
Contract Substantial Completion Date:	April 2018
Actual Substantial Completion Date:	November 2018
If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each:	
Design changes with General Contractor	
Project Description and why it is comparable to this Contract:	
Provided control panels, modifications to existing control panels, instrumentation equipment, fiber optic communication equipment and Modicon PLCs.	

Bidding Requirements, Contract Forms and Conditions of the Contract

CONSTRUCTION EXPERIENCE DOCUMENTATION FORM	
EXPERIENCE ITEM NUMBER:	ITEM 2
Project Number:	7
Does Bidder plan to self-perform this work?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If "NO", provide the following Subcontractor's information: Control Panels USA Inc	
Company's Address:	16310 Bratton Lane, Bldg 1, Ste 100, Austin, Tx 78728
Permanent Address:	Same
Phone No.	(512) 863-3224
# of years Subcontractor has been in business under current company name:	21
Name of Project:	City of Austin Montopolis Water Reclamation Initiative Storage and Pump Station
Location:	Austin, Texas
OWNER's Name:	City of Austin
OWNER's Address:	505 Barton Springs Rd, Suite 760, Austin, Tx 78704
OWNER's Contact Person (Print):	Javier Ramirez
Phone/Fax No.:	(512) 972-1000
Initial Contract Price:	\$430,000.00
Final Contract Price:	\$404,000.00
Contract Start Date: <i>(Date of Notice to Proceed)</i>	October 2016
Contract Time:	Calendar Days: 480 Working Days:
Contract Substantial Completion Date:	February 2018
Actual Substantial Completion Date:	July 2018
If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each:	
Design changes with General Contractor	
Project Description and why it is comparable to this Contract:	
Provided control panels, modifications to existing control panels, instrumentation equipment, fiber optic communication equipment, wireless communication equipment and Modicon PLCs.	

Bidding Requirements, Contract Forms and Conditions of the Contract

CONSTRUCTION EXPERIENCE DOCUMENTATION FORM		
EXPERIENCE ITEM NUMBER:	ITEM 2	
Project Number:	8	
Does Bidder plan to self-perform this work?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
If "NO", provide the following Subcontractor's information: Control Panels USA Inc		
Company's Address:	16310 Bratton Lane, Bldg 1, Ste 100, Austin, Tx 78728	
Permanent Address:	Same	
Phone No.	(512) 863-3224	
# of years Subcontractor has been in business under current company name:	21	
Name of Project:	San Antonio Water System Naco Pump Station Improve.	
Location:	San Antonio, Texas	
OWNER's Name:	San Antonio Water System	
OWNER's Address:	2800 US Hwy 281N, San Antonio, Texas 78212	
OWNER's Contact Person (Print):	Michelle Pfeil	
Phone/Fax No.:	(210) 233-2443	michelle.pfeil@saws.org
Initial Contract Price:	\$1,089,850.00	
Final Contract Price:	\$1,121,033.00	
Contract Start Date: <i>(Date of Notice to Proceed)</i>	June 2014	
Contract Time:	Calendar Days: 720	Working Days:
Contract Substantial Completion Date:	May 2016	
Actual Substantial Completion Date:	May 2017	
If contract time extensions were added to the contract as a result of Bidder's responsibilities, provide a short explanation of each:		
Design changes, Owner enhancements, General Contractor scheduling, unforeseen conditions and rain (354 added days)		
Project Description and why it is comparable to this Contract:		
Provided SCADA control panels, numerous peripheral control panels and field instrumentation equipment for upgrades to an existing water treatment facility. The SCADA panel was designed using Modicon M340 PLC equipment communicating via radio to the SAWS top end SCADA software system.		

Bidding Requirements, Contract Forms and Conditions of the Contract**ATTACHMENT E
AVAILABLE EQUIPMENT LIST**

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Name of Bidder:	Matous Construction, Ltd.
Solicitation Number:	IFB 6100 CLMC940
CIP ID Number:	3023.066

Provide a list of equipment that is available to the CONTRACTOR or its Subcontractor(s) and is specifically intended to be used on the Work under this Contract. Also indicate whether the equipment is owned or will be leased by the CONTRACTOR and/or Subcontractor(s).

<u>EQUIPMENT</u>	<u>OWNED OR LEASED</u>	<u>COMMITTED TO ANOTHER PROJECT? (Yes / No)</u>	<u>AVAILABLE / RELEASE DATE</u>
See attached list	Owned	No	Immediately

Use additional pages, as necessary

MAJOR EQUIPMENT AVAILABLE

Work Trucks

Fleet of ¾ Ton Work Trucks

Diesel Haul Truck with 50 TON Trailer

Rubber Tire Backhoe Loaders

Fleet of Cat 420D 4X4's

Fleet of 3 CY RT Loaders

Mini Equipment

Cat 259B Skid Steers

Cat 303.5 CR Mini Excavators

Large Excavators, 75,000# Class

Volvo E300 Excavator

Cat 330C Excavator

Cat 320 CL Excavator

Large Excavators, 110,000# Class

Volvo E480 Excavator

Rough Terrain Cranes

30 TN Terex Hydraulic Cranes

30 TN Grove Hydraulic Crane

50 TN Grove Hydraulic Crane

55 TN Terex Hydraulic Crane

Compaction Equipment

60" Cat Sheepsfoot Rollers

84" Cat Steel Vibratory Rollers

Trench Rollers

Ride On Rollers

Misc Equipment

Welders, Air Compressors,

Roust A Bouts, Hoists, etc.

Bidding Requirements, Contract Forms and Conditions of the Contract**ATTACHMENT F
AVAILABLE WORKFORCE**

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Name of Bidder:	Matous Construction, Ltd.
Solicitation Number:	IFB 6100 CLMC940
CIP ID Number:	3023.066

Provide a list of the available workforce for the various disciplines and crafts required for the Work on this Project, including the number of work crews, and number and worker classification for each equipment operator, mechanic, and laborer for that portion of the Work that Bidder will actually perform.

Number of Anticipated Work Crews: 1

DISCIPLINE OR CRAFT	NO. OF EMPLOYEES	COMMITTED TO ANOTHER PROJECT? (Yes / No)	AVAILABLE / RELEASE DATE
Professional (specify)	1 - Project Mgr.	No	Immediately
Superintendent	1	No	Immediately
Technical (specify)			
Skilled Workers (specify)	2 - Form Carpenters 2 - Plumbers	No	Immediately
Semiskilled Workers (specify)	4 - Laborers	No	Immediately
Equipment Operators (list)	1 - Crane, 2 - Backhoe, 1 - Mini Excavator	No	Immediately
Other			

Use additional pages, as necessary

Bidding Requirements, Contract Forms and Conditions of the Contract**ATTACHMENT G****CURRENT PROJECT LISTING (INCLUDING ALL CITY OF AUSTIN PROJECTS)**

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Name of Bidder:	Matous Construction, Ltd.
Solicitation Number:	IFB 6100 CLMC940
CIP ID Number:	3023.066

Provide a list of all current projects, including all City of Austin projects. Include the following for all jobs that Bidder is currently committed to or has currently underway: brief statement regarding the job type; estimated project duration; project contact; and project description.

Name of Project:	See Attached List	
Location:		
Type of Job:		
City of Austin Job?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Project Start Date		
Estimated Completion Date:		
Project Contact:		
Brief Description:		

Name of Project:		
Location:		
Type of Job:		
City of Austin Job?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Project Start Date		
Estimated Completion Date:		
Project Contact:		
Brief Description:		

CURRENT PROJECTS

Project	Owner	Contract Amount	% Complete	Est. Completion Date
Davis Water Treatment Plant Treated Water Discharge System Austin, Texas	The City of Austin, Texas James King, Project Manager 512.657.4053 James.King@austintexas.gov	\$ 45,676,261	95%	June 2023
Davis Water Treatment Plant Power Distribution Upgrade Austin, Texas	The City of Austin, Texas James King, Project Manager 512.657.4053 James.King@austintexas.gov	\$ 8,028,009	97%	June 2023
Ullrich Water Treatment Plant Lime Feed Loop Austin, Texas	The City of Austin, Texas Matt Hendrix, Project Manager 512.974.7073 Matt.Hendrix@austintexas.gov	\$ 12,457,905	95%	September 2022
South Austin Regional WWTP Electrical Substation No. 1 Replacement Project Austin, Texas	The City of Austin, Texas Gary Jackson, Project Manager 512.762.7628 gary.jackson@austintexas.gov	\$ 5,040,646	70%	November 2022
Temple Water Treatment Plant Membrane Treatment Facility Expansion Temple, Texas	The City of Temple, Texas James Billeck, P.E., Deputy City Engineer 254.298.5660 jbilleck@templetx.gov	\$ 45,257,949	65%	April 2023
City of Jarrell Donahoe Wastewater Treatment Plant Phase II Expansion Jarrell, Texas	The City of Jarrell, Texas Greg Beach, Engineer Greg.Beach@mrbgroup.com	\$ 4,076,655	96%	September 2022
Waller Creek Inlet Facility Catenary Screen Pilot Austin, Texas	The City of Austin, Texas Susan Kenzle, Project Manager 512.974.2565 susan.kenzle@austintexas.gov	\$ 1,975,061	75%	September 2022
Hornsby Bend Biosolids Management Plant Centrifuges Phase 2 Austin, Texas	The City of Austin, Texas Jules Parrish, Project Manager 512.974.9385 Jules.Parrish@austintexas.gov	\$ 11,136,000	20%	October, 2023

CURRENT PROJECTS

Project	Owner	Contract Amount	% Complete	Est. Completion Date
City of Cameron Water Treatment Plant Improvements Phase II Cameron, Texas	The City of Cameron, Texas Bill Harris, Mayor Jake Blair, PE jblair@kpaengineers.com	\$ 1,342,000	5%	April 2023
Davis & Handcox WTP Polymer Feed Sys (2018 Flood Res. Impmt) Austin, Texas	The City of Austin, Texas Matt Hendrix, Project Manager 512.974.7073 matt.hendrix@austintexas.gov	\$ 8,213,105	<5%	July 2023
Davis Water Treatment Plant Filter Media Tank Improvements Austin, Texas	The City of Austin, Texas Matt Hendrix, Project Manager 512.974.7073 matt.hendrix@austintexas.gov	\$ 820,000	<5%	April 2023

Bidding Requirements, Contract Forms and Conditions of the Contract

ATTACHMENT H
COMPLETED PROJECTS (INCLUDING ALL CITY OF AUSTIN PROJECTS)

Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status.

Name of Bidder:	Matous Construction, Ltd.
Solicitation Number:	IFB 6100 CLMC940
CIP ID Number:	3023.066

Provide a list of all completed projects, including all City of Austin projects that Bidder has completed in the past five (5) years by calendar year (or life of company if less than five (5) years). Include the following: a brief statement regarding the job type, the estimated project duration, project contact, and project description.

Calendar Year of _____

Name of Project:	See attached listing	
Location:		
Type of Job:		
City of Austin Job?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Project Duration:		
Project Contact:		
Brief Description:		

Name of Project:		
Location:		
Type of Job:		
City of Austin Job?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Project Duration:		
Project Contact:		
Brief Description:		

Use additional pages as necessary to achieve a representative listing covering 5 years

COMPLETED PROJECTS**Past Five Years**

Project	Owner	Engineer	Final Contract Amount	Year Completed
Cameron WWTP Phase I Solids Handling	City of Cameron	Kasberg, Patrick & Associates 254.773.3731	\$ 1,288,004	2022
Hornsby Bend Side Stream Treatment Plant Relief	City of Austin	Carollo Engineers, Inc. 512.453.5383	\$ 13,219,090	2021
Hornsby Bend BMP Thickener Complex Rehabilitation	City of Austin	CP&Y 512.492.6852	\$ 16,279,752	2021
City of Lago Vista 2016 WWTP Improvements Lago Vista, Texas	City of Lago Vista	Walker Partners, LLC 512.750.4453	\$ 2,830,788	2021
City of Iredell 2017-2018 CDBG Sewer Improvement Project	City of Iredell	Consulting Environmental Engineers, Inc. 254.968.8130	\$ 261,096	2020
Central Texas WSC Filter Valves, Plant No. 1	Central Texas Water Supply Corp	N/A	\$ 215,240	2020
Pflugerville Central Wastewater Treatment Plant - Completion Agreement	The Hanover Insurance Company	Freese and Nichols, Inc. 512.617.3100	\$ 89,345	2020
SAR WWTP Filter Improvements	City of Austin	AECOM 512.457.7701	\$ 25,952,594	2019
SAR WWTP Trains A&B Blower Replacement	City of Austin	Carollo Engineers, P.C. 512.453.5383	\$ 23,536,033	2019
SAR WWTP Thickener Improvements	City of Austin	CDM Smith 512-345-1100	\$ 7,610,683	2019
Salado 0.200 MGD Wastewater Treatment Plant	Village of Salado	Kasberg, Patrick & Associates 254.773.3731	\$ 5,008,521	2019
Aqua WSC ER Station Jockey Pumps	Aqua Water Supply Corp	Steger Bizzell 512.930.9412	\$ 360,000	2019
Cameron WTP Clarifier Rehab Cameron, TX	City of Cameron	Kasberg, Patrick & Associates 254.773.3731	\$ 1,374,782	2018
City of Temple Chlorine Storage Safety Improvements	City of Temple	Kasberg, Patrick & Associates 254.773.3731	\$ 802,706	2018
McGregor WWTP Modifications	City of McGregor	Walker Partners 512.382.0021	\$ 294,677	2017

COMPLETED PROJECTS
(Sorted by Contract Amount)

Project	Owner	Engineer	Final Contract Amount
Hornsby Bend BMP Digester Improvements &	The City of Austin	CH2M Hill, Inc. 512.453.1980	\$ 28,463,623
SAR WWTP Filter Improvements	The City of Austin	AECOM 512.457.7701	\$ 25,952,594
SAR WWTP Trains A&B Blower Replacement	The City of Austin	Carollo Engineers, P.C. 512.453.5383	\$ 23,536,033
Bell Co. WCID No. 1 South WWTP	Bell Co. WCID No.1	Lockwood, Andrews & Newnam 713.266.6900	\$ 19,662,009
Davis WTP Improvements & Equipment Replacement / Rehab-Phase B	The City of Austin	Turner, Collie, & Braden 512.472.4519	\$ 17,527,972
Hornsby Bend BMP Thickener Complex Rehabilitation	City of Austin	CP&Y 512.492.6852	\$ 16,279,752
Bell Co. Water Tmt Plant	Bell County	Wayne, Smith & Assoc 713.450.1300	\$ 16,065,039
Brushy Creek WWTP	Brushy Creek MUD	CH2M Hill, Inc. 512.453.1980	\$ 14,598,909
7.08 MGD Water Treatment Plant at Stillhouse Hollow Reservoir	Kempner Water Supply Corporation	Steger Bizzell 512.930.9412	\$ 14,345,202
Hornsby Bend Side Stream Treatment Plant Relief	City of Austin	Carollo Engineers, Inc. 512.453.5383	\$ 13,219,090
Plant #1 WWTP Improvements	Bell Co. WCID #1	Lockwood, Andrews & Newnam 713.266.6900	\$ 10,585,215
Modif. To Exist. Plant	Bell Co. WCID #1	SCL Engineering 713.450.1300	\$ 9,144,029
S-308A Lime Handling Facility@COA Plant No. 4	The City of Austin	MWH Constructors 512.682.9900	\$ 8,248,516
SAR WWTP Thickener Improvements	The City of Austin	CDM Smith 512-345-1100	\$ 7,610,683
Hornsby Bend Sludge Mang. Contract 2	City of Austin	CH2M Hill, Inc. 512.453.1980	\$ 6,812,520
Mountain Creek WWTP	Trinity River Authority	The Wallace Group 254.554.5959	\$ 5,927,640
Walnut Creek WWTP Power Distribution System Improvements - Phase II	The City of Austin	Harutunian Engineering, Inc. 512.454.2788	\$ 5,630,099
Sandy Creek WTP Expansion	The Lower Colorado River Authority	Turner, Collie & Braden, Inc. 512.472.4519	\$ 5,135,596
Lago Vista WTP No. 3	The City of Lago Vista	HDR Engineering 512.912.5100	\$ 5,148,634

COMPLETED PROJECTS
(Sorted by Contract Amount)

Project	Owner	Engineer	Final Contract Amount
Salado 0.200 MGD Wastewater Treatment Plant	The Village of Salado	Kasberg, Patrick & Associates 254.773.3731	\$ 5,008,521
Ameircan Water Pump Station No. 7 Ft. Hood, TX	American Water Operations and Maintenance, Inc.	American Water Operations and Maintenance, Inc.	\$ 4,934,791
S-306 Washwater Recycle Facility@COA Plant No. 4	The City of Austin	MWH Constructors 512.682.9900	\$ 4,807,970
0.325 MGD Wastewater Treatment Plant	West Travis Co. PUA	Murfee Engineering Co., Inc. 512.327.9204	\$ 4,790,313
Water Treatment Plant & Raw Water Intake	Bluebonnet WSC	Duff Consulting Engineers 254.756.5414	\$ 4,735,689
Phase 1B - Reuse Water Trmt Facilities	City of Round Rock	HDR Engineering 512.912.5100	\$ 4,727,338
Water Treatment Plant	City of Robinson	The Wallace Group 254.554.5959	\$ 4,549,655
Hornsby Bend Sludge Mang. Contract 1	City of Austin	CH2M Hill 512.453.1980	\$ 4,431,248
South Austin Regional WWTP Train C Substation	The City of Austin	Turner, Collie & Braden, Inc. 512.472.4519	\$ 4,138,480
2015 Water/Waste Water Treatment Projects	The City of Seguin	TRC Engineers 512.454.8716	\$ 3,357,441
Membrane Filtration System	Travis Co. #18	CMA Engineering 512.894.3230	\$ 3,170,439
Barton Creek Section N 100,000 GPD WWTP Site Improvements	Travis County MUD No. 4	Murfee Engineering Co., Inc. 512.327.9204	\$ 2,877,903
City of Lago Vista 2016 WWTP Improvements	The City of Lago Vista	Walker Partners, LLC 512.750.4453	\$ 2,830,788
Round Rock West WWTP	LCRA	HDR Engineering 512.912.5100	\$ 2,510,741
Lakeway S.5 WWTP	Lakeway MUD	Dannenbaum Engineer 512.345.8505	\$ 2,493,981
Ullrich WTP 160 MGD Plant Expansion -Contract 4	The City of Austin	Camp, Dresser & McKee 512.346.1100	\$ 2,468,661
Northwest WWTP Improvements - Phase I	The City of Copperas Cove	Lockwood, Andrews, and Newnam 254.753.9585	\$ 2,430,603
Round Rock WTP 1.5 MG Clearwell Project	The City of Round Rock	Camp, Dresser & McKee, Inc. 512.346.1100	\$ 2,398,700
Doc. L. Curb WTP Expansion	Central Texas Water Supply	S.D. Kallman, L.P. 512.281.4404	\$ 2,361,275
Camp Swift WTP	Aqua WSC	Malcolm Pirnie 512.494.1165	\$ 2,242,286

COMPLETED PROJECTS
(Sorted by Contract Amount)

Project	Owner	Engineer	Final Contract Amount
Legend Oaks Pump Station	Chisholm Trail Special Utility	Lockwood, Andrews & Newnam 512.388.4212	\$ 2,170,096
Wastewater Treatment Plant	City of Fredericksburg	C. Darryl Primeaux 512.327.6729	\$ 2,078,623
Gatesville WWTP	City of Gatesville	The Wallace Group 254.554.5959	\$ 2,057,000
Rehabilitation of Conventional WTP Mixed Media Filters and Lagoon No. 4 Replacement	The City of Temple	Carollo Engineers, P.C. 512.453.5383	\$ 2,055,866
Albert R. Davis WTP Chemical Feed Improv.	The City of Austin	URS Corporation 512.454.4797	\$ 2,033,429
Cimarron Hills WWTP	City of Georgetown	The Wallace Group 254.554.5959	\$ 1,914,958
Hico WTP	The City of Hico	Brannon Corporation 800.256.2492	\$ 1,866,300
Water Treatment Plant	Aquilla Water Supply	Knowlton.English Flowers 817.283.6211	\$ 1,865,053
Hurst Creek MUD WWTP Improvements	Hurst Creek MUD	James Miertschin & Assoc 512.261.6282	\$ 1,771,829
Hornsby Bend Sludge Management	City of Austin	CH2M Hill 512.453.1980	\$ 1,594,936
Killeen Lift Station No. 6	City of Killeen	The Wallace Group 254.554.5959	\$ 1,594,811
Water Tmt Plant Exp. Microfloc Trident Unit	Travis Co. WCID #20	Murfee Engineering 512.327.9204	\$ 1,585,139
Robinson RO Train	City of Robinson	The Wallace Group 254.554.5959	\$ 1,565,300
Bell Co. #3 WWTP	Bell Co. WC&ID #3	The Wallace Group 254.554.5959	\$ 1,535,661
AR Davis WTP	City of Austin	HDR Engineering 512.912.5100	\$ 1,406,872
Hamilton WTP Expansion	The City of Hamilton	TRC Engineers 512.454.8716	\$ 1,396,774
South Austin Regional WWTP	City of Austin	Turner, Collie & Braden, Inc. 512.472.4519	\$ 1,388,699
Cameron WTP Clarifier Rehab	City of Cameron	Kasberg, Patrick & Associates 254.773.3731	\$ 1,374,782
Cameron WWTP Phase I Solids Handling	100 S. Houston	Kasberg, Patrick & Associates 254.773.3731	\$ 1,288,004
Coca-Cola Process Wastewater Pre-Treatment System	Coca-Cola North America	Todd Ecological, Inc. 508.548.2545	\$ 1,280,450

COMPLETED PROJECTS
(Sorted by Contract Amount)

Project	Owner	Engineer	Final Contract Amount
Ullrich Membrane	City of Austin		\$ 1,175,283
Water Treatment Plant	City of Taylor	Jones & Neuse 512.327.9840	\$ 1,108,607
Lobo Street Lift Station	City of Cedar Park	Turner, Collie & Braden, Inc. 512.472.4519	\$ 1,078,642
Fryer Creek Lift Station	City of Temple	Freese & Nichols 512.451.7955	\$ 1,077,137
Lakeway I.6 Pond & P.S	Lakeway MUD	HDR Engineering 512.912.5100	\$ 1,074,346
American Water Sodium Hypochlorite Facilities	American Water Operations and	American Water Operations and Maintenance, Inc.	\$ 1,066,350
Wastewater Tmt Plant	City of Schulenburg	O'Malley Engineers 956.836.7937	\$ 1,065,171
River Plantation Lift Station Replacement	City of Austin	LJA Engineering & Surveying, Inc. 512.439.4700	\$ 1,057,269
Three Creeks Subdivision Sanitary Lift Station Phase I	WBW Construction	WBW Construction	\$ 1,056,252
Walnut Creek WWTP	City of Austin	Hartutunian Engineer 512.454.2788	\$ 1,048,373
Hornsby Bend BMP Biogas Energy Project	City of Austin	Chevron Energy Solutions 913.748.8734	\$ 1,011,275
Davis WTP Security Improvements - Phase I	The City of Austin	DAVCAR Engineering 512.328.4428	\$ 958,010
Transfer Pump Station at Water Treatment Plant	The City of Marble Falls	S.D. Kallman, L.P. 512.281.4404	\$ 921,665
Hubbard WWTP	City of Hubbard	The Wallace Group 254.554.5959	\$ 920,200
Hurst Creek WWTP	Hurst Creek MUD	James Miertschin & Assoc 512.261.6282	\$ 916,402
Troy and Hickory Lift Stations	The City of Temple	Freese & Nichols 210.298.3800	\$ 906,650
So. Whitehall Rd Water Well	Mofat Water Supply Corporation	Bury+Partners 254.742.2110	\$ 893,683
Leander NW Booster Pump Station	The City of Leander	Haynie Consulting 512.837.2446	\$ 841,340
812 Pump Station Modifications	Aqua Water Supply Corporation	Steger Bizzell 512.930.9412	\$ 809,433
BNSF			\$ 805,542
Hornsby Bend Sludge Thickening Building	The City of Austin	Waugh Engineering, Inc. 512.474.4470	\$ 794,000
City of Temple Chlorine Storage Safety Improvements	The City of Temple	Kasberg, Patrick & Associates 254.773.3731	\$ 802,706

COMPLETED PROJECTS
(Sorted by Contract Amount)

Project	Owner	Engineer	Final Contract Amount
Hornsby Bend Thickener L.S	City of Austin	Parson, Inc. 512.719.6000	\$ 776,022
Davis WTP Chlorine System Improvements	The City of Austin Chris Wolter, P.E.	Jacobs Engineering Group, Inc.	\$ 775,646
Stony Point WWTP New Headworks & Equalization	Aqua Water Supply Corporation	Steger Bizzell 512.930.9412	\$ 768,400
Shanklin Lane Pump Station 3527 Shanklin Lane	Central Texas Water Supply	S.D. Kallman, L.P. 512.281.4404	\$ 738,920
Northwest WWTP Improvements - Phase II	The City of Copperas Cove	Lockwood, Andrews, and Newnam 254.753.9585	\$ 704,026
Mart WWTP	The City of Mart	Bury & Partners 512.328.0011	\$ 717,781
Hurst Creek			\$ 712,464
Panda Temple Power Doshier Farm Effluent Pump	Panda Energy	Kasberg, Patrick & Associates 254.773.3731	\$ 697,300
Water Tmt Plant Expansion	Hurst Creek MUD	James Miertschin & Assoc 512.261.6282	\$ 677,659
American Water Pump Station No. 4	American Water Operations and	American Water Operations and Maintenance, Inc.	\$ 661,876
Booster Pump Station	City of Leander	Jay Engineers 512.259.3882	\$ 659,640
Harris Branch WWTP Sand Filter and Chlorine Contact	The City of Austin	DAVCAR Engineering 512.328.4428	\$ 620,522
Cottonwood Creek Golf Course Water System	The City of Waco	G.E. Walker & Associates 254.714.1402	\$ 607,000
Sparta Road Pump Station	City of Belton	Roming Parker & Kasberg 254.773.3731	\$ 604,028
SAR WWTP Emergency Reparis	The City of Austin	Austin Water Utility 512.972.0248	\$ 602,960
Secondary Lift Station Rehabilitation Project Phase II	American Water Operations	American Water Operations and Maintenance, Inc.	\$ 589,300
East Bell WSC Pump Station	East Bell Water Supply Corporation	Tabor & Associates, Inc. 254.756.2118	\$ 543,300
Bell Co. WC&ID No. 1 South	Bell Co. WC&ID No. 1	Bell Co. WC&ID No. 1	\$ 534,000
Effluent Storage Pond	Travis Co. MUD	James Miertschin 512.261.6282	\$ 521,945
Travis Co. WCID No. 20	Travis Co. WC&ID No. 20	Murfee Engineering 512.327.9204	\$ 520,760
SE Elevated Pump Station	City of Round Rock	HDR Engineering 512.912.5100	\$ 515,532
Williamson Creek Lift Station	The City of Temple	S.D. Kallman, L.P. 512.281.4404	\$ 479,000

COMPLETED PROJECTS
(Sorted by Contract Amount)

Project	Owner	Engineer	Final Contract Amount
Ft. Hood Sewage Lift Stations		American Water Operations and Maintenance, Inc.	\$ 462,050
West Pump Station	City of West	The Wallace Group 254.554.5959	\$ 451,548
Hurst Creek Disinfection	Hurst Creek MUD	James Miertschin 512.261.6282	\$ 423,000
Bluebonnet WSC	Bluebonnet WSC		\$ 409,450
TC Green Water Tmt Plant	City of Austin	Turner, Collie & Braden, Inc. 512.472.4519	\$ 408,879
Westlake Lift Station	Eanes ISD	Murfee Engineering 512.327.9204	\$ 404,630
Turkey Run Pump Station	City of Copperas Cove	The Wallace Group 254.554.5959	\$ 400,419
Hwy 195 Pump Station	Central Tx WSC	S.D. Kallman 512.218.4404	\$ 397,000
Fredericksburg 2012 WW Headworks Improvements	City of Fredericksburg	Lackey & Associates	\$ 387,445
Wastewater Tmt Plant	City of Copperas Cove	Blackwell, Lackey & Assoc 512.442.3008	\$ 380,000
Clar. Rehab	City of Temple	Roming Parker & Kasberg 254.773.3731	\$ 379,332
Hurst Creek WTP Improvements	Hurst Creek MUD	James Miertschin 512.327.2708	\$ 362,000
Doshier Farm RAS Pump Rehabilitation	The City of Temple 3210 East Avenue H	Kasberg, Patrick & Associates, LP 254.773.3731	\$ 356,581
Lorena Cholranation		Kasberg, Patrick & Associates, LP 254.773.3731	\$ 342,000
Copperas Cove Clarifier No. 2	The City of Copperas Cove	The City of Copperas Cove	\$ 318,100
Killeen Metering Station	The City of Killeen	The Wallace Group 254.554.5959	\$ 316,930
AW Pump Station No. 3	American Water Operations	Bury & Partners 512.328.0011	\$ 316,300
Walnut Creek WWTP Polymer	The City of Austin	Austin Water Utility 512.972.0347	\$ 307,000
Phosphorus Removal	City of Clifton	Camp Dresser & McKee 512.346.1100	\$ 303,876
Disinfection Facility	City of Round Rock	Blackwell, Lackey & Assoc 512.442.3008	\$ 301,193
McGregor WWTP Modifications	City of McGregor	Walker Partners 512.382.0021	\$ 294,677
pH Neutralization System	Central Texas Corrugated	Central Texas Corrugated 7200 Mars Drive	\$ 275,000

COMPLETED PROJECTS
(Sorted by Contract Amount)

Project	Owner	Engineer	Final Contract Amount
City of Iredell 2017-2018 CDBG Sewer Improvement	City of Iredell	Consulting Environmental Engineers, Inc. 254.968.8130	\$ 261,096
Belt Press Facility	City of Hamilton	Hunter Associates Texas 512.454.8716	\$ 232,208
Temple Filter Media			\$ 219,600
Central Texas WSC Filter Valves, Plant No. 1	Central Texas Water Supply Corp	N/A	\$ 215,240
Round Rock Well Site #9	City of Round Rock	HDR Engineering 512.912.5100	\$ 205,429
City of Temple Clarifier #4	The City of Temple	The City of Temple 254.298.5655	\$ 194,106
Harker Heights UV System	City of Harker Heights	The Wallace Group 254.554.5959	\$ 185,718
Stormwater Runoff Improv.	MATES Training Facility	Adjutant General 512.706.6746	\$ 178,040
Temple WTP Actuator			\$ 154,748
Temple-Belton			\$ 151,000
Brownwood Equipment	Texas Parks & Wildlife		\$ 147,000
City of Copperas Cove NW Weir Gate	The City of Copperas Cove		\$ 141,500
Wastewater Tmt Improvements	City of Granger		\$ 140,900
Mart WTP	City of Mart	Bury & Partners 512.328.0011	\$ 117,000
COT Replacement of Mixed Media Filter	City of Temple	The City of Temple 254.298.5655	\$ 114,950
SSLGC			\$ 112,485
AW Chlorine Scrubber at Building 6898	American Water Operations		\$ 102,500
Bell Co. #1 Demo. BPS	Bell. Co. WCID #1	The Wallace Group 254.554.5959	\$ 98,833
Wastewater Tmt Plant	City of Round Rock	HDR Engineers 512.912.5100	\$ 97,700
Pflugerville Central WWTP - Completion Agreement	The Hanover Insurance Company	Freese and Nichols, Inc. 512.617.3100	\$ 89,345
Hurst Creek MUD Creek Crossing			\$ 89,054
Doshier Farm Emergency Repair			\$ 85,998

COMPLETED PROJECTS
(Sorted by Contract Amount)

Project	Owner	Engineer	Final Contract Amount
Clifton Aeration	City of Clifton		\$ 79,736
Cameron			\$ 78,956
West Travis Co PUA Clarifier			\$ 77,320
Bell Co. Terminal Valve Replacement	Bell Co. WCID #1	SCL Engineering 713.450.1300	\$ 77,000
COT Clarifier Leveling			\$ 62,000
Booster Pump Station	Adjutant General	The Wallace Group 254.554.5959	\$ 52,445
Aeration Equipment	City of Bartlett	The Wallace Group 254.554.5959	\$ 48,700
Shoal Creek Aerial Crossing			\$ 48,000
Moody Clarifier Rehab	City of Moody		\$ 44,680
Flow Metering	City of Gatesville	The Wallace Group 254.554.5959	\$ 44,635
AW Lift Station 70019			\$ 44,010

Bidding Requirements, Contract Forms and Conditions of the Contract

**ATTACHMENT I
BIDDERS AUTHENTICATION**

(Attention Bidder: Complete and return within three (3) days of notification of the three (3) low bidders' status)

Solicitation Number:	IFB 6100 CLMC940
CIP ID Number:	3023.066

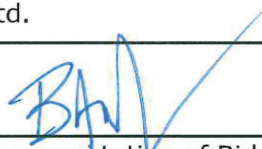
THE STATE OF TEXAS
COUNTY OF TRAVIS

I certify that my responses and the information provided in Attachments A-H are true and correct to the best of my personal knowledge and belief and that I have made no willful misrepresentations in this Section, nor have I withheld any relevant information in my statements and answers to questions. I am aware that any information given by me in this Section may be investigated and I hereby give my full permission for any such investigation and I fully acknowledge that any misrepresentations or omissions in my responses and information may cause my bid to be rejected.

Bidder's full name and entity status:

Matous Construction, Ltd.

 Company's Name

Bruce A. Matous 

 Signature, Authorized Representative of Bidder

CEO

 Title

September 6, 2022

 Date

END

Bidding Requirements, Contract Forms and Conditions of the Contract

CERTIFICATE OF NON-SUSPENSION OR DEBARMENT

Section 00405

Solicitation Number: CLMC940 (to be filled in by Contractor)

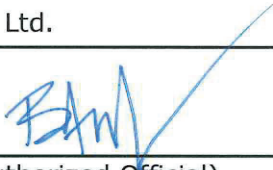
The City of Austin is prohibited from contracting with or making prime or sub-awards to parties that are suspended or debarred or whose principals are suspended or debarred from Federal, State, or City of Austin Contracts. Covered transactions include procurement contracts for goods or services equal to or in excess of \$25,000.00 and all non-procurement transactions. This certification is required for all bidders on all City of Austin Contracts to be awarded with values equal to or in excess of \$25,000.00 and all non-procurement transactions.

The CONTRACTOR hereby certifies that its firm and its principals are not currently suspended or debarred from bidding on any Federal, State, or City of Austin Contracts.

Contractor's full name and entity status:

Matous Construction, Ltd.

Bruce A. Matous



(Name/Signature of Authorized Official)

CEO

Title

September 6, 2022

Date

END

Bidding Requirements, Contract Forms and Conditions of the Contract**STATEMENT OF BIDDER'S SAFETY EXPERIENCE**

Section 00410

**BIDDER'S SAFETY EXPERIENCE
(To Be Submitted Post-Bid)****Solicitation Number:** CLMC940 (to be filled in by Contractor)**NAME OF BIDDER:** Matous Construction, Ltd.

Pursuant to Section 252.0435 of the Local Government Code, the OWNER will consider the safety records of bidders prior to awarding a City contract. Upon request, a bidder is required to provide information to demonstrate the safety and health performance of their company. The information obtained from a bidder or from other sources will be used to determine the bidder's safety record, and will not automatically be used to exclude the bidder from selection for this or any future procurement. The OWNER will consider the responses to this Section 00410 document separately when making a discretionary determination of whether to disqualify a bidder, and may also consider the cumulative impact of the information generated by the bidder's responses in making the determination. Bidders are responsible for reviewing the safety records of proposed subcontractors.

Upon notification from the OWNER, the three (3) apparent low bidders are required to provide the following information:

WORKERS' COMPENSATION EXPERIENCE MODIFICATION RATE DATA			
Provide bidder's Workers' Compensation Experience Modification Rate (EMR) Data using the loss experience that occurred within the past five years.		Policy Year	EMR
	Current EMR:	2022	.85
Attach bidder's NCCI workers compensation experience rating sheets for the past five (5) years.	1 Year Ago:	2021	.72
	2 Years Ago:	2020	.71
	3 Years Ago:	2019	.71
	4 Years Ago:	2018	.72
Bidder's initialing here certifies that bidder does not have an EMR: _____			
<i>(Submit a copy of bidder's Insurance Loss Run Reports for the last five years if bidder does not have an EMR.)</i>			
Bidder may include additional information explaining any circumstances that may have affected the company's EMR rate.			

Bidding Requirements, Contract Forms and Conditions of the Contract

Evaluation: Bidders with a 5-year EMR average that exceeds the 5-year industry average EMR by more than 25% may be deemed non-responsive.

REGULATORY NOTICE AND CITATION HISTORY DATA

Provide bidder's information regarding regulatory **OSHA and/or Environmental Protection Agency Notices and Citations** as follows:

Describe federal, state, city/municipal or county OSHA notices of noncompliance or citations issued to or received by the bidder within the past three years or any notices from any environmental protection agency, including any notices or citations from any state agency or local government responsible for enforcing environmental protection or other health and safety laws or regulations of any state of the United States, received within the past three years.

Provide a description of each on the OSHA/EPA form on the following page to include:

- Date of Citation/Notices
- Issuing agency
- Standard cited
- Level of violation (i.e. serious, willful)
- Dates and brief description(s) of the event(s)
- Brief description(s) of actions taken to correct the violation(s)
- Current status (Open, Closed, Contested)
- If Closed, date of Closure
- If Open, estimated date of Closure

Bidder may include additional information explaining any related circumstances.

Evaluation: Information may be verified by referring to respective agency. More than two serious or more than one willful or repeated violation (investigation completed) within the past three years may deem the Bidder non-responsive.

OSHA and/or Environmental Protection Agency Notices Within Past Three Years

Bidding Requirements, Contract Forms and Conditions of the Contract

Date of Citation or Notice	Issuing Agency	Violation Level (i.e. serious, willful)	Brief description of event	Brief description of actions taken to correct violation(s)	Current Status (Open, Closed, Contested)	Closed Date, or if Open, estimated Close Date
NONE						

Bidding Requirements, Contract Forms and Conditions of the Contract

INJURY AND ILLNESS INCIDENCE RATE DATA	
Provide bidder's *Total Case Incidence Rate(s) (TCIR) for the 3 most recent calendar years. Attach bidder's OSHA 300 and 300A logs for the past 3 years.	TCIR Rates: Current Rate: <u>0.00</u> 1 Year Ago: <u>3.34</u> 2 Years Ago: <u>9.16</u>
DAYS AWAY, RESTRICTED, AND TRANSFER RATE DATA	
Provide bidder's **Days Away, Restricted, and Transfer Rate(s) (DART) for the three most recent calendar years.	DART Rates: Current Rate: <u>0.00</u> 1 Year Ago: <u>3.34</u> 2 Years Ago: <u>7.63</u>
Bidder may include additional information explaining any circumstances that may have affected the submitted rates and/or their associated three year trends.	
Evaluation: Rates will be compared to the most recently published Bureau of Labor Statistics (BLS) national average for the Standard Industrial Classification code (SIC) or North American Industrial Classification Systems (NAICS) code for the construction industry. For consideration of another code within the construction industry, the Bidder must provide the code and justification. Bidders with a 3-year TCIR or DART average that exceeds the 3-year TCIR or DART industry average may be deemed non-responsive.	

**TCIR – To calculate the calendar year TCIR, determine the total number of all recordable injuries and illnesses that occurred during the year in question, divide that total by the total number of hours worked by all employees during that year, and multiply the result by 200,000.*

*** DART – To calculate the calendar year DART, determine the total number of recordable injuries and illnesses resulting in days away from work, restricted work activity, and/or job transfer that occurred during the year in question, divide that total by the total number of hours worked by all employees during that year, and multiply the result by 200,000.*

Bidding Requirements, Contract Forms and Conditions of the Contract

ACKNOWLEDGEMENT

THE STATE OF TEXAS

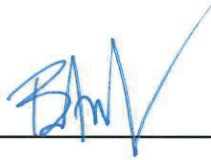
COUNTY OF TRAVIS

I certify that my responses and the information I have provided are true and correct to the best of my personal knowledge and belief and I have made no willful misrepresentations in this, or withheld any relevant information in my statements. I am aware that any information given by me in response to this Section 00410 may be investigated and I hereby give my full permission for any such investigations, and I fully acknowledge that any misrepresentations or omissions in my responses and information may cause my bid to be rejected or cause any contract based on misrepresentations to be cancelled.

Contractor's full name and entity status:

Matous Construction, Ltd.

Bruce A. Matous



(Name/Signature of Authorized Official)

CEO

Title

September 6, 2022

Date

END

Bidding Requirements, Contract Forms and Conditions of the Contract**PROHIBITED ACTIVITIES**

Section 00440

**NON-COLLUSION, NON-CONFLICT OF INTEREST
AND ANTI-LOBBYING****State of Texas****County of Travis**

The term "**Bidder**", as used herein, includes the individual or business entity submitting the bid includes the directors, officers, partners, managers, members, principals, owners, agents, representatives, employees, other parties in interest of the Bidder, and anyone or any entity acting for or on behalf of the Bidder, including a subcontractor in connection with this bid.

The terms "**City**" and "**Owner**" are synonymous.

1. **Anti-Collusion Statement.** The Bidder has not and will not in any way directly or indirectly:
 - a. colluded, conspired, or agreed with any other person, firm, corporation, bidder or potential bidder to the amount of this bid or the terms or conditions of this bid.
 - b. paid or agreed to pay any other person, firm, corporation bidder or potential bidder any money or anything of value in return for assistance in procuring or attempting to procure a contract or in return for establishing the prices in the attached bid or the bid of any other bidder.
2. **Preparation of Invitation for Bid and Contract Documents.** The Bidder has not received any compensation or a promise of compensation for participating in the preparation or development of the underlying bid or contract documents., In addition, the Bidder has not otherwise participated in the preparation or development of the underlying bid or contract documents, except to the extent of any comments or questions and responses in the bidding process, which are available to all bidders, so as to have an unfair advantage over other bidders, provided that the Bidder may have provided relevant product or process information to a consultant in the normal course of its business.
3. **Participation in Decision Making Process.** The Bidder has not participated in the evaluation of bids or proposals or other decision making process for this solicitation, and, if Bidder is awarded a contract hereunder, no individual, agent, representative, consultant or sub contractor or consultant associated with Bidder, who may have been involved in the evaluation or other decision making process for this solicitation, will have any direct or indirect financial interest in the Contract, provided that the Bidder may have provided relevant product or process information to a consultant in the normal course of its business.
4. **Present Knowledge.** Bidder is not presently aware of any potential or actual conflicts of interest regarding this solicitation, which either enabled Bidder to obtain an advantage over other bidders or would prevent Bidder from advancing the best interests of OWNER in the course of the performance of the Contract.

Bidding Requirements, Contract Forms and Conditions of the Contract

5. **City Code.** As provided in Sections 2-7-61 through 2-7-65 of the City Code, no individual with a substantial interest in Bidder is a City official or employee or is related to any City official or employee within the first or second degree of consanguinity or affinity.
6. **Chapter 176 Conflict of Interest Disclosure.** In accordance with Chapter 176 of the Texas Local Government Code, the Bidder:
- a. does not have an employment or other business relationship with any local government officer of OWNER or a family member of that officer that results in the officer or family member receiving taxable income;
 - b. has not given a local government officer of OWNER one or more gifts, other than gifts of food lodging transportation or entertainment accepted as a guest, that have an aggregate value of more than \$100 in the twelve-month period preceding the date the officer becomes aware of the execution of the Contract or that OWNER is considering doing business with the Bidder; and
 - c. does not have a family relationship with a local government officer of OWNER in the third degree of consanguinity or the second degree of affinity.

As required by Chapter 176, Bidder must file the Conflicts of Interest Questionnaire with the Purchasing Department no later than the seventh business day after the commencement of contract discussions or negotiations with the City or the submission of a Bid, response to a request for proposals, or other writing related to a potential contract with OWNER. The questionnaire must be updated not later than the seventh day after the date of an event that would make a statement in the questionnaire inaccurate or incomplete. There are statutory penalties for failure to comply with Chapter 176.

7. **Anti-Lobbying Ordinance.** On June 14, 2018, the Austin City Council adopted Ordinance No. 20180614-056 replacing Chapter 2.7, Article 6 of the City Code relating to Anti-Lobbying and Procurement. The policy defined in this Code applies to Solicitations for goods and/or services requiring City Council approval under City Charter Article VII, Section 15 (Purchase Procedures). The City requires Offerors submitting Offers on this Solicitation to certify that the Offeror has not in any way directly or indirectly had communication restricted in the ordinance section 2-7-104 during the No- Lobbying Period as defined in the Ordinance. The text of the City Ordinance is included in Section 00100 of this solicitation and is also posted on the Internet at:

https://assets.austintexas.gov/purchase/downloads/New_ALO_Ordinance_No_20180614-056.pdf

8. Pursuant to Texas Government Code §2271.002, the City is prohibited from contracting with any "company" for goods or services unless the following verification is included in this Contract.
- A. For the purposes of this Section only, the terms "company" and "boycott Israel" have the meaning assigned by Texas Government Code §2271.001.
 - B. If the Bidder qualifies as a "company," then Bidder verifies that it:
 - i. does not "boycott Israel"; and
 - ii. will not "boycott Israel" during the term of this Contract.
 - C. Bidder's obligations under this Section, if any exist, will automatically cease or be reduced to the extent that the requirements of Texas Government Code Chapter 2271 are subsequently repealed, reduced, or declared unenforceable

Bidding Requirements, Contract Forms and Conditions of the Contract

or invalid in whole or in part by any court or tribunal of competent jurisdiction or by the Texas Attorney General, without any further impact on the validity or continuity of this Contract.

9. Bidder certifies that it is aware of City Council Resolution No. 20191114-056, which prohibits the City from contracting with entities that engage in certain practices related to conversion therapy. By bidding and accepting this Contract, the Bidder agrees that: (1) its firm and its principals are not currently and will not during the term of the Contract engage in practicing LGBTQ+ conversion therapy; referring persons to a healthcare provider or other person or organization for LGBTQ+ conversion therapy; or contracting with another entity to conduct LGBTQ+ conversion therapy; and that (2) if the City determines in its sole discretion that Bidder has during the term of this Contract engaged in any such practices, the City may terminate this Contract without penalty to the City.

10. Pursuant to Texas Government Code Chapter 2274, Bidder certifies that if it has or will have remote or direct access to communication infrastructure systems, cybersecurity systems, the electric grid, hazardous waste treatment systems, or water treatment facilities as a result of any City contract, that Bidder is not:

A. owned by or the majority of stock or other ownership interest of its firm is not held or controlled by:

- i. individuals who are citizens of China, Iran, North Korea, Russia, or a Governor-designated country; or
- ii. a company or other entity, including a governmental entity, that is owned or controlled by citizens of or is directly controlled by the government of China, Iran, North Korea, Russia, or a Governor-designated country; or
- iii. headquartered in China, Iran, North Korea, Russia, or a Governor-designated country.

11. Pursuant to Texas Government Code Chapter 2274, Bidder certifies that, if it has 10 or more full-time employees, Bidder: (1) it does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association; and (2) will not discriminate during the term of the resulting contract against a firearm entity or firearm trade association.

12. Pursuant to Texas Government Code Chapter 2274, Bidder certifies that, if Bidder has 10 or more full-time employees, Bidder: (1) does not boycott energy companies; and (2) will not boycott energy companies during the term of the contract.

END

Bidding Requirements, Contract Forms and Conditions of the Contract

NONRESIDENT BIDDER PROVISIONS

Section 00475

Solicitation Number: _____ (to be filled in by Contractor)

Bidder must answer the following questions in accordance with Vernon's Texas Statutes and Codes Annotated Government Code § 2252.002, as amended:

- A. Is the bidder that is making and submitting this bid a "resident bidder" or a "nonresident bidder"?

Answer: _____

(1) Texas Resident Bidder - A bidder whose principal place of business is in Texas and includes a Contractor whose ultimate parent company or majority owner has its principal place of business in Texas.

(2) Nonresident Bidder - A bidder who is not a Texas Resident Bidder.

- B. If the Bidder is a "Nonresident Bidder", does the state, in which the Nonresident Bidder's principal place of business is located, have a law requiring a Nonresident Bidder of that state to bid a certain amount or percentage under the bid of a Resident Bidder of that state in order for the nonresident bidder of that state to be awarded a contract on his bid in such state?

Answer: Yes No Which state? _____

If the answer to Question B is "yes", then what amount or percentage must a Texas Resident Bidder bid under the bid price of a Resident Bidder of that state in order to be awarded a contract on such bid in said state?

Answer: _____

Bidding Requirements, Contract Forms and Conditions of the Contract

Contractor's full name and entity status:

(Name/Signature of Authorized Official)

Title

Date

END

Bidding Requirements, Contract Forms and Conditions of the Contract**AGREEMENT SECTION**

Section 00500

**STATE OF TEXAS
COUNTY OF TRAVIS**

THIS AGREEMENT is made and entered into by and between the City of Austin, Texas, a municipal corporation, organized and existing under the laws of the State of Texas, acting through its City Manager or other duly authorized designees, hereinafter referred to as the "OWNER," and Matous Construction Ltd, of the City of Belton, County of Bell, and the State of Texas, hereinafter referred to as the "CONTRACTOR."

In consideration of the promises, performances, payments, and agreements set forth herein CONTRACTOR hereby agrees to commence and complete the following Project:

Walnut Creek WWTP Gas Scrubber Systems Renewal

and all Work in accordance with the Project Manual, Drawings, and Addenda, which are incorporated herein by reference and made a part hereof and which have been prepared by Atkins North America Inc and approved by OWNER, and OWNER agrees to pay the CONTRACTOR the total amount of:

\$6,375,000.00	Six Million Three Hundred Seventy-Five Thousand Dollars
(Figures)	(Words)

The CONTRACTOR hereby agrees to commence work on the date specified in the written "Notice to Proceed" to be issued by the OWNER and to substantially complete construction of the improvements, as required by the Project Manual, Drawings, and Addenda for the Work within Three Hundred Sixty (360) Calendar Days. If a Substantial Completion date has been specified, the CONTRACTOR further agrees to reach Final Completion within Thirty (30) Calendar Days after Substantial Completion as required by the Project Manual, Drawings, and Addenda for the work. Waiver of any breach of this Contract shall not constitute waiver of any subsequent breach.

In consideration of the award and execution of this Contract, and in consideration of the waiver of its right to attorney's fees by the OWNER, the CONTRACTOR knowingly and intentionally waives its right to attorney's fees under Section 271.153 of the Texas Local Government Code in any administrative proceeding, alternative dispute resolution proceeding, or litigation arising out of or connected to this Contract.

OWNER agrees to pay CONTRACTOR from available funds for the performance of the Contract in accordance with the Bid and the provisions of the Contract Documents, subject to additions and deductions, as provided therein.

The OWNER's payment obligations are payable only and solely from funds available for the purposes of this Agreement.

Although drafted by OWNER, this Agreement, in event of any disputes over its meaning or application, shall be interpreted fairly and reasonably, and neither more strongly for nor against either party.

This Agreement is executed to be effective upon the date of the last party to sign.

Bidding Requirements, Contract Forms and Conditions of the Contract

The undersigned, by their signature, represents that they are authorized to bind the Contractor to fully comply with the Contract. The Contractor, by signing below, acknowledge that they have read the entire contract and agree to be bound by the terms contained herein.

OWNER

By: Garrett Cox
29BBB9476405425...
12/14/2022 (Signature)

Date
Procurement Manager
Title of Signatory

DS
MDW 12/14/2022 Procurement Supervisor

CONTRACTOR

By: Bruce Matous
5FFF9B5BD7B6412...
12/1/2022 (Signature)

Date
Bruce Matous
Printed Name of Signatory

Title of Signatory, Authorized Rep

ATTEST (as applicable)

***Corporate Secretary of Corporate Bidder or Corporate General Partner**

END

Performance Bond/ 00610

PERFORMANCE BOND
Section 00610

STATE OF TEXAS
COUNTY OF Travis

Bond No. 107730801
C.I.P. ID No. #CLMC940

Project Name: Walnut Creek WWTP Gas Scrubber Systems Renewal

Know All Men By These Presents: That Matous Construction Ltd of the City of Belton, County of Bell, and State of Texas, as Principal, and Travelers Casualty and Surety Company of America, a solvent company authorized under laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto City of Austin (OWNER), in the penal sum of Six Million Three Hundred Seventy-Five Thousand U.S. Dollars (\$6,375,000.00 U.S.) for payment whereof, well and truly to be made, said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, by these presents:

Conditions of this Bond are such that, whereas, Principal has entered a certain written contract with OWNER, dated the 15th day of November 2022, which Agreement is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

Now, therefore, the condition of this obligation is such, that if said Principal shall faithfully perform said Agreement and shall in all respects duly and faithfully observe and perform all and singular covenants, conditions and agreements in and by said contract agreed and covenanted by Principal to be observed and performed, and according to the true intent and meaning of said Agreement hereto annexed, then this obligation shall be void; otherwise to remain in full force and effect. If OWNER notifies Principal and Surety the OWNER is considering declaring Principal in default, Surety agrees to meet with OWNER and Principal no later than fifteen days after receipt of such notice to discuss methods of performing the Work of the Contract.

Provided, however, that this bond is executed pursuant to provisions of Chapter 2253, Texas Government Code as amended, and all liabilities on this bond shall be determined in accordance with provisions of said Article to the same extent as if it were copied at length herein.

Surety, for value received, stipulates, and agrees that no change in Contract Time or Contract Amount shall in anywise affect its obligation on this bond, and it does hereby waive notice of any such change in Contract Time or Contract Amount.

In witness whereof, said Principal and Surety have signed and sealed this instrument this 21st day of November, 2022.

Matous Construction, Ltd.

Travelers Casualty and Surety Company of America

Principal

Surety

By 

By 

(Signature) Bruce A. Matous

(Signature) Emily Mikeska

Title CEO

Title Attorney-In-Fact

Address 8602 Hwy 317
Belton, TX 76513

Address 1023 Canyon Creek Dr. Suite 110
Temple, TX 76502

Performance Bond / 00610

Telephone 254-899-8681 Fax _____
E-Mail Address emikeska@ward-moore.com

Name and address of Resident Agent of Surety:

John R. Ward, Ward & Moore Insurance Services, P. O. Box 179, Gatesville, TX 76528

Note: Bond shall be issued by a solvent surety company authorized to do business in Texas, and shall meet any other requirements established by law or by OWNER pursuant to applicable law. A copy of the surety agent's "Power of Attorney" must be attached hereto.

END



**Travelers Casualty and Surety Company of America
Travelers Casualty and Surety Company
St. Paul Fire and Marine Insurance Company**

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company are corporations duly organized under the laws of the State of Connecticut (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint **Emily Mikeska** of **TEMPLE**, **Texas**, their true and lawful Attorney(s)-in-Fact to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed, and their corporate seals to be hereto affixed, this **21st** day of **April**, **2021**.



State of Connecticut

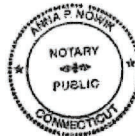
City of Hartford ss.

By: 
Robert L. Raney, Senior Vice President

On this the **21st** day of **April**, **2021**, before me personally appeared **Robert L. Raney**, who acknowledged himself to be the Senior Vice President of each of the Companies, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of said Companies by himself as a duly authorized officer.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

My Commission expires the **30th** day of **June**, **2026**




Anna P. Nowik, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of each of the Companies, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, **Kevin E. Hughes**, the undersigned, Assistant Secretary of each of the Companies, do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which remains in full force and effect.

Dated this **21st** day of **November**, **2022**




Kevin E. Hughes, Assistant Secretary

**To verify the authenticity of this Power of Attorney, please call us at 1-800-421-3880.
Please refer to the above-named Attorney(s)-in-Fact and the details of the bond to which this Power of Attorney is attached.**

IMPORTANT NOTICE

To obtain information or make a complaint:

You may call Travelers Casualty and Surety Company of America and its affiliates' toll-free telephone number for information or to make a complaint at:

1-800-328-2189

You may contact the Texas Department of Insurance to obtain information on companies, coverages, rights or complaints at:

1-800-252-3439

You may write the Texas Department of Insurance:

P. O. Box 149104
Austin, TX 78714-9104
Fax: (512) 475-1771
Web: <http://www.tdi.state.tx.us>
E-mail: ConsumerProtection@tdi.state.tx.us

PREMIUM OR CLAIM DISPUTES:

Should you have a dispute concerning your premium or about a claim you should contact your Agent or Travelers first. If the dispute is not resolved, you may contact the Texas Department of Insurance.

ATTACH THIS NOTICE TO YOUR BOND:

This notice is for information only and does not become a part or condition of the attached document and is given to comply with Texas legal and regulatory requirements.

Bidding Requirements, Contract Forms and Conditions of the Contract

PAYMENT BOND
Section 00620

STATE OF TEXAS
COUNTY OF Travis

Bond No. 107730801
C.I.P. ID No. #CLMC940

Project Name: Walnut Creek WWTP Gas Scrubber Systems Renewal

Know All Men By These Presents: That **Matous Construction Ltd** of the City of **Belton**, County of **Bell**, and the State of **Texas** as Principal, and Travelers Casualty and Surety Company of America, a solvent company authorized under laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto **City of Austin** (OWNER), and all Subcontractors, workers, laborers, mechanics, and suppliers as their interests may appear, all of whom shall have right to sue upon this bond in the penal sum of Six Million Three Hundred Seventy-Five Thousand U.S. Dollars (\$6,375,000.00 U.S.) for payment whereof, well and truly to be made, said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, by these presents:

Conditions of this Bond are such that, whereas, Principal has entered a certain written contract with OWNER, dated the 15th day of November 2022, which Agreement is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

Now, therefore, the condition of this obligation is such, that if the said Principal shall well and truly pay all Subcontractors, workers, laborers, mechanics, and suppliers, all monies to them owing by said Principals for subcontracts, work, labor, equipment, supplies, and materials done and furnished for the construction of improvement of said Agreement, then this obligation shall be and become null and void; otherwise to remain in full force and effect.

Provided, however, that this bond is executed pursuant to provisions of Chapter 2253, Texas Government Code as amended, and all liabilities on this bond shall be determined in accordance with provisions of said Article to the same extent as if it were copied at length herein.

Surety, for value received, stipulates, and agrees that no change in Contract Time or Contract Amount shall in anywise affect its obligation on this bond, and it does hereby waive notice of any such change in Contract Time or Contract Amount.

In witness whereof, said Principal and Surety have signed and sealed this instrument this 21st day of November, 2022.

Matous Construction Ltd
Principal
By 
(Signature) Bruce A. Matous
Title CEO

Travelers Casualty and Surety Company of America
Surety
By 
(Signature) Emily Mikeska
Title Attorney-In-Fact

Bidding Requirements, Contract Forms and Conditions of the Contract

Address 8602 Hwy 317
Belton, TX 76513

Address 1023 Canyon Creek Dr. Suite 110
Temple, TX 76502

Telephone 254-899-8681 Fax _____

E-Mail Address emikeska@ward-moore.com

Name and address of Resident Agent of Surety:

John R. Ward, Ward & Moore Insurance Services, P. O. Box 179, Gatesville, TX 76528

Note: Bond shall be issued by a solvent Surety company authorized to do business in Texas and shall meet any other requirements established by law or by OWNER pursuant to applicable law. A copy of surety agent's "Power of Attorney" must be attached hereto.

END



**Travelers Casualty and Surety Company of America
Travelers Casualty and Surety Company
St. Paul Fire and Marine Insurance Company**

POWER OF ATTORNEY

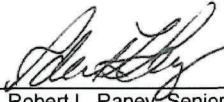
KNOW ALL MEN BY THESE PRESENTS: That Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, and St. Paul Fire and Marine Insurance Company are corporations duly organized under the laws of the State of Connecticut (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint **Emily Mikeska** of **TEMPLE, Texas**, their true and lawful Attorney(s)-in-Fact to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed, and their corporate seals to be hereto affixed, this **21st** day of **April, 2021**.



State of Connecticut

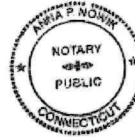
City of Hartford ss.

By: 
Robert L. Raney, Senior Vice President

On this the **21st** day of **April, 2021**, before me personally appeared **Robert L. Raney**, who acknowledged himself to be the Senior Vice President of each of the Companies, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of said Companies by himself as a duly authorized officer.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

My Commission expires the **30th** day of **June, 2026**




Anna P. Nowik, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of each of the Companies, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, any Assistant Secretary, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, **Kevin E. Hughes**, the undersigned, Assistant Secretary of each of the Companies, do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which remains in full force and effect.

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Kevin E. Hughes, Assistant Secretary

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You may write the Texas Department of Insurance:

P. O. Box 149104

Austin, TX 78714-9104

Fax: (512) 475-1771

Web: <http://www.tdi.state.tx.us>

E-mail: ConsumerProtection@tdi.state.tx.us

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Bidding Requirements, Contract Forms and Conditions of the Contract

NON-DISCRIMINATION AND NON-RETALIATION CERTIFICATE

Section 00630

**City of Austin, Texas
Equal Employment/Fair Housing Office**

To: City of Austin, Texas, ("OWNER")

Our firm conforms to the Code of the City of Austin Section 5-4-2 as reiterated below:

Chapter 5-4. Discrimination in Employment by City Contractors.

Sec. 4-2 Discriminatory Employment Practices Prohibited. (B) As an Equal Employment Opportunity (EEO) employer, the Contractor will conduct its personnel activities in accordance with established federal, state and local EEO laws and regulations and agrees:

- (1) Not to engage in any discriminatory employment practice defined in this chapter.
- (2) To take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without discrimination being practiced against them as defined in this chapter. Such affirmative action shall include, but not be limited to: all aspects of employment, including hiring, placement, upgrading, transfer, demotion, recruitment, recruitment advertising; selection for training and apprenticeship, rates of pay or other forms of compensation, and layoff or termination.
- (3) To post in conspicuous places, available to employees and applicants for employment, notices to be provided by OWNER setting forth the provisions of this chapter.
- (4) To state in all solicitations or advertisements for employees placed by or on behalf of Contractor, that all qualified applicants will receive consideration for employment without regard to race, creed, color, religion, national origin, sexual orientation, gender identity, disability, veteran status, sex or age.
- (5) To obtain a written statement from any labor union or labor organization furnishing labor or service to Contractors in which said union or organization has agreed not to engage in any discriminatory employment practices as defined in this chapter and to take affirmative action to implement policies and provisions of this chapter.
- (6) To cooperate fully with OWNER's Equal Employment/Fair Housing Office in connection with any investigation or conciliation effort of said Equal Employment/Fair Housing Office to ensure that the purpose of the provisions against discriminatory employment practices are being carried out.
- (7) To require compliance with provisions of this chapter by all subcontractors having fifteen or more employees who hold any subcontract providing for expenditure of \$2,000.00 or more in connection with any contract with OWNER subject to the terms of this chapter.

Bidding Requirements, Contract Forms and Conditions of the Contract

For the purposes of this Bid and any resulting Contract, Contractor adopts the provisions of the City's Minimum Standard Nondiscrimination and Non-Retaliation Policy as set forth below.

City of Austin

Minimum Standard Non-Discrimination and Non-Retaliation in Employment Policy

As an Equal Employment Opportunity (EEO) employer, the Contractor will conduct its personnel activities in accordance with established federal, state and local EEO laws and regulations.

The Contractor will not discriminate against any applicant or employee based on race, creed, color, national origin, sex, age, religion, veteran status, gender identity, disability, or sexual orientation. This policy covers all aspects of employment, including hiring, placement, upgrading, transfer, demotion, recruitment, recruitment advertising, selection for training and apprenticeship, rates of pay or other forms of compensation, and layoff or termination.

The Contractor agrees to prohibit retaliation, discharge or otherwise discrimination against any employee or applicant for employment who has inquired about, discussed or disclosed their compensation.

Further, employees who experience discrimination, sexual harassment, or another form of harassment should immediately report it to their supervisor. If this is not a suitable avenue for addressing their complaint, employees are advised to contact another member of management or their human resources representative. No employee shall be discriminated against, harassed, intimidated, nor suffer any reprisal as a result of reporting a violation of this policy. Furthermore, any employee, supervisor, or manager who becomes aware of any such discrimination or harassment should immediately report it to executive management or the human resources office to ensure that such conduct does not continue.

Contractor agrees that to the extent of any inconsistency, omission, or conflict with its current non-discrimination and non-retaliation employment policy, the Contractor has expressly adopted the provisions of the City's Minimum Non-Discrimination Policy contained in Section 5-4-2 of the City Code as set forth above and the City's Non-Retaliation Policy, as the Contractor's Non-Discrimination and Non-Retaliation Policy or as an amendment to such Policy and such provisions are intended to not only supplement the Contractor's policy, but will also supersede the Contractor's policy to the extent of any conflict.

*UPON CONTRACT AWARD, THE CONTRACTOR SHALL PROVIDE A COPY TO THE CITY OF THE CONTRACTOR'S NON-DISCRIMINATION AND NON-RETALIATION POLICY ON COMPANY LETTERHEAD, WHICH CONFORMS IN FORM, SCOPE, AND CONTENT TO THE CITY'S MINIMUM NON-DISCRIMINATION AND NON-RETALIATION POLICY, AS SET FORTH HEREIN, **OR** THIS NON-DISCRIMINATION AND NON-RETALIATION POLICY, WHICH HAS BEEN ADOPTED BY THE CONTRACTOR FOR ALL PURPOSES (THE FORM OF WHICH HAS BEEN APPROVED BY THE CITY'S EQUAL EMPLOYMENT/FAIR HOUSING OFFICE), WILL BE CONSIDERED THE CONTRACTOR'S NON-DISCRIMINATION AND NON-RETALIATION POLICY WITHOUT THE REQUIREMENT OF A SEPARATE SUBMITTAL.*

(<http://austintexas.gov/page/bid-docs>).

Sanctions:

Our firm understands that non-compliance with Chapter 5-4 may result in sanctions, including termination of the contract and suspension or debarment from participation in future City contracts until deemed compliant with the requirements of Chapter 5-4.

Bidding Requirements, Contract Forms and Conditions of the Contract

Term:

The Contractor agrees that this Section 00630 Non-Discrimination and Non-Retaliation Certificate or the Contractor's separate conforming policy, which the Contractor has executed and filed with the Owner, will remain in force and effect for one year from the date of filing. The Contractor further agrees that, in consideration of the receipt of continued Contract payments, the Contractor's Non-Discrimination Policy will automatically renew from year-to-year for the term of the underlying Contract.

END

Bidding Requirements, Contract Forms and Conditions of the Contract**TITLE VI ASSURANCES APPENDIX A**

Section 00631

Solicitation Number: CLMC940 (to be filled in by Contractor)

During the performance of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. Compliance with Regulations: The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Nondiscrimination in Federally assisted programs of the U.S. Department of Transportation, the Federal Highway Administration, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. Nondiscrimination: The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate either directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 C.F.R. part 21.
3. Solicitations for Subcontracts, Including Procurements of Materials and Equipment: In all solicitations, either by competitive bidding or negotiation made by the contract for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Nondiscrimination on the grounds of race, color, or national origin.
4. Information and Reports: The contractor shall provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its book, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the Federal Highway Administration to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information the contractor will so certify to the Recipient, or the Federal Highway Administration, as appropriate, and will set forth what efforts it has made to obtain the information.
5. Sanctions for Noncompliance: In the event of the contractor's noncompliance with the Nondiscrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to:
 - (a) withholding of payments to the contractor under the contract until the contractor complies, and or
 - (b) cancelling, terminating or suspending a contract, in whole or in part.

Bidding Requirements, Contract Forms and Conditions of the Contract

- 6. Incorporation of Provisions: The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for non-compliance: Provided, that if a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

(Source: DOT 1050.2A, Updated DOT Standard Title VI Assurances and Non-Discrimination Provisions 10/22/2013. Must be inserted into every contract/agreement regardless of funding sources.)

Contractor's full name and entity status:

Matous Construction, Ltd.

Bruce A. Matous



(Name/Signature of Authorized Official)

CEO

Title

September 6, 2022

Date

END

Bidding Requirements, Contract Forms and Conditions of the Contract**TITLE VI ASSURANCES APPENDIX E**

Section 00632

Solicitation Number: CLMC940 (to be filled in by Contractor)

During the performance of this contract, the contractor (hereinafter includes consultants), for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following nondiscrimination statutes and authorities; including but not limited to:

Pertinent Nondiscrimination Authorities:

1. Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 C.F.R. Part 21.
2. The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
3. Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);
4. Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 C.F.R. Part 27;
5. The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);
6. Airport and Airway Improvement Act of 1982, (49 U.S.C. § 4 71, Section 4 7123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
7. The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, subrecipients and contractors, whether such programs or activities are Federally funded or not);
8. Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
9. The Federal Aviation Administration's Nondiscrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
10. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures nondiscrimination against minority populations by discouraging programs, policies, and activities with

Bidding Requirements, Contract Forms and Conditions of the Contract

disproportionately high and adverse human health or environmental effects on minority and low-income populations;

11. Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP).
12. To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
13. Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

(Source: DOT 1050.2A, Updated DOT Standard Title VI Assurances and Non-Discrimination Provisions 10/22/2013. Must be inserted into every contract/agreement regardless of funding sources.)

Contractor's full name and entity status:

Matous Construction, Ltd.

Bruce A. Matous



(Name/Signature of Authorized Official)

CEO

Title

September 6, 2022

Date

END

Bidding Requirements, Contract Forms and Conditions of the Contract
CERTIFICATE OF INSURANCE
Section 00650

This Certificate shall be completed by a licensed insurance agent:

Name and Address of Agency:
Ward & Moore Insurance Services

1023 Canyon Creek Drive, Suite 110
Temple, TX 76502

Phone: 254-771-5700/ _____

Name and Address of Insured:
Matous Construction, Ltd.
8602 North Highway 317
Belton, TX 76513
Phone: 254-780-1400 / 254-780-2599

Prime or Sub-Contractor?: Prime

Name of Prime Contractor, if different from Insured: _____

City of Austin Reference: CLMC940
Project Name: Walnut Creek WWTP Gas Scrubber Systems Renewal
C.I.P. No.: 3023.066
Project Location: Walnut Creek
Managing Dept.: Public Works

Managing Dept.:

Contract No.:
Project Mgr.: Gabriel Castano

Insurers Affording Coverages:

Insurer A: Cincinnati Insurance Company

Insurer B: Travelers Property Casualty Company of America

Insurer C: Texas Mutual Insurance Company

Insurer D: Hanover Insurance Company

Insurer E: Indian Harbor Insurance Company

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YYYY)	POLICY EXPIRATION DATE (MM/DD/YYYY)	LIMITS OF LIABILITY	
A	Commercial General Liability Policy	EPP 0471570	01/12/2021	01/12/2024	Each Occurrence	\$ 1,000,000
	As defined in the Policy, does the Policy provide:				General Aggregate	\$ 2,000,000
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Completed Operations/Products				Completed Operations /Products Aggregate	\$ 2,000,000
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Contractual Liability				Personal & Advertising Injury	\$ 1,000,000
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Explosion				Deductible or Self Insured Retention	\$ 0
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Collapse					
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Underground					
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Contractors/ Subcontractors Work					
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Aggregate Limits per Project Form CG 2503					
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Additional Insured Form – CG 2010 and CG2037					
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- 30 Day Notice of Cancellation Form – CG 0205					
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Waiver of Subrogation Form – CG 2404						
E	Pollution/ Environmental Impairment Policy	PEC 004910005	01/12/2022	01/12/2023	Occurrence	\$ 2,000,000
					Aggregate	\$ 2,000,000

Certificate of Insurance / 00650

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YYYY)	POLICY EXPIRATION DATE (MM/DD/YYYY)	LIMITS OF LIABILITY	
A	Auto Liability Policy As defined in the Policy, does the Policy provide:	EBA 0471570	01/12/2022	01/12/2023	CSL	\$ 1,000,000
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Any Auto				Bodily Injury (Per Accident)	\$
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- All Owned Autos				Bodily Injury (Per Person)	\$
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Non-Owned Autos				Property Damage (Per Accident)	\$
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Hired Autos					
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Waiver of Subrogation – CA0444					
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- 30 Day Notice of Cancellation – CA0244					
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Additional Insured – CA2048					
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No -- MCS 90						
B	Excess Liability <input checked="" type="checkbox"/> Umbrella Form <input type="checkbox"/> Excess Liability Follow Form	EXS 0603016	01/12/2022	01/12/2023	Occurrence	\$5,000,000
					Aggregate	\$5,000,000
C	Workers Compensation and Employers Liability As defined in the Policy, does the Policy provide:	0002008328	01/12/2022	01/12/2023	<input checked="" type="checkbox"/> Statutory	
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Waiver of Subrogation – WC420304				Each Accident	\$ 1,000,000
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- 30 Day Notice of Cancellation – WC420601				Disease – Policy Limit	\$ 1,000,000
D	Is a Builders Risk or Installation Insurance Policy provided? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	IHD A88886706	01/12/2022	01/12/2023	Jobsite Limit	\$6,375,000
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- Is the City shown as loss payee/mortgagee?				Temporary Storage	\$500,000
E	Professional Liability As defined in the Policy, does the Policy provide:	PEC004910005	01/12/2022	01/12/2023	Transit	\$500,000
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No -- 30 Day Notice of Cancellation Retroactive Date: <u>01/12/2015</u>				Deductible	\$10,000
					Each Claim/Aggregate	\$ 2,000,000
					Deductible or Self Insured Retention	\$ 10,000

This form is for informational purposes only and certifies that policies of insurance listed above have been issued to insured named above and are in force at this time. Notwithstanding any requirements, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain, insurance afforded by policies described herein is subject to all terms, exclusions and conditions of such policies.

CERTIFICATE HOLDER:DATE ISSUED: 11/18/2022

City of Austin
Capital Contracting Office
P.O. Box 1088
Austin, Texas 78767



AUTHORIZED REPRESENTATIVE SIGNATURE
Licensed Insurance Agent

END

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

CANCELLATION OR NONRENEWAL BY US NOTIFICATION TO A DESIGNATED ENTITY

This endorsement modifies insurance provided under the following:

**BUSINESSOWNERS PACKAGE POLICY
CLAIMS-MADE EXCESS LIABILITY COVERAGE PART
COMMERCIAL AUTO COVERAGE PART
COMMERCIAL GENERAL LIABILITY COVERAGE PART
COMMERCIAL UMBRELLA LIABILITY COVERAGE PART
DENTIST'S PACKAGE POLICY
ELECTRONIC DATA LIABILITY COVERAGE PART
EXCESS LIABILITY COVERAGE PART
LIQUOR LIABILITY COVERAGE PART
OWNERS AND CONTRACTORS PROTECTIVE LIABILITY COVERAGE PART
POLLUTION LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS COVERAGE PART
PRODUCT WITHDRAWAL COVERAGE PART
PROFESSIONAL LIABILITY COVERAGE PART
PROFESSIONAL UMBRELLA LIABILITY COVERAGE PART
PROFESSIONAL UMBRELLA LIABILITY COVERAGE PART - CLAIMS-MADE
RAILROAD PROTECTIVE LIABILITY COVERAGE PART
UNDERGROUND STORAGE TANK POLICY**

SCHEDULE

Name and mailing address of person(s) or organization(s):

1. FOR WHOM YOU ARE REQUIRED IN A WRITTEN CONTRACT THAT WAS EXECUTED ON OR AFTER THE EARLIER OF THE FOLLOWING DATES: A. THE EFFECTIVE DATE OF THIS POLICY, OR B. THE EFFECTIVE DATE OF THE ORIGINAL POLICY OF WHICH THIS POLICY IS A RENEWAL OR REPLACEMENT, AND 2. FOR WHOM YOU ARE REQUIRED IN THAT SAME WRITTEN CONTRACT AS REFERRED TO IN 1. ABOVE TO PROVIDE CANCELLATION NOTICE.

Number of days notice (other than nonpayment of premium): 30

- A.** If we cancel or nonrenew this policy for any statutorily permitted reason other than nonpayment of premium we will mail notice to the person or organization shown in the Schedule. We will mail such notice at least the number of days shown in the Schedule before the effective date of cancellation or nonrenewal.
- B.** If we cancel this policy for nonpayment of premium, we will mail notice to the person or organization shown in the Schedule. We will mail such notice at least 10 days before the effective date of cancellation.
- C.** If notice is mailed, proof of mailing to the mailing address shown in the Schedule will be sufficient proof of notice.
- D.** In no event will coverage extend beyond the actual expiration, termination or cancellation of the policy.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

CinciPlus®
BUSINESS AUTO XC+®
(EXPANDED COVERAGE PLUS)
ENDORSEMENT

This endorsement modifies insurance provided by the following:

BUSINESS AUTO COVERAGE FORM

With respect to the coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by this endorsement.

A. Blanket Waiver of Subrogation

SECTION IV - BUSINESS AUTO CONDITIONS, A. Loss Conditions, 5. Transfer of Rights of Recovery Against Others to Us is amended by the addition of the following:

We waive any right of recovery we may have against any person or organization because of payments we make for "bodily injury" or "property damage" arising out of the operation of a covered "auto" when you have assumed liability for such "bodily injury" or "property damage" under an "insured contract", provided the "bodily injury" or "property damage" occurs subsequent to the execution or the "insured contract".

B. Noncontributory Insurance

SECTION IV - BUSINESS AUTO CONDITIONS, B. General Conditions, 5. Other Insurance c. is deleted in its entirety and replaced by the following:

- c. Regardless of the provisions of Paragraph a. above, this Coverage Form's Liability Coverage is primary and we will not seek contribution from any other insurance for any liability assumed under an "insured contract" that requires liability to be assumed on a primary noncontributory basis.

C. Additional Insured by Contract

SECTION II - LIABILITY COVERAGE, A. Coverage, 1. Who is an Insured is amended to include as an insured any person or organization for whom you have agreed in a valid written contract to provide insurance as afforded by this policy.

This provision is limited to the scope of the valid written contract.

This provision does not apply unless the valid written contract has been:

- 1. Executed prior to the accident causing "bodily injury" or "property damage"; and
- 2. Is still in force at the time of the "accident" causing "bodily injury" or "property damage".

D. Employee Hired Auto

1. Changes in Liability Coverage

The following is added to the **SECTION II - LIABILITY COVERAGE, A. Coverage, 1. Who is an Insured**:

An "employee" of yours is an "insured" while operating an "auto" hired or rented under a contract or agreement in that "employee's" name, with your permission, while performing duties related to the conduct of your business.

2. Changes in General Conditions

SECTION IV - BUSINESS AUTO CONDITIONS, B. General Conditions, 5. Other Insurance is deleted in its entirety and replaced by the following:

- b. For Hired Auto Physical Damage Coverage the following are deemed to be covered "autos" you own:

- (1) Any covered "auto" you lease, hire, rent or borrow; and
- (2) Any covered "auto" hired or rented by your "employee" under a contract in that individual "employee's" name, with your permission, while performing duties related to the conduct of your business.

However, any "auto" that is leased, hired, rented or borrowed with a driver is not a covered "auto".

E. Audio, Visual and Data Electronic Equipment

SECTION III - PHYSICAL DAMAGE COVERAGE, C. Limit of Insurance is amended by adding the following:

4. The most we will pay for all "loss" to audio, visual or data electronic equipment and any accessories used with this equipment as a result of any one "accident" is the lesser of:
 - a. The actual cash value of the damaged or stolen property as of the time of the "accident";
 - b. The cost of repairing or replacing the damaged or stolen property with other property of like kind and quality; or
 - c. \$2,500.

Provided the equipment, at the time of the "loss" is:

- a. Permanently installed in or upon the covered "auto" in a housing, opening or other location that is not normally used by the "auto" manufacturer for the installation of such equipment;
- b. Removable from a permanently installed housing unit as described in Paragraph 2.a. above; or
- c. An integral part of such equipment.

F. Who is an Insured - Amended

SECTION II - LIABILITY COVERAGE, A. Coverage, 1. Who is an Insured is amended by adding the following:

The following are "insureds":

1. Any subsidiary which is a legally incorporated entity of which you own a financial interest of more than 50% of the voting stock on the effective date of this coverage form.

However, the insurance afforded by this provision does not apply to any subsidiary that is an "insured" under any other automobile liability policy or would be an "insured" under such policy but for termination of such policy or the exhaustion of such policy's limits of insurance.

2. Any organization that is newly acquired or formed by you and over which you maintain majority ownership. The insurance provided by this provision:

- a. Is effective on the date of acquisition or formation, and is afforded for 180 days after such date;
 - b. Does not apply to "bodily injury" or "property damage" resulting from an "accident" that occurred before you acquired or formed the organization;
 - c. Does not apply to any newly acquired or formed organization that is a joint venture or partnership; and
 - d. Does not apply to an insured under any other automobile liability policy or would be an insured under such a policy but for the termination of such policy or the exhaustion of such policy's limits of insurance.
3. Any of your "employees" while using a covered "auto" in your business or your personal affairs, provided you do not own, hire or borrow that "auto".

G. Liability Coverage Extensions - Supplementary Payments - Higher Limits

SECTION II - LIABILITY COVERAGE, A. Coverage, 2. Coverage Extensions, a. Supplementary Payments is amended by:

1. Replacing the \$2,000 Limit of Insurance for bail bonds with \$4,000 in (2); and
2. Replacing the \$250 Limit of Insurance for reasonable expenses with \$500 in (4).

H. Amended Fellow Employee Exclusion

SECTION II - LIABILITY COVERAGE, B. Exclusions, 5. Fellow Employee is modified as follows:

Exclusion 5. **Fellow Employee** is deleted.

I. Hired Auto - Physical Damage

If hired "autos" are covered "autos" for Liability Coverage, then Comprehensive and Collision Physical Damage Coverages as provided under **SECTION III - PHYSICAL DAMAGE COVERAGE** of this Coverage Part are extended to "autos" you hire, subject to the following:

1. The most we will pay for "loss" to any hired "auto" is \$50,000 or the actual cash value or cost to repair or replace, whichever is the least, minus a deductible.
2. The deductible will be equal to the largest deductible applicable to any owned "auto" for that coverage, or \$1,000, whichever is less.
3. Hired Auto - Physical Damage coverage is excess over any other collectible insurance.

4. Subject to the above limit, deductible, and excess provisions we will provide coverage equal to the broadest coverage applicable to any covered "auto" you own insured under this policy.

Coverage includes loss of use of that hired auto, provided it results from an "accident" for which you are legally liable and as a result of which a monetary loss is sustained by the leasing or rental concern. The most we will pay for any one "accident" is \$3,000.

If a limit for Hired Auto - Physical Damage is shown in the Schedule, then that limit replaces, and is not added to, the \$50,000 limit indicated above and the deductibles shown in the Schedule are applicable.

J. Rental Reimbursement

SECTION III - PHYSICAL DAMAGE COVERAGE is amended by adding the following:

1. We will pay for rental reimbursement expenses incurred by you for the rental of an "auto" because of a "loss" to a covered "auto". Payment applies in addition to the otherwise applicable amount of each coverage you have on a covered "auto". No deductible applies to this coverage.
2. We will pay only for those expenses incurred during the policy period beginning 24 hours after the "loss" and ending, regardless of the policy's expiration, with the lesser of the following number of days:
 - a. The number of days reasonably required to repair the covered "auto". If "loss" is caused by theft, this number of days is added to the number of days it takes to locate the covered "auto" and return it to you; or
 - b. 30 days.
3. Our payment is limited to the lesser of the following amounts:
 - a. Necessary and actual expenses incurred; or
 - b. \$50 per day.
4. This coverage does not apply while there are spare or reserve "autos" available to you for your operations.
5. We will pay under this coverage only that amount of your rental reimbursement expenses which is not already provided for under **SECTION III - PHYSICAL DAMAGE COVERAGE, A. Coverage, 4. Coverage Extensions**.

K. Transportation Expense - Higher Limits

SECTION III - PHYSICAL DAMAGE COVERAGE, A. Coverage, 4. Coverage Extensions is amended by replacing \$20 per day with \$50 per day, and \$600 maximum with \$1,500 maximum in **Extension a. Transportation Expenses**.

L. Airbag Coverage

SECTION III - PHYSICAL DAMAGE COVERAGE, B. Exclusions, 3.a. is amended by adding the following:

However, the mechanical and electrical breakdown portion of this exclusion does not apply to the accidental discharge of an airbag. This coverage for airbags is excess over any other collectible insurance or warranty.

M. Loan or Lease Gap Coverage

1. **SECTION III - PHYSICAL DAMAGE COVERAGE, C. Limit of Insurance** is deleted in its entirety and replaced by the following, but only for private passenger type "autos" with an original loan or lease, and only in the event of a "total loss" to such a private passenger type "auto":
 - a. The most we will pay for "loss" in any one "accident" is the greater of:
 - (1) The amount due under the terms of the lease or loan to which your covered private passenger type "auto" is subject, but will not include:
 - (a) Overdue lease or loan payments;
 - (b) Financial penalties imposed under the lease due to high mileage, excessive use or abnormal wear and tear;
 - (c) Security deposits not refunded by the lessor;
 - (d) Costs for extended warranties, Credit Life Insurance, Health, Accident or Disability Insurance purchased with the loan or lease; and
 - (e) Carry-over balances from previous loans or leases, or
 - (2) Actual cash value of the stolen or damaged property.
 - b. An adjustment for depreciation and physical condition will be made in determining actual cash value at the time of "loss".

2. **SECTION V - DEFINITIONS** is amended by adding the following, but only for the purposes of this **Loan or Lease Gap Coverage**:

"Total loss" means a "loss" in which the cost of repairs plus the salvage value exceeds the actual cash value.

N. Glass Repair - Waiver of Deductible

SECTION III - PHYSICAL DAMAGE COVERAGE, D. Deductible is amended by adding the following:

No deductible applies to glass damage if the glass is repaired in a manner acceptable to us rather than replaced.

O. Duties in the Event of an Accident, Claim, Suit or Loss - Amended

SECTION IV - BUSINESS AUTO CONDITIONS, A. Loss Conditions, 2. Duties in the Event of Accident, Claim, Suit or Loss, a. is amended by adding the following:

This condition applies only when the "accident" or "loss" is known to:

1. You, if you are an individual;
2. A partner, if you are a partnership;
3. An executive officer or insurance manager, if you are a corporation; or
4. A member or manager, if you are a limited liability company.

P. Unintentional Failure to Disclose Hazards

SECTION IV - BUSINESS AUTO CONDITIONS, B. General Conditions, 2. Concealment, Misrepresentation or Fraud is amended by adding the following:

However, if you unintentionally fail to disclose any hazards existing on the effective date of this Coverage Form, we will not deny coverage under this Coverage Form because of such failure.

Q. Mental Anguish Resulting from Bodily Injury

SECTION V - DEFINITIONS, C. "Bodily injury" is deleted in its entirety and replaced by the following:

"Bodily injury" means bodily injury, sickness or disease sustained by a person, including mental anguish and death sustained by the same person that results from such bodily injury, sickness or disease. "Bodily injury" does not include mental anguish or death that does not result from bodily injury, sickness or disease.

R. Coverage for Certain Operations in Connection with Railroads

With respect to the use of a covered "auto" in operations for or affecting a railroad:

1. **SECTION V - DEFINITIONS, H. "Insured contract", 1.c.** is deleted in its entirety and replaced by the following:
 - c. An easement or license agreement;
2. **SECTION V - DEFINITIONS, H. "Insured contract", 2.a.** is deleted.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

CONTRACTORS ADDITIONAL INSURED - AUTOMATIC STATUS AND AUTOMATIC WAIVER OF SUBROGATION WHEN REQUIRED IN WRITTEN CONTRACT, AGREEMENT, PERMIT OR AUTHORIZATION

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

A. Additional Insured - Owners, Lessees Or Contractors - Automatic Status For Other Parties When Required In Written Contract Or Agreement With You

1. Section II - Who Is An Insured is amended to include as an additional insured any person or organization you have agreed in writing in a contract or agreement to add as an additional insured on this Coverage Part. Such person(s) or organization(s) is an additional insured only with respect to liability for:

a. "Bodily injury", "property damage" or "personal and advertising injury" *caused, in whole or in part, by* the performance of your ongoing operations by you or on your behalf, under that written contract or written agreement. Ongoing operations does not apply to "bodily injury" or "property damage" occurring after:

(1) All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or

(2) That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project; and

b. "Bodily injury" or "property damage" *caused, in whole or in part, by* "your work" performed under that written contract or written agreement and in

cluded in the "products-completed operations hazard", but only if:

(1) The Coverage Part to which this endorsement is attached provides coverage for "bodily injury" or "property damage" included within the "products-completed operations hazard"; and

(2) The written contract or written agreement requires you to provide additional insured coverage included within the "products-completed operations hazard" for that person or organization.

If the written contract or written agreement requires you to provide additional insured coverage included within the "products-completed operations hazard" for a specified length of time for that person or organization, the "bodily injury" or "property damage" must occur prior to the expiration of that period of time in order for this insurance to apply.

If the written contract or written agreement requires you to provide additional insured coverage for a person or organization per only ISO additional insured endorsement form number **CG 20 10**, without specifying an edition date, and without specifically requiring additional insured coverage included within the "products-completed operations hazard", this Paragraph **b.** does not apply to that person or organization.

2. If the written contract or written agreement described in Paragraph **1.** above specifically requires you to provide additional insured coverage to that person or organization:

a. *Arising out of* your ongoing operations or *arising out of* "your work"; or

- b. By way of an edition of an ISO additional insured endorsement that includes *arising out of* your ongoing operations or *arising out of* "your work";

then the phrase *caused, in whole or in part, by* in Paragraph **A.1.a.** and/or Paragraph **A.1.b.** above, whichever applies, is replaced by the phrase *arising out of*.

3. With respect to the insurance afforded to the additional insureds described in Paragraph **A.1.**, the following additional exclusion applies:

This insurance does not apply to "bodily injury", "property damage" or "personal and advertising injury" arising out of the rendering of, or the failure to render, any professional architectural, engineering or surveying services, including:

- a. The preparing, approving or failing to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; or
- b. Supervisory, inspection, architectural or engineering activities.

This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in the supervision, hiring, employment, training or monitoring of others by that insured, if the "occurrence" which caused the "bodily injury" or "property damage", or the offense which caused the "personal and advertising injury", involved the rendering of, or the failure to render, any professional architectural, engineering or surveying services.

4. This Paragraph **A.** does not apply to additional insureds described in Paragraph **B.**

B. Additional Insured - State Or Governmental Agency Or Subdivision Or Political Subdivision - Automatic Status When Required In Written Permits Or Authorizations

1. **Section II - Who Is An Insured** is amended to include as an additional insured any state or governmental agency or subdivision or political subdivision you have agreed in writing in a contract, agreement, permit or authorization to add as an additional insured on this Coverage Part. Such state or governmental agency or subdivision or political subdivision is an additional insured only with respect to operations performed by you or on your behalf for which the state or governmental agency or subdivision or political subdivision issued, in writing, a contract, agreement, permit or authorization.

2. With respect to the insurance afforded to the additional insureds described in Paragraph **B.1.**, the following additional exclusions apply:

This insurance does not apply to:

- a. "Bodily injury", "property damage" or "personal and advertising injury" arising out of operations performed for the federal government, state or municipality; or
- b. "Bodily injury" or "property damage" included within the "products-completed operations hazard."

- C. The insurance afforded to additional insureds described in Paragraphs **A.** and **B.**:

1. Only applies to the extent permitted by law; and
2. Will not be broader than that which you are required by the written contract, written agreement, written permit or written authorization to provide for such additional insured; and
3. Does not apply to any person, organization, state, governmental agency or subdivision or political subdivision specifically named as an additional insured for the same project in the schedule of an endorsement added to this Coverage Part.

- D. With respect to the insurance afforded to the additional insureds described in Paragraphs **A.** and **B.**, the following is added to **Section III - Limits Of Insurance**:

The most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the written contract, written agreement, written permit or written authorization described in Paragraphs **A.** and **B.**; or
2. Available under the applicable Limits of Insurance shown in the Declarations;

whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

- E. **Section IV - Commercial General Liability Conditions** is amended to add the following:

Automatic Additional Insured Provision

This insurance applies only if the "bodily injury" or "property damage" occurs, or the "personal and advertising injury" offense is committed:

1. During the policy period; and

2. Subsequent to your execution of the written contract or written agreement, or the issuance of a written permit or written authorization, described in Paragraphs **A.** and **B.**
- F. Except when **G.** below applies, the following is added to **Section IV - Commercial General Liability Conditions, 5. Other Insurance**, and supersedes any provision to the contrary:

When Other Additional Insured Coverage Applies On An Excess Basis

This insurance is primary to other insurance available to the additional insured described in Paragraphs **A.** and **B.** except:

1. As otherwise provided in **Section IV - Commercial General Liability Conditions, 5. Other Insurance, b. Excess Insurance**; or
 2. For any other valid and collectible insurance available to the additional insured as an additional insured by attachment of an endorsement to another insurance policy that is written on an excess basis. In such case, this insurance is also excess.
- G. The following is added to **Section IV - Commercial General Liability Conditions, 5. Other Insurance**, and supersedes any provision to the contrary:

Primary Insurance When Required By Written Contract, Agreement, Permit Or Authorization

Except when wrap-up insurance applies to the claim or "suit" on behalf of the additional insured, this insurance is primary to any other insurance available to the additional insured described in Paragraphs **A.** and **B.** provided that:

1. The additional insured is a Named Insured under such other insurance; and
2. You have agreed in writing in a contract, agreement, permit or authorization described in Paragraph **A.** or **B.** that this insurance would be primary to any other insurance available to the additional insured.

As used in this endorsement, wrap-up insurance means any insurance provided by a consolidated (wrap-up) insurance program.

Primary And Noncontributory Insurance When Required By Written Contract, Agreement, Permit Or Authorization

Except when wrap-up insurance applies to the claim or "suit" on behalf of the additional insured, this insurance is primary to and will not seek contribution from any other insurance available to the additional insured described in Paragraphs **A.** and **B.** provided that:

1. The additional insured is a Named Insured under such other insurance; and
2. You have agreed in writing in a contract, agreement, permit or authorization described in Paragraph **A.** or **B.** that this insurance would be primary and would not seek contribution from any other insurance available to the additional insured.

As used in this endorsement, wrap-up insurance means any insurance provided by a consolidated (wrap-up) insurance program.

- H. **Section IV - Commercial General Liability Conditions, 9. Transfer Of Rights Of Recovery Against Others To Us** is amended by the addition of the following:

We waive any right of recovery we may have against any additional insured under this endorsement against whom you have agreed to waive such right of recovery in a written contract, written agreement, written permit or written authorization because of payments we make for injury or damage arising out of your ongoing operations or "your work" done under a written contract, written agreement, written permit or written authorization. However, our rights may only be waived prior to the "occurrence" giving rise to the injury or damage for which we make payment under this Coverage Part. The insured must do nothing after a loss to impair our rights. At our request, the insured will bring "suit" or transfer those rights to us and help us enforce those rights.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

TEXAS - CONTRACTORS' COMMERCIAL GENERAL LIABILITY BROADENED ENDORSEMENT

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

A. Endorsement - Table of Contents:

<u>Coverage:</u>	<u>Begins on Page:</u>
1. Employee Benefit Liability Coverage.....	3
2. Unintentional Failure to Disclose Hazards.....	9
3. Damage to Premises Rented to You.....	9
4. Supplementary Payments.....	10
5. Medical Payments.....	10
6. 180 Day Coverage for Newly Formed or Acquired organizations.....	10
7. Waiver of Subrogation.....	11
8. Automatic Additional Insured - Specified Relationships:.....	11
• Managers or Lessors of Premises;	
• Lessor of Leased Equipment;	
• Vendors;	
• State or Governmental Agency or Subdivision or Political Subdivision - Permits or Authorizations Relating to Premises; and	
• Mortgagee, Assignee or Receiver	
9. Property Damage to Borrowed Equipment.....	14
10. Employees as Insureds - Specified Health Care Services and Good Samaritan Services.....	15
11. Broadened Notice of Occurrence.....	15
12. Nonowned Aircraft.....	15
13. Bodily Injury Redefined.....	15
14. Expected or Intended Injury Redefined.....	15
15. Former Employees as Insureds.....	15
16. Voluntary Property Damage Coverage and Care, Custody or Control Liability Coverage.....	16
17. Broadened Contractual Liability - Work Within 50' of Railroad Property.....	17
18. Alienated Premises.....	17

B. Limits of Insurance:

The Commercial General Liability Limits of Insurance apply to the insurance provided by this endorsement, except as provided below:

1. Employee Benefit Liability Coverage

Each Employee Limit: \$1,000,000
Aggregate Limit: \$3,000,000
Deductible Amount: \$ 1,000

3. Damage to Premises Rented to You

The lesser of:

- The Each Occurrence Limit shown in the Declarations; or
- \$500,000 unless otherwise stated \$ _____

4. Supplementary Payments

- Bail Bonds: \$2,500

b. Loss of Earnings: \$ 500

5. Medical Payments

Medical Expense Limit: \$ 10,000

9. Property Damage to Borrowed Equipment

Each Occurrence Limit: \$10,000
 Deductible Amount: \$ 250

16. Voluntary Property Damage Coverage (Coverage a.) And Care, Custody or Control Liability Coverage (Coverage b.)

Limits of Insurance

Coverage a.

\$1,000 Each Occurrence

\$5,000 Aggregate

Coverage b. \$5,000 Each Occurrence unless otherwise stated \$ _____

Deductible Amount (Each Occurrence)

Coverage a. \$250

Coverage b. \$250 unless otherwise stated \$ _____

COVERAGE	PREMIUM BASIS (a) Area (b) Payroll (c) Gross Sales (d) Units (e) Other	RATE (For Limits in Excess of \$5,000)	ADVANCE PREMIUM (For Limits in Excess of \$5,000)
b. Care, Custody or Control			\$
TOTAL ANNUAL PREMIUM			\$

- a. Insurance under this provision is afforded only until the 180th day after you acquire or form the organization or the end of the policy period, whichever is earlier;

7. Waiver of Subrogation

Section IV - Commercial General Liability Conditions, 9. Transfer of Rights of Recovery Against Others to us is amended by the addition of the following:

We waive any right of recovery we may have against any person or organization against whom you have agreed to waive such right of recovery in a written contract or agreement because of payments we make for injury or damage arising out of your ongoing operations or "your work" done under a written contract or agreement with that person or organization and included in the "products-completed operations hazard". However, our rights may only be waived prior to the "occurrence" giving rise to the injury or damage for which we make payment under this Coverage Part. The insured must do nothing after a loss to impair our rights. At our request, the insured will bring "suit" or transfer those rights to us and help us enforce those rights.

8. Automatic Additional Insured - Specified Relationships

- a. The following is added to **Section II - Who is an Insured**:

- (1) Any person(s) or organization(s) described in Paragraph **8.a.(2)** of this endorsement (hereinafter referred to as additional insured) whom you are required to add as an additional insured under this Coverage Part by reason of a written contract, written agreement, written permit or written authorization.

- (2) Only the following persons or organizations are additional insureds under this endorsement, and insurance coverage provided to such additional insureds is limited as provided herein:

- (a) **Managers or Lessors of Premises**

The manager or lessor of a premises leased to you with whom you have agreed per Paragraph **8.a.(1)** of this endorsement to provide insur-

ance, but only with respect to liability arising out of the ownership, maintenance or use of that part of the premises leased to you, subject to the following additional exclusions:

This insurance does not apply to:

- (i) Any "occurrence" which takes place after you cease to be a tenant in that premises;

- (ii) Structural alterations, new construction or demolition operations performed by or on behalf of such additional insured.

- (b) **Lessor of Leased Equipment**

Any person or organization from whom you lease equipment when you and such person(s) or organization(s) have agreed per Paragraph **8.a.(1)** of this endorsement to provide insurance. Such person(s) or organization(s) are insureds only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by your maintenance, operation or use of equipment leased to you by such person(s) or organization(s). A person's or organization's status as an additional insured under this endorsement ends when their contract or agreement with you for such leased equipment ends. However, this insurance does not apply to any "occurrence" which takes place after the equipment lease expires.

- (c) **Vendors**

Any person or organization (referred to below as vendor) with whom you have agreed per Paragraph **8.a.(1)** of this endorsement to provide insurance, but only with respect to "bodily injury" or "property damage"

arising out of "your products" which are distributed or sold in the regular course of the vendor's business, subject to the following additional exclusions:

- (i) The insurance afforded the vendor does not apply to:
 - 1) "Bodily injury" or "property damage" for which the vendor is obligated to pay damages by reason of the assumption of liability in a contract or agreement. This exclusion does not apply to liability for damages that the vendor would have in the absence of the contract or agreement;
 - 2) Any express warranty unauthorized by you;
 - 3) Any physical or chemical change in the product made intentionally by the vendor;
 - 4) Repackaging, except when unpacked solely for the purpose of inspection, demonstration, testing, or the substitution of parts under instructions from the manufacturer, and then repackaged in the original container;
 - 5) Any failure to make such inspections, adjustments, tests or servicing as the vendor has agreed to make or normally undertakes to make in the usual course of business, in connection with the distribution

or sale of the products;

- 6) Demonstration, installation, servicing or repair operations, except such operations performed at the vendor's premises in connection with the sale of the product;
- 7) Products which, after distribution or sale by you, have been labeled or re-labeled or used as a container, part or ingredient of any other thing or substance by or for the vendor; or
- 8) "Bodily injury" or "property damage" arising out of the sole negligence of the vendor for its own acts or omissions or those of its employees or anyone else acting on its behalf. However, this exclusion does not apply to:
 - a) The exceptions contained in Paragraphs (c) (i) 4) or 6) of this endorsement; or
 - b) Such inspections, adjustments, tests or servicing as the vendor has agreed to make or normally undertakes to make in the usual course of business, in connection with the distribution or sale of the products.

- (ii) This insurance does not apply to any insured person or organization:
 - 1) From whom you have acquired such products, or any ingredient, part or container, entering into, accompanying or containing such products; or
 - 2) When liability included within the "products-completed operations hazard" has been excluded under this Coverage Part with respect to such products.
- (d) **State or Governmental Agency or Subdivision or Political Subdivision - Permits or Authorizations Relating to Premises**

Any state or governmental agency or subdivision or political subdivision with which you have agreed per Paragraph **8.a.(1)** of this endorsement to provide insurance, subject to the following additional provision:

This insurance applies only with respect to the following hazards for which the state or governmental agency or subdivision or political subdivision has issued a permit or authorization in connection with premises you own, rent or control and to which this insurance applies:

 - (i) The existence, maintenance, repair, construction, erection or removal of advertising signs, awnings, canopies, cellar entrances, coal holes, driveways, man-holes, marquees, hoist away openings, sidewalk vaults, street banners or decorations and similar exposures; or
 - (ii) The construction, erection or removal of elevators; or
 - (iii) The ownership, maintenance or use of any elevators covered by this insurance.
- (e) **Mortgagee, Assignee or Receiver**

Any person or organization with whom you have agreed per Paragraph **8.a.(1)** of this endorsement to provide insurance, but only with respect to their liability as mortgagee, assignee, or receiver and arising out of the ownership, maintenance, or use of the premises by you. However, this insurance does not apply to structural alterations, new construction and demolition operations performed by or for that person or organization.
- (3) The insurance afforded to additional insureds described in Paragraph **8.a.(1)** of this endorsement:
 - (a) Only applies to the extent permitted by law; and
 - (b) Will not be broader than that which you are required by the written contract, written agreement, written permit or written authorization to provide for such additional insured; and
 - (c) Does not apply to any person, organization, vendor, state, governmental agency or subdivision or political subdivision, specifically named as an additional insured under any other provision of, or endorsement added to, this Coverage Part, provided such other provision or endorsement covers the injury or damage for which this insurance applies.
- b. With respect to the insurance afforded to the additional insureds described in Paragraph **8.a.(1)** of this endorsement, the following is added to **Section III - Limits of Insurance**:

The most we will pay on behalf of the additional insured is the amount of insurance:

- (1) Required by the written contract, written agreement, written permit or written authorization described in Paragraph **8.a.(1)** of this endorsement; or
- (2) Available under the applicable Limits of Insurance shown in the Declarations;

whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

- c. **Section IV - Commercial General Liability Conditions** is amended to include the following:

Automatic Additional Insured Provision

This insurance applies only if the "bodily injury" or "property damage" occurs, or the "personal and advertising injury" offense is committed:

- (1) During the policy period; and
- (2) Subsequent to your execution of the written contract or written agreement, or the issuance of a written permit or written authorization, described in Paragraph **8.a.(1)**.

- d. **Section IV - Commercial General Liability Conditions** is amended as follows:

Condition **5. Other Insurance** is amended to include:

Primary and Noncontributory Insurance

This insurance is primary to and will not seek contribution from any other insurance available to an additional insured per Paragraph **8.a.(1)** of this endorsement provided that:

- (1) The additional insured is a Named Insured under such other insurance; and
- (2) You have agreed in writing in a contract, agreement, permit or authorization described in **8.a.(2)** of this endorsement that this insurance would be primary and would not seek contribution from any other insurance available to the additional insured.

9. Property Damage to Borrowed Equipment

- a. The following is added to **Exclusion 2.j. Damage to Property** under **Section I - Coverage A - Bodily Injury and Property Damage Liability**:

Paragraphs **(3)** and **(4)** of this exclusion do not apply to tools or equipment loaned to you, provided they are not being used to perform operations at the time of loss.

- b. With respect to the insurance provided by this section of the endorsement, the following additional provisions apply:

- (1) The Limits of Insurance shown in the Declarations are replaced by the limits designated in **Section B. Limits of Insurance, 9. Property Damage to Borrowed Equipment** of this endorsement with respect to coverage provided by this endorsement. These limits are inclusive of and not in addition to the limits being replaced. The Limits of Insurance shown in **Section B. Limits of Insurance, 9. Property Damage to Borrowed Equipment** of this endorsement fix the most we will pay in any one "occurrence" regardless of the number of:

- (a) Insureds;
- (b) Claims made or "suits" brought; or
- (c) Persons or organizations making claims or bringing "suits".

(2) Deductible Clause

- (a) Our obligation to pay damages on your behalf applies only to the amount of damages for each "occurrence" which are in excess of the Deductible Amount stated in **Section B. Limits of Insurance, 9. Property Damage to Borrowed Equipment** of this endorsement. The limits of insurance will not be reduced by the application of such deductible amount.
- (b) **Section IV - Commercial General Liability Conditions, 2. Duties in the Event of Occurrence, of-**

EXCESS FOLLOW-FORM AND UMBRELLA LIABILITY INSURANCE

THIS POLICY, IN PART, PROVIDES FOLLOW-FORM LIABILITY COVERAGE. COVERAGE WILL APPLY ON A CLAIMS-MADE BASIS WHEN FOLLOWING CLAIMS-MADE UNDERLYING INSURANCE.

COVERAGE WILL APPLY ON A DEFENSE-WITHIN-LIMITS BASIS WHEN FOLLOWING UNDERLYING INSURANCE UNDER WHICH DEFENSE EXPENSES ARE PAYABLE WITHIN, AND NOT IN ADDITION TO, THE LIMITS OF INSURANCE. WHEN FOLLOWING SUCH UNDERLYING INSURANCE, PAYMENT OF DEFENSE EXPENSES UNDER THIS POLICY WILL REDUCE, AND MAY EXHAUST, THE LIMITS OF INSURANCE OF THIS POLICY.

PLEASE READ THE ENTIRE POLICY CAREFULLY.

Various provisions in this policy restrict coverage. Read the entire policy carefully to determine rights, duties and what is and is not covered.

Throughout this policy, the words "you" and "your" refer to the Named Insured shown in the Declarations and any other person or organization qualifying as a Named Insured under this policy. The words "we", "us" and "our" refer to the company providing this insurance.

The word "insured" means any person or organization qualifying as such under **SECTION II – WHO IS AN INSURED**.

Other words and phrases that appear in quotation marks have special meaning. Refer to **SECTION VI – DEFINITIONS**.

SECTION I – COVERAGES

A. COVERAGE A – EXCESS FOLLOW-FORM LIABILITY

1. We will pay on behalf of the insured those sums, in excess of the "applicable underlying limit", that the insured becomes legally obligated to pay as damages to which Coverage **A** of this insurance applies, provided that the "underlying insurance" would apply to such damages but for the exhaustion of its applicable limits of insurance. If a sublimit is specified in any "underlying insurance", Coverage **A** of this insurance applies to damages that are in excess of that sublimit only if such sublimit is shown for that "underlying insurance" in the Schedule Of Underlying Insurance.
2. Coverage **A** of this insurance is subject to the same terms, conditions, agreements, exclusions and definitions as the "underlying insurance", except with respect to any

provisions to the contrary contained in this insurance.

3. The amount we will pay for damages is limited as described in **SECTION III – LIMITS OF INSURANCE**.
4. For the purposes of Paragraph 1. above:
 - a. The applicable limit of insurance stated for the policies of "underlying insurance" in the Schedule Of Underlying Insurance will be considered to be reduced or exhausted only by the following payments:
 - (1) Payments of judgments or settlements for damages that are covered by that "underlying insurance". However, if such "underlying insurance" has a policy period which differs from the policy period of this Excess Follow-Form And Umbrella Liability Insurance, any such payments for damages that would not be covered by this Excess

2. We have no duty to defend any insured against any "suit":
 - a. Seeking damages to which this insurance does not apply; or
 - b. If any other insurer has a duty to defend.
3. When we have the duty to defend, we may, at our discretion, investigate and settle any claim or "suit". In all other cases, we may, at our discretion, participate in the investigation, defense and settlement of any claim or "suit" for damages to which this insurance may apply. If we exercise such right to participate, all expenses we incur in doing so will not reduce the applicable limits of insurance.
4. Our duty to defend ends when we have used up the applicable limit of insurance in the payment of judgments or settlements, or defense expenses if such expenses are within the limits of insurance of this policy.
5. We will pay, with respect to a claim we investigate or settle, or "suit" against an insured we defend:
 - a. All expenses we incur.
 - b. The cost of:
 - (1) Bail bonds required because of accidents or traffic law violations arising out of the use of any vehicle to which this insurance applies; or
 - (2) Appeal bonds and bonds to release attachments;

but only for bond amounts within the applicable limit of insurance. We do not have to furnish these bonds.
 - c. All reasonable expenses incurred by the insured at our request to assist us in the investigation or defense of such claim or "suit", including actual loss of earnings up to \$1,000 a day because of time off from work.
 - d. All court costs taxed against the insured in the "suit". However, these payments do not include attorneys' fees or attorneys' expenses taxed against the insured.
 - e. Prejudgment interest awarded against the insured on that part of the judgment we pay. If we make an offer to pay the applicable limit of insurance, we will not pay any prejudgment interest based on that period of time after the offer.
 - f. All interest that accrues on the full amount of any judgment after entry of the judgment and before we have paid, offered to pay or deposited in court the part of the judgment that is within the

applicable limit of insurance. If we do not pay part of the judgment for any reason other than it is more than the applicable limit of insurance, we will not pay any interest that accrues on that portion of the judgment.

With respect to a claim we investigate or settle, or "suit" against an insured we defend under **COVERAGE A – EXCESS FOLLOW-FORM LIABILITY**, these payments will not reduce the applicable limits of insurance, but only if the applicable "underlying insurance" provides for such payments in addition to its limits of insurance. With respect to a claim we investigate or settle, or "suit" against an insured we defend under **COVERAGE B – UMBRELLA LIABILITY**, these payments will not reduce the applicable limits of insurance.

SECTION II – WHO IS AN INSURED

A. COVERAGE A – EXCESS FOLLOW-FORM LIABILITY

With respect to Coverage **A**, the following persons and organizations qualify as insureds:

1. The Named Insured shown in the Declarations; and
2. Any other person or organization qualifying as an insured in the "underlying insurance". If you have agreed to provide insurance for that person or organization in a written contract or agreement:
 - a. The limits of insurance afforded to such person or organization will be:
 - (1) The amount by which the minimum limits of insurance you agreed to provide such person or organization in that written contract or agreement exceed the total limits of insurance of all applicable "underlying insurance"; or
 - (2) The limits of insurance of this policy; whichever is less; and
 - b. Coverage under this policy does not apply to such person or organization if the minimum limits of insurance you agreed to provide such person or organization in that written contract or agreement are wholly within the total limits of insurance of all available applicable "underlying insurance".

B. COVERAGE B – UMBRELLA LIABILITY

With respect to Coverage **B**:

1. The Named Insured shown in the Declarations is an insured.
2. If you are:

- a. An individual, your spouse is also an insured, but only with respect to the conduct of a business of which you are the sole owner.
 - b. A partnership or joint venture, your members, your partners and their spouses are also insureds, but only with respect to the conduct of your business.
 - c. A limited liability company, your members are also insureds, but only with respect to the conduct of your business. Your managers are also insureds, but only with respect to their duties as your managers.
 - d. An organization other than a partnership, joint venture or limited liability company, your "officers" and directors are also insureds, but only with respect to their duties as your "officers" or directors. Your stockholders are also insureds, but only with respect to their liability as stockholders.
 - e. A trust, your trustees are also insureds, but only with respect to their duties as trustees.
3. Each of the following is also an insured:
- a. Your "volunteer workers" only while performing duties related to the conduct of your business, or your "employees", other than either your "officers" (if you are an organization other than a partnership, joint venture or limited liability company) or your managers (if you are a limited liability company), but only for acts within the scope of their employment by you or while performing duties related to the conduct of your business. However, none of these "employees" or "volunteer workers" are insureds for:
 - (1) "Bodily injury" or "personal injury":
 - (a) To you, to your partners or members (if you are a partnership or joint venture), to your members (if you are a limited liability company), to a co-"employee" while in the course of his or her employment or performing duties related to the conduct of your business, or to your other "volunteer workers" while performing duties related to the conduct of your business;
 - (b) To the spouse, child, parent, brother or sister of that co-"employee" or "volunteer worker" as a consequence of Paragraph (1)(a) above;
 - (c) For which there is any obligation to share damages with or repay someone else who must pay damages because of the injury described in Paragraph (1)(a) or (b) above; or
 - (d) Arising out of his or her providing or failing to provide professional health care services.
- Unless you are in the business or occupation of providing professional health care services, Paragraphs (1)(a), (b), (c) and (d) above do not apply to "bodily injury" arising out of providing or failing to provide first aid or "Good Samaritan services" by any of your "employees" or "volunteer workers" other than an employed or volunteer doctor. Any such "employees" or "volunteer workers" providing or failing to provide first aid or "Good Samaritan services" during their work hours for you will be deemed to be acting within the scope of their employment by you or performing duties related to the conduct of your business.
- (2) "Property damage" to property:
 - (a) Owned, occupied or used by; or
 - (b) Rented to, in the care, custody or control of, or over which physical control is being exercised for any purpose by;
 - you, any of your "employees" or "volunteer workers", any of your partners or members (if you are a partnership or joint venture), or any of your members (if you are a limited liability company).
 - b. Any person (other than your "employee" or "volunteer worker"), or any organization, while acting as your real estate manager.
 - c. Any person or organization having proper temporary custody of your property if you die, but only:
 - (1) With respect to liability arising out of the maintenance or use of that property; and
 - (2) Until your legal representative has been appointed.
 - d. Your legal representative if you die, but only with respect to duties as such. That

representative will have all your rights and duties under this insurance.

4. Any organization, other than a partnership, joint venture or limited liability company, of which you are the sole owner, or in which you maintain an ownership interest of more than 50%, on the first day of the policy period is an insured and will qualify as a Named Insured. No such organization is an insured or will qualify as a Named Insured for "bodily injury" or "property damage" that occurred, or "personal injury" or "advertising injury" caused by an offense committed after the date, if any, during the policy period, that you no longer maintain an ownership interest of more than 50% in such organization.
5. Any organization you newly acquire or form, other than a partnership, joint venture or limited liability company, and of which you are the sole owner, or in which you maintain an ownership interest of more than 50%, is an insured and will qualify as a Named Insured if there is no other similar insurance available to that organization. However:
 - a. Coverage under this provision is afforded only until the 180th day after you acquire or form the organization or the end of the policy period, whichever is earlier; and
 - b. Coverage for such organization does not apply to:
 - (1) "Bodily injury" or "property damage" that occurred; or
 - (2) "Personal injury" or "advertising injury" arising out of an offense committed;
 before you acquired or formed the organization.

No person or organization is an insured or will qualify as a Named Insured with respect to the conduct of any current or past partnership, joint venture or limited liability company that is not shown as a Named Insured in the Declarations. This paragraph does not apply to any such partnership, joint venture or limited liability company that otherwise qualifies as an insured under Paragraph **B.** of **SECTION II – WHO IS AN INSURED.**

C. COVERAGE C – CRISIS MANAGEMENT SERVICE EXPENSES

With respect to Coverage **C**, the following persons and organizations are insureds and will qualify as Named Insureds:

1. The Named Insured shown in the Declarations.

2. Any organization, other than a partnership, joint venture or limited liability company, of which you are the sole owner, or in which you maintain an ownership interest of more than 50%, on the first day of the policy period. No such organization is an insured or will qualify as a Named Insured for "crisis management service expenses" arising out of a "crisis management event" that first commences after the date, if any, during the policy period, that you no longer maintain an ownership interest of more than 50% in such organization.
3. Any organization you newly acquire or form, other than a partnership, joint venture or limited liability company, and of which you are the sole owner, or in which you maintain an ownership interest of more than 50%, if there is no other similar insurance available to that organization. However:
 - a. Coverage under this provision is afforded only until the 180th day after you acquire or form the organization or the end of the policy period, whichever is earlier; and
 - b. Coverage for such organization does not apply to "crisis management service expenses" arising out of a "crisis management event" that occurred before you acquired or formed the organization, even if an "executive officer" only first becomes aware of an "event" or "occurrence" that leads to such "crisis management event" after the date you acquired or formed the organization.

No person or organization is an insured or will qualify as a Named Insured with respect to the conduct of any current or past partnership, joint venture or limited liability company that is not shown as a Named Insured in the Declarations.

SECTION III – LIMITS OF INSURANCE

- A.** The Limits of Insurance shown in the Declarations and the rules below fix the most we will pay for the amounts described below to which this insurance applies regardless of the number of:
 1. Insureds;
 2. Claims made or "suits" brought;
 3. Number of vehicles involved;
 4. Persons or organizations making claims or bringing "suits"; or
 5. Coverages provided under this insurance.

As indicated in Paragraph **D.1.** of **SECTION I – COVERAGES**, for any "suit" for which we have the right and duty to defend the insured under Coverage **A**, defense expenses will be within the

- b. You have paid all premiums due for this policy at the time you make such request;
 - c. You promptly pay the additional premium we charge for the Extended Reporting Period endorsement for this insurance when due. We will determine that additional premium after we have received your request for the Extended Reporting Period endorsement for this insurance. That additional premium is not subject to any limitation stated in the "underlying insurance" on the amount or percentage of additional premium that may be charged for the "extended reporting period" in such "underlying insurance"; and
 - d. That Extended Reporting Period endorsement is issued by us and made a part of this policy.
3. Any Extended Reporting Period endorsement for this insurance will not reinstate or increase the Limits of Insurance or extend the policy period.
 4. Except with respect to any provisions to the contrary contained in Paragraphs 1., 2. or 3. above, all provisions of any option to purchase an "extended reporting period" granted to you in the "underlying insurance" apply to this insurance.

J. INSPECTIONS AND SURVEYS

1. We have the right but are not obligated to:
 - a. Make inspections and surveys at any time;
 - b. Give you reports on the conditions we find; and
 - c. Recommend changes.
2. Any inspections, surveys, reports or recommendations relate only to insurability and the premiums to be charged. We do not make safety inspections. We do not undertake to perform the duty of any person or organization to provide for the health or safety of workers or the public. We do not warrant that conditions:
 - a. Are safe or healthful; or
 - b. Comply with laws, regulations, codes or standards.

K. LEGAL ACTION AGAINST US

1. No person or organization has a right under this insurance:
 - a. To join us as a party or otherwise bring us into a "suit" asking for damages from an insured; or

- b. To sue us on this insurance unless all of its terms have been fully complied with.
2. A person or organization may sue us to recover on an agreed settlement or on a final judgment against an insured. We will not be liable for damages that:
 - a. Are not payable under the terms of this insurance; or
 - b. Are in excess of the applicable limit of insurance.

An agreed settlement means a settlement and release of liability signed by us, the insured and the claimant or the claimant's legal representative.

L. MAINTENANCE OF UNDERLYING INSURANCE

1. The insurance afforded by each policy of "underlying insurance" will be maintained for the full policy period of this Excess Follow-Form And Umbrella Liability Insurance. This provision does not apply to the reduction or exhaustion of the aggregate limit or limits of such "underlying insurance" solely by payments as permitted in Paragraphs 4.a.(1), (2) and (3) of **COVERAGE A – EXCESS FOLLOW-FORM LIABILITY** of **SECTION I – COVERAGES**. As such policies expire, you will renew them at limits and with coverage at least equal to the expiring limits of insurance. If you fail to comply with the above requirements, Coverage **A** is not invalidated. However, in the event of a loss, we will pay only to the extent that we would have paid had you complied with the above requirements.
2. The first Named Insured shown in the Declarations must give us written notice of any change in the "underlying insurance" as respects:
 - a. Coverage;
 - b. Limits of insurance;
 - c. Termination of any coverage; or
 - d. Exhaustion of aggregate limits.
3. If you are unable to recover from any "underlying insurer" because you fail to comply with any term or condition of the "underlying insurance", Coverage **A** is not invalidated. However, we will pay for any loss only to the extent that we would have paid had you complied with that term or condition in that "underlying insurance".

M. OTHER INSURANCE

This insurance is excess over any valid and collectible "other insurance" whether such "other insurance" is stated to be primary, contributing,

excess, contingent or otherwise. This provision does not apply to a policy bought specifically to apply as excess of this insurance.

However, if you specifically agree in a written contract or agreement that the insurance provided to any person or organization that qualifies as an insured under this insurance must apply on a primary basis, or a primary and non-contributory basis, then insurance provided under Coverage A is subject to the following provisions:

1. This insurance will apply before any "other insurance" that is available to such additional insured which covers that person or organization as a named insured, and we will not share with that "other insurance", provided that the injury or damage for which coverage is sought is caused by an "event" that takes place or is committed subsequent to the signing of that contract or agreement by you.
2. This insurance is still excess over any valid and collectible "other insurance", whether primary, excess, contingent or otherwise, which covers that person or organization as an additional insured or as any other insured that does not qualify as a named insured.

N. PREMIUM

1. The first Named Insured shown in the Declarations is responsible for the payment of all premiums and will be the payee for any return premiums.
2. If the premium is a flat charge, it is not subject to adjustment except as provided in Paragraph 4. below.
3. If the premium is other than a flat charge, it is an advance premium only. The earned premium will be computed at the end of the policy period, or at the end of each year of the policy period if the policy period is two years or longer, at the rate shown in the Declarations, subject to the Minimum Premium.
4. Additional premium may become payable when coverage is provided for additional insureds under the provisions of **SECTION II – WHO IS AN INSURED.**

O. PREMIUM AUDIT

The premium for this policy is the amount stated in Item 5. of the Declarations. The premium is a flat charge unless it is specified in the Declarations as adjustable.

P. PROHIBITED COVERAGE – UNLICENSED INSURANCE

1. With respect to loss sustained by any insured in a country or jurisdiction in which we are not licensed to provide this insurance, this insurance does not apply to the extent that insuring such loss would violate the laws or regulations of such country or jurisdiction.
2. We do not assume responsibility for:
 - a. The payment of any fine, fee, penalty or other charge that may be imposed on any person or organization in any country or jurisdiction because we are not licensed to provide insurance in such country or jurisdiction; or
 - b. The furnishing of certificates or other evidence of insurance in any country or jurisdiction in which we are not licensed to provide insurance.

Q. PROHIBITED COVERAGE – TRADE OR ECONOMIC SANCTIONS

We will provide coverage for any loss, or otherwise will provide any benefit, only to the extent that providing such coverage or benefit does not expose us or any of our affiliated or parent companies to:

1. Any trade or economic sanction under any law or regulation of the United States of America; or
2. Any other applicable trade or economic sanction, prohibition or restriction.

R. REPRESENTATIONS

By accepting this insurance, you agree:

1. The statements in the Declarations and any subsequent notice relating to "underlying insurance" are accurate and complete;
2. Those statements are based upon representations you made to us; and
3. We have issued this insurance in reliance upon your representations.

S. SEPARATION OF INSURED

Except with respect to the Limits of Insurance, and any rights or duties specifically assigned in this policy to the first Named Insured shown in the Declarations, this insurance applies:

1. As if each Named Insured were the only Named Insured; and
2. Separately to each insured against whom claim is made or "suit" is brought.

T. WAIVER OR TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US

1. If the insured has rights to recover all or part of any payment we have made under this insurance, those rights are transferred to us and the insured must do nothing after loss to impair them. At our request, the insured will bring suit or transfer those rights to us and help us, and with respect to Coverage **A**, the "underlying insurer", enforce them.

If the insured has agreed in a contract or agreement to waive that insured's right of recovery against any person or organization, we waive our right of recovery against that person or organization, but only for payments we make because of an "event" that takes place or is committed subsequent to the execution of that contract or agreement by such insured.

2. Reimbursement of any amount recovered will be made in the following order:
 - a. First, to any person or organization (including us or the insured) who has paid any amount in excess of the applicable limit of insurance;
 - b. Next, to us; and
 - c. Then, to any person or organization (including the insured and with respect to Coverage **A**, the "underlying insurer") that is entitled to claim the remainder, if any.
3. Expenses incurred in the process of recovery will be divided among all persons or organizations receiving amounts recovered according to the ratio of their respective recoveries.

U. TRANSFER OF YOUR RIGHTS AND DUTIES UNDER THIS INSURANCE

1. Your rights and duties under this insurance may not be transferred without our written consent except in the case of death of an individual Named Insured.
2. If you die, your rights and duties will be transferred to your legal representative but only while acting within the scope of duties as your legal representative. Until your legal representative is appointed, anyone having proper temporary custody of your property will have your rights and duties but only with respect to that property.

V. UNINTENTIONAL OMISSION OR ERROR

The unintentional omission of, or unintentional error in, any information provided by you which we relied upon in issuing this policy will not prejudice your rights under this insurance. However, this

provision does not affect our right to collect additional premium or to exercise our rights of cancellation or nonrenewal in accordance with applicable insurance laws or regulations.

W. WHEN LOSS IS PAYABLE

If we are liable under this insurance, we will pay for injury, damage or loss after:

1. The insured's liability is established by:
 - a. A court decision; or
 - b. A written agreement between the claimant, the insured, any "underlying insurer" and us; and
2. The amount of the "applicable underlying limit" or "self-insured retention" is paid by or on behalf of the insured.

SECTION VI – DEFINITIONS

A. With respect to all coverages of this insurance:

1. "Applicable underlying limit" means the sum of:
 - a. The applicable limit of insurance stated for the policies of "underlying insurance" in the Schedule Of Underlying Insurance subject to the provisions in Paragraphs **4.a.(1), (2) and (3) of COVERAGE A – EXCESS FOLLOW-FORM LIABILITY of SECTION I – COVERAGES**; and
 - b. The applicable limit of insurance of any "other insurance" that applies.

The limits of insurance in any policy of "underlying insurance" will apply even if:

- a. The "underlying insurer" claims the insured failed to comply with any term or condition of the policy; or
 - b. The "underlying insurer" becomes bankrupt or insolvent.
2. "Auto hazard" means all "bodily injury" and "property damage" to which liability insurance afforded under an auto policy of "underlying insurance" would apply but for the exhaustion of its applicable limits of insurance.
 3. "Electronic data" means information, facts or programs stored as or on, created or used on, or transmitted to or from computer software (including systems and applications software), hard or floppy disks, CD-ROMs, tapes, drives, cells, data processing devices or any other media which are used with electronically controlled equipment.
 4. "Event" means an "occurrence", offense, accident, act, error, omission, wrongful act or loss.

POLICY NUMBER: CUP-8S57576A-22-NF

ISSUE DATE: 01/12/22

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

DESIGNATED PERSON OR ORGANIZATION – NOTICE OF CANCELLATION PROVIDED BY US

This endorsement modifies insurance provided under the following:

ALL COVERAGE PARTS INCLUDED IN THE POLICY

SCHEDULE

Cancellation:

Number of Days Notice: 30

Person or organization:

ANY PERSON OR ORGANIZATION WITH WHOM YOU HAVE AGREED IN A WRITTEN CONTRACT OR AGREEMENT TO WAIVE YOUR RIGHT OF RECOVERY, BUT ONLY FOR PAYMENTS WE MAKE BECAUSE OF DAMAGES TO WHICH THIS INSURANCE APPLIES, AFTER YOU HAVE EXECUTED THAT CONTRACT OR AGREEMENT.

Address:

ANY LOCATION TO WHICH SUCH WRITTEN CONTRACT DESCRIBED IN THE NAME OF PERSON(S) OR ORGANIZATION(S) SECTION OF THIS SCHEDULE APPLIES

PROVISIONS

If we cancel this policy for any legally permitted reason other than nonpayment of premium, and a number of days is shown for Cancellation in the Schedule above, we will mail notice of cancellation to the person or organization shown in such Schedule. We will mail such notice to the address shown in the Schedule above at least the number of days shown for Cancellation in such Schedule before the effective date of cancellation.



**WORKERS' COMPENSATION AND
EMPLOYERS LIABILITY POLICY**

WC 42 03 04 B
Insured copy

TEXAS WAIVER OF OUR RIGHT TO RECOVER FROM OTHERS ENDORSEMENT

This endorsement applies only to the insurance provided by the policy because Texas is shown in item 3.A. of the Information Page.

We have the right to recover our payments from anyone liable for an injury covered by this policy. We will not enforce our right against the person or organization named in the Schedule, but this waiver applies only with respect to bodily injury arising out of the operations described in the schedule where you are required by a written contract to obtain this waiver from us.

This endorsement shall not operate directly or indirectly to benefit anyone not named in the Schedule.

The premium for this endorsement is shown in the Schedule.

Schedule

- 1. Specific Waiver
Name of person or organization
- Blanket Waiver
Any person or organization for whom the Named Insured has agreed by written contract to furnish this waiver.
- 2. Operations: All Texas operations
- 3. Premium:
The premium charge for this endorsement shall be **2.00** percent of the premium developed on payroll in connection with work performed for the above person(s) or organization(s) arising out of the operations described.
- 4. Advance Premium: Included, see Information Page

This endorsement changes the policy to which it is attached effective on the inception date of the policy unless a different date is indicated below.
(The following "attaching clause" need be completed only when this endorsement is issued subsequent to preparation of the policy.)
This endorsement, effective on 1/12/22 at 12:01 a.m. standard time, forms a part of:

Policy no. 0002008328 of Texas Mutual Insurance Company effective on 1/12/22

Issued to: Matous Construction, Ltd.

Authorized representative

This is not a bill

NCCI Carrier Code: 29939

1/6/22



**WORKERS' COMPENSATION AND
EMPLOYERS LIABILITY POLICY**

WC 42 06 01
Insured copy

TEXAS NOTICE OF MATERIAL CHANGE ENDORSEMENT

This endorsement applies only to the insurance provided by the policy because Texas is shown in Item 3.A. of the Information Page.

In the event of cancellation or other material change of the policy, we will mail advance notice to the person or organization named in the Schedule. The number of days advance notice is shown in the Schedule.

This endorsement shall not operate directly or indirectly to benefit anyone not named in the Schedule.

Schedule

- 1. Number of days advance notice: 30
- 2. Notice will be mailed to: PER LIST ON FILE

This endorsement changes the policy to which it is attached effective on the inception date of the policy unless a different date is indicated below.
(The following "attaching clause" need be completed only when this endorsement is issued subsequent to preparation of the policy.)
This endorsement, effective on 1/12/22 at 12:01 a.m. standard time, forms a part of:

Policy no. 0002008328 of Texas Mutual Insurance Company effective on 1/12/22

Issued to: Matous Construction, Ltd.

Authorized representative

This is not a bill

NCCI Carrier Code: 29939

1/6/22

Bidding Requirements, Contract Forms and Conditions of the Contract

TEXAS SALES AND USE TAX EXEMPTION CERTIFICATE

Section 00670

City of Austin, Texas
P.O. Box 1088
Austin, Texas 78767

CONTRACTOR/PURCHASER: _____

Street Address: _____

City, State, ZIP Code: _____

PROJECT: Walnut Creek WWTP Gas Scrubber Systems RenewalProject Manager: Rebecca Vento, P.E.

FDU No.: _____

CIP ID No.: #3023.066**Description of items to be purchased or as described on the attached order or invoice:**

The Contractor may purchase all labor, materials, supplies, and equipment to be incorporated in the City of Austin realty, including easements, or completely consumed at the Project jobsite and services required by or integral to the performance of the contract for the Project without paying sales or use tax in accordance with State Comptroller Rule 3.291.

Contractor/Purchaser claims this exemption for the following reason: This contract is to be performed for the City of Austin, a tax exempt entity under the Texas Tax Code.

I understand that I will be liable for payment of sales and use taxes which may become due for failure to comply with the provisions of the Tax Code. I also understand that it is a criminal offense to give an exemption certificate to the contractor for taxable items that I know, at the time of purchase, will be used in a manner other than that expressed in this certificate and depending on the amount of tax evaded, the offense may range from a Class B misdemeanor to a felony of the second degree.

City of Austin, Texas	Title	Date
 ELAINE HART	DEPUTY CITY MANGER/CHIEF FINANCIAL OFFICER	January 11, 2019

CONTRACTOR/PURCHASER: _____

By: _____

Title: _____

Date: _____

NOTE: This certificate cannot be issued for the purchase, lease, or rental of a motor vehicle.

THIS CERTIFICATE DOES NOT REQUIRE A NUMBER TO BE VALID. Sales and Use Tax "Exemption Numbers" or "Tax Exempt" Numbers do not exist. This certificate should be furnished to the supplier. Do not send the completed certificate to the Comptroller of Public Accounts.

END

Bidding Requirements, Contract Forms and Conditions of the Contract

NON-USE OF ASBESTOS AFFIDAVIT (CONTRACTOR PRIOR TO CONSTRUCTION)

Section 00680

**STATE OF TEXAS
COUNTY OF TRAVIS**

BEFORE ME, the undersigned authority, personally appeared the Affiant who, being by me first duly sworn, upon oath deposed and stated:

"My name is _____, hereinafter known as Affiant. "I am over the age of 18 years and I have never been convicted of a crime. I am the _____ of _____ hereinafter known as CONTRACTOR.

"I am fully competent to make this affidavit. I have personal knowledge of the facts set forth below and they are all true and correct.

"WHEREAS CONTRACTOR has submitted a bid to the City of Austin as the Prime CONTRACTOR and anticipates being awarded a contract for the construction of _____ located at _____, Austin, Texas, hereinafter known as Project, for the City of Austin, Texas, hereinafter known as OWNER, and "WHEREAS asbestos in a dust form is a recognized health hazard, and "WHEREAS the OWNER desires not to have any asbestos containing materials used or incorporated into the construction of the Project; "THEREFORE the CONTRACTOR affirms and understands the following:

- 1.** The CONTRACTOR, any person, firm or organization representing or represented by the CONTRACTOR, or employed by the CONTRACTOR shall not cause or allow any material to be incorporated into the construction of the project, or allow any building material on the project site that is an asbestos containing material or any other material defined as containing asbestos by any laws, rules or regulations promulgated by the United States Government, the State of Texas or any governmental organization or agency operating under the authority of either of those entities.
- 2.** Realizing that there might be some materials in which a satisfactory non-asbestos containing material could not be obtained, the Consultant has received prior approval from the OWNER before specifying any such asbestos containing material. Those approved materials are the only asbestos containing materials that are exempt from the above prohibition.
- 3.** The CONTRACTOR certifies and affirms their understanding that if any asbestos containing materials not approved by the City of Austin for inclusion into the Project, are determined, as a result of any inspection and sample analysis performed by an individual(s) and/or firm(s) certified and/or licensed to perform such inspection by the United States Government and/or the State of Texas, to have been incorporated into the construction of the Project, or brought onto the site of the Project, the OWNER shall look to the CONTRACTOR for reimbursement of any and all costs incurred in the removal and/or other abatement of said asbestos containing materials.

Bidding Requirements, Contract Forms and Conditions of the Contract

4. CONTRACTOR further understands that OWNER shall also look to the CONTRACTOR for any and all damages to OWNER which result from the inability of the OWNER to use any portion or all of the Project due to the incorporation of asbestos containing materials that have not been approved by OWNER.

5. CONTRACTOR further understands that OWNER will pursue reimbursement of any said cost and compensation for any said damages from the CONTRACTOR by any and every means within OWNER's right and power.

Signature of Affiant: _____

**STATE OF TEXAS
COUNTY OF TRAVIS**

ON _____, 20____, personally appeared _____ and been duly sworn by me, subscribed to the foregoing affidavit and has stated that the facts stated therein are true and correct.

Notary Public, State of Texas

Printed Name of Notary

My Commission Expires: _____

END

Bidding Requirements, Contract Forms and Conditions of the Contract

NON-USE OF ASBESTOS AFFIDAVIT (CONTRACTOR AFTER CONSTRUCTION)

Section 00681

**STATE OF TEXAS
COUNTY OF TRAVIS**

BEFORE ME, the undersigned authority, personally appeared the Affiant who, being by me first duly sworn, upon oath deposed and stated:

"My name is _____, hereinafter known as Affiant. "I am over the age of 18 years and I have never been convicted of a crime. I am the _____ of _____ hereinafter known as CONTRACTOR.

"I am fully competent to make this affidavit. I have personal knowledge of the facts set forth below and they are all true and correct.

"WHEREAS CONTRACTOR was awarded a Contract for, and was the Prime CONTRACTOR for the construction of _____ located at _____, Austin, Texas, hereinafter known as Project, for the City of Austin, Texas, hereinafter known as OWNER, and "WHEREAS asbestos in a dust form is a recognized health hazard, and "WHEREAS the OWNER desires not to have any asbestos containing materials used or incorporated into the construction of the Project; "THEREFORE the CONTRACTOR affirms and understands the following:

1. The CONTRACTOR, any person, firm or organization representing or represented by the CONTRACTOR, or employed by the CONTRACTOR has not caused or allowed any material to be incorporated into the construction of the project, or allowed any building material on the project site that is an asbestos containing material or any other material defined as containing asbestos by any laws, rules or regulation promulgated by the United States Government, the State of Texas or any governmental organization or agency operating under the authority of either of those entities.

2. Realizing that there were some materials in which a satisfactory non-asbestos containing material could not be obtained, the Consultant received prior approval from the OWNER before specifying any such asbestos containing material. Those approved materials were the only asbestos containing materials incorporated into the construction of the Project and are listed below, with their locations:

Bidding Requirements, Contract Forms and Conditions of the Contract

3. The CONTRACTOR certifies and affirms their understanding that if any asbestos containing materials not approved by the City of Austin for inclusion into the Project, are determined, as a result of any inspection and sample analysis performed by an individual(s) and/or firm(s) certified and/or licensed to perform such inspection by the United States Government and/or the State of Texas, to have been incorporated into the construction of the Project, or brought onto the site of the Project, the OWNER shall look to the CONTRACTOR for reimbursement of any and all costs incurred in the removal and/or other abatement of said asbestos containing materials.

4. CONTRACTOR further understands that OWNER shall also look to the CONTRACTOR for any and all damages to OWNER which result from the inability of the OWNER to use any portion or all of the Project due to the incorporation of asbestos containing materials that have not been approved by OWNER.

5. CONTRACTOR further understands that OWNER will pursue reimbursement of any said cost and compensation for any said damages from the CONTRACTOR by any and every means within OWNER's right and power.

Signature of Affiant: _____

**STATE OF TEXAS
COUNTY OF TRAVIS**

On _____, 20____, personally appeared _____ and been duly sworn by me, subscribed to the foregoing affidavit and has stated that the facts stated therein are true and correct.

Notary Public, State of Texas

Printed Name of Notary

My Commission Expires: _____

END

Bidding Requirements, Contract Forms and Conditions of the Contract
GENERAL CONDITIONS OF THE CONTRACT
Section 00700

General Conditions Table of Contents

ARTICLE 1 - DEFINITIONS 2

ARTICLE 2 - PRELIMINARY MATTERS 6

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE 8

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS 9

ARTICLE 5 - BONDS AND INSURANCE 12

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES 16

ARTICLE 7 - OTHER WORK..... 28

ARTICLE 8 - OWNER'S RESPONSIBILITIES 29

ARTICLE 9 - ENGINEER/ARCHITECT'S STATUS DURING CONSTRUCTION 30

ARTICLE 10 - CHANGES IN THE WORK 31

ARTICLE 11 - CHANGE OF CONTRACT AMOUNT 34

ARTICLE 12 - CHANGE OF CONTRACT TIMES..... 36

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK 39

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION..... 42

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION 48

ARTICLE 16 - DISPUTE RESOLUTION..... 50

ARTICLE 17 - MISCELLANEOUS 53

ARTICLE 1 – DEFINITIONS

Whenever used in these General Conditions or in the other Contract Documents the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

- 1.1 Addendum** - Written instruments issued by the Contract Awarding Authority which clarify, correct or change the bidding requirements or the Contract Documents prior to the Due Date. "Addenda" is the plural form of Addendum.
- 1.2 Agreement** - Prescribed form, Section 00500.
- 1.3 Alternative Dispute Resolution** - The process by which a disputed Claim may be settled if the OWNER and the CONTRACTOR cannot reach an agreement between themselves, as an alternative to litigation.
- 1.4 Bid** - A complete, properly signed response to an Invitation for Bid that, if accepted, would bind the Bidder to perform the resultant Contract.
- 1.5 Bidder** - A person, firm, or entity that submits a Bid in response to a Solicitation. Any Bidder may be represented by an agent after submitting evidence demonstrating the agent's authority. The agent cannot certify as to his own agency status.
- 1.6 Bid Documents** - The advertisement or Invitation for Bids, instructions to Bidders, the Bid form, the Contract Documents and Addenda.
- 1.7 Calendar Day** - Any day of the week; no days being excepted. Work on Saturdays, Sundays, and/or Legal Holidays shall be coordinated with OWNER.
- 1.8 Change Directive** - A written directive to CONTRACTOR, signed by OWNER, ordering a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Amount or Contract Time, or both. A Change Directive may be used in the absence of total agreement on the terms of a Change Order. A Change Directive does not change the Contract Amount or Contract Time, but is evidence that the parties expect that the change directed or documented by a Change Directive will be incorporated in a subsequently issued Change Order.
- 1.9 Change Orders** - Written agreements entered into between CONTRACTOR and OWNER authorizing an addition, deletion, or revision to the Contract, issued on or after the Execution Date of the Agreement.
- 1.10 Claim** - A written demand seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract.
- 1.11 Contract** - The binding legal agreement between the OWNER and the CONTRACTOR. The Contract represents the entire and integrated agreement between OWNER and CONTRACTOR for performance of the Work, as evidenced by the Contract Documents.
- 1.12 Contract Amount** - The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents.
- 1.13 Contract Awarding Authority** - A City department authorized to enter into Contracts on behalf of the City.
- 1.14 Contract Documents** - Project Manual, Drawings, Addenda and Change Orders.
- 1.15 Contract Time** - The number of days allowed for completion of the Work as defined by the Contract. When any period is referred to in days, it will be computed to exclude the first and include the last day of such period. A day of twenty-four hours measured from midnight to the next midnight will constitute a day.

- 1.16 CONTRACTOR** - The individual, firm, corporation, or other business entity with whom OWNER has entered into the Contract for performance of the Work.
- 1.17 Critical Path** - The longest series of tasks that runs consecutively from the beginning to the end of the project, as determined by duration and workflow sequence. This longest path sets the managerial standard for how quickly a project can be completed, given appropriate resources.
- 1.18 Drawings** - Those portions of the Contract Documents which are graphic representations of the scope, extent and character of the Work to be furnished and performed by CONTRACTOR and which have been approved by OWNER. Drawings may include plans, elevations, sections, details, schedules and diagrams. Shop Drawings are not Drawings as so defined.
- 1.19 Due Date** - The date and time specified for receipt of Bids.
- 1.20 Engineer/Architect (E/A)** - The OWNER's design professional identified as such in the Contract. The titles of "Architect/Engineer," "Architect" and "Engineer" used in the Contract Documents shall read the same as Engineer/Architect (E/A). Nothing contained in the Contract Documents shall create any contractual or agency relationship between E/A and CONTRACTOR.
- 1.21 Equal** - The terms "equal" or "approved equal" shall have the same meaning.
- 1.22 Execution Date** - Date of last signature of the parties to the Agreement.
- 1.23 Field Order** - A written order issued by Owner's Representative which orders minor changes in the Work and which does not involve a change in the Contract Amount or the Contract Time.
- 1.24 Final Completion** - The point in time when OWNER determines that all Work has been completed and final payment to CONTRACTOR will be made in accordance with the Contract Documents.
- 1.25 Force Account** - a basis of payment for the direct performance of Work with payment based on the actual cost of the labor, equipment and materials furnished and consideration for overhead and profit as set forth in Section 11.5.
- 1.26 Inspector** - The authorized representative of any regulatory agency that has jurisdiction over any portion of the Work.
- 1.27 Invitation for Bid (IFB)** - a Solicitation requesting pricing for a specified Good or Service which has been advertised for Bid in a newspaper and/or the Internet.
- 1.28 Legal Holidays**
- 1.28.1** The following are recognized by the OWNER:
- | <u>Holiday</u> | <u>Date Observed</u> |
|------------------------------------|-----------------------------|
| New Year's Day | January 1 |
| Martin Luther King, Jr.'s Birthday | Third Monday in January |
| President's Day | Third Monday in February |
| Memorial Day | Last Monday in May |
| Juneteenth | June 19 |
| Independence Day | July 4 |
| Labor Day | First Monday in September |
| Veteran's Day | November 11 |
| Thanksgiving Day | Fourth Thursday in November |
| Friday after Thanksgiving | Friday after Thanksgiving |

Christmas Eve	December 24
Christmas Day	December 25

1.28.2 If a Legal Holiday falls on Saturday, it will be observed on the preceding Friday. If a Legal Holiday falls on Sunday, it will be observed on the following Monday.

1.28.3 Christmas Eve is observed only if it falls on a Monday through Thursday. If Christmas Eve falls on a Friday, that day is observed as the Christmas Day holiday.

- 1.29 Milestones** - A significant event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
- 1.30 Notice to Proceed** - A Written Notice given by OWNER to CONTRACTOR fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform CONTRACTOR's obligations under the Contract Documents.
- 1.31 OWNER** - City of Austin, Texas, a municipal corporation, home rule city and political subdivision organized and existing under the laws of the State of Texas, acting through the City Manager or his/her designee, officers, agents or employees to administer design and construction of the Project.
- 1.32 Owner's Representative** - The designated representative of the OWNER. The Owner's Representative will be identified at the pre-construction conference.
- 1.33 Partial Occupancy or Use** - Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work, provided OWNER and CONTRACTOR have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, utilities, corrective work, insurance and warranties.
- 1.34 Project** - The subject of the Work and its intended result.
- 1.35 Project Manual** - That portion of the Contract Documents which may include the following: introductory information; bidding requirements, Contract forms and General and Supplemental General Conditions; General Requirements; Specifications; Drawings; MBE/WBE or DBE Procurement Program Package; Project Safety Manual; and Addenda.
- 1.36 Resident Project Representative** - The authorized representative of E/A who may be assigned to the site or any part thereof.
- 1.37 Shop Drawings** - All drawings, diagrams, illustrations, schedules and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR as required by the Contract Documents.
- 1.38 Specifications** - Those portions of the Contract Documents consisting of written technical descriptions as applied to the Work, which set forth to CONTRACTOR, in detail, the requirements which must be met by all materials, equipment, construction systems, standards, workmanship, equipment and services in order to render a completed and useful project.
- 1.39 Solicitation** - Solicitation means, as applicable, an Invitation for Bid or a Request for Proposal.
- 1.40 Substantial Completion** - The stage in the progress of the Work when the Work, or designated portion thereof, is sufficiently complete in accordance with the Contract Documents so OWNER can occupy or utilize the Work for its intended use, as evidenced by a Certificate of Substantial Completion approved by OWNER.

- 1.41 Subcontractor** - An individual, firm, corporation, or other business entity having a direct contract with CONTRACTOR for the performance of a portion of the Work under the Contract.
- 1.42 Sub-Subcontractor** - A person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the work.
- 1.43 Superintendent** - The representative of CONTRACTOR authorized in writing to receive and fulfill instructions from the Owner's Representative, and who shall supervise and direct construction of the Work.
- 1.44 Supplemental General Conditions** - The part of the Contract Documents which amends or supplements the General Conditions. All General Conditions which are not so amended or supplemented remain in full force and effect.
- 1.45 Supplier** - An individual or entity having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by CONTRACTOR or any Subcontractor.
- 1.46 Time Extension Request** - An approved request for time extension on a form acceptable to OWNER.
- 1.47 Work** - The entire completed construction, or the various separately identifiable parts thereof, required to be furnished under the Contract Documents.
- 1.48 Working Day** - Any day of the week, not including Saturdays, Sundays, or Legal Holidays in which conditions under the CONTRACTOR's control will permit work for a continuous period of not less than seven (7) hours between 7:00 a.m. and 6:00 p.m. If other contract documents reduce the continuous period available for work to less than seven (7) hours, those reduced hours shall be considered a Working Day. Upon agreement with Owner's Representative, work on Saturdays, Sundays, and/or Legal Holidays may be allowed and will be considered a Working Day.
- 1.49 Working Hours**
- 1.49.1 Working Day Contract:** All Work shall be done between 7:00 a.m. and 6:00 p.m. unless otherwise authorized by Owner's Representative. However, emergency work may be done without prior permission as indicated in paragraph 6.11.5. If night Work is authorized and conditions under CONTRACTOR's control will permit Work for a continuous period of not less than seven (7) hours between 12:00 a.m. and 11:59 p.m. it will be considered a Working Day. Night Work may be revoked at any time by OWNER if CONTRACTOR fails to maintain adequate equipment and supervision for the prosecution and control of the night Work.
- 1.49.2 Calendar Day Contract:** All Work shall be done between 7:00 a.m. and 6:00 p.m. unless authorized by Owner's Representative. However, emergency work may be done without prior permission as indicated in paragraph 6.11.5. Night Work may be revoked at any time by OWNER if CONTRACTOR fails to maintain adequate equipment and supervision for the prosecution and control of the night Work.
- 1.50 Written Notice** - Written communication between OWNER and CONTRACTOR. Written Notice shall be deemed to have been duly served if delivered in person to Owner's Representative or CONTRACTOR's duly authorized representative, or if delivered at or sent by registered or certified mail to the attention of Owner's Representative or CONTRACTOR's duly authorized representative at the last business address known to the party giving notice.

ARTICLE 2 - PRELIMINARY MATTERS

- 2.1 Delivery of Agreement, Bonds, Insurance, etc.:** Within five (5) Working Days after written notification of award of Contract, CONTRACTOR shall deliver to OWNER signed Agreement, Bond(s), Insurance Certificate(s) and other documentation required for execution of Contract.
- 2.2 Copies of Documents:** OWNER shall furnish to CONTRACTOR (1) copy of the executed Project Manual, one (1) set of Drawings and one (1) copy of the Contract Documents in .pdf format. Additional copies will be furnished, upon request, at the cost specified in the Supplemental General Conditions.”
- 2.3 Commencement of Contract Times; Notice to Proceed:** The Contract Time(s) will begin to run on the day indicated in the Notice to Proceed. Notice to Proceed will be given at any time within sixty (60) calendar days after the Execution Date of the Agreement, unless extended by written agreement of the parties.
- 2.4 Before Starting Construction:**
- 2.4.1** No Work shall be done at the site prior to the preconstruction conference without OWNER's approval. Before undertaking each part of the Work, CONTRACTOR shall carefully study the Contract Documents to check and verify pertinent figures shown thereon compare accurately to all applicable field measurements. CONTRACTOR shall promptly report in writing to Owner's Representative any conflict, error, ambiguity or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from Owner's Representative before proceeding with any Work affected thereby. CONTRACTOR shall be liable to OWNER for failure to report any conflict, error, ambiguity or discrepancy in the Contract Documents of which CONTRACTOR knew or reasonably should have known.
- 2.4.2** It is mutually agreed between CONTRACTOR and OWNER that successful completion of the Work within the Contract completion date is of primary importance. Therefore, the CONTRACTOR hereby agrees to submit to the Owner's Representative for review and approval, or acceptance, as appropriate, all information requested within this section, including a Baseline Schedule, no later than five working days prior to the preconstruction conference. The Owner's Representative will schedule the preconstruction conference upon the timely submittal of the required documents, unless time is extended by written mutual agreement. CONTRACTOR will submit the following:
- .1** A proposed Baseline Schedule developed using Microsoft Project software, unless otherwise approved by Owner's Representative ("Baseline Schedule") to confirm that all Work will be completed within the Contract time. The Baseline Schedule must (i) indicate the times (number of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents, (ii) identify the Critical Path for completing the Work, (iii) identify when all Subcontractors will be utilized, and (iv) take into consideration any limitations on Working Hours, including baseline Rain Days on Calendar Day Contracts, and (v) be prepared accordance with Section 01310, Schedules and Reports, if applicable; otherwise in accordance with Section 01300, Submittals. This Baseline Schedule, a copy of which shall be made available at the job site(s), must contain sufficient detail to indicate that the CONTRACTOR has properly identified required Work elements and tasks, has provided for a sufficient and proper workforce and integration of Subcontractors, has provided sufficient

resources and has considered the proper sequencing of the Work required to result in a successful Project that can be completed within the Contract time;

- .2 An organizational chart showing the principals and management personnel who will be involved with the Work, including each one's responsibilities for the Work;
- .3 To the extent not set forth in the Section 00400 Statement of Contractor's Experience, a complete listing of the CONTRACTOR's employees proposed for the Work. List each one by name and job title, and show length of employment with CONTRACTOR;
- .4 To the extent not set forth in the Section 00410 Statement of Bidder's Safety Experience, a discussion and confirmation of the CONTRACTOR's commitment to safety by providing a copy of its employee's safety handbook and the safety records for the past three years of CONTRACTOR's proposed project manager and Superintendent;
- .5 A preliminary schedule of Shop Drawing and sample submittals;
- .6 A preliminary schedule of values for all of the Work, subdivided into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will be deemed to include an appropriate amount of overhead and profit applicable to each item of Work;
- .7 To the extent not set forth in the Section 00400 Statement of Contractor's Experience, a letter designating CONTRACTOR's Superintendent and project manager, and a confirmation of past project experience for the CONTRACTOR's Superintendent and project manager specifically intended for the Work;
- .8 A letter from CONTRACTOR and Subcontractor(s) listing salaried specialists. A salaried specialist is anyone except an hourly worker whose wage rate is governed by Section 00830 of this agreement;
- .9 A letter designating the project's Safety Representative along with a copy of their Department of Labor-issued OSHA card proving completion of the OSHA 30-hour Construction Safety and Health training class in the OSHA Outreach Training Program;
- .10 If applicable, an excavation safety system plan;
- .11 If applicable, a plan illustrating proposed locations of temporary facilities;
- .12 A completed Non-Use of Asbestos Affidavit (Prior to Construction);
- .13 A letter designating the Texas Registered Professional Land Surveyor for layout of the Work, if the Work requires the services of a surveyor; and
- .14 Copies of the Department of Labor-issued OSHA cards proving completion of the OSHA 10-hour Construction Safety and Health training class in the OSHA Outreach Training Program for each worker (defined as a person covered by a prevailing wage determination) that will initially be on site. Note that workers must possess other OSHA-required training as the work dictates in accordance with the OSHA Act; and specifically, the contractor must meet the required provisions in 509S Excavation Safety Systems required prior to commencing excavation;

.15 A certificate of worker's compensation insurance coverage for all persons providing services on the Project (refer to 5.2.1.3 in Section 00700 for definition of persons providing services on the Project);

.16 A Construction Equipment Emissions Reduction Plan.

2.4.3 Neither the acceptance nor the approval of any of the submittals required in paragraph 2.4.2, above, will constitute the adoption, affirmation, or direction of the CONTRACTOR'S means and methods.

2.5 Preconstruction Conference: Prior to commencement of Work at the site, CONTRACTOR must attend a preconstruction conference with Owner's Representative and others, as set forth in Division 1. Additionally, prior to commencement of work, the CONTRACTOR shall host a preconstruction conference for the Subcontractors identified on the originally approved compliance plan, Owner's Representative and others, as set forth in Division 1. The CONTRACTOR shall notify all Subcontractors five (5) working days prior to the preconstruction conference. If the CONTRACTOR has included Subcontractors in the initial preconstruction conference, the additional Subcontractor preconstruction conference will not be required.

2.6 Initially Acceptable Schedules: Unless otherwise provided in the Contract Documents, CONTRACTOR shall obtain approval of Owner's Representative on the Baseline Schedule submitted in accordance with paragraph 2.4.2.1 and Division 1 before the first progress payment will be made to CONTRACTOR. The Baseline Schedule must provide for an orderly progression of the designated portion of the Work to completion within any specified Milestones and Contract Times. Acceptance of the schedule by Owner's Representative will neither impose on Owner's Representative responsibility or liability for the sequencing, scheduling or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility for such Work. CONTRACTOR's schedule of Shop Drawings and sample submissions must provide an acceptable basis for reviewing and processing the required submittals. CONTRACTOR's schedule of values must conform to the requirements set forth in Division 1.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.1 Intent:

3.1.1 The intent of the Contract Documents is to include all information necessary for the proper execution and timely completion of the Work by CONTRACTOR. The CONTRACTOR will execute the Work described in and reasonably inferable from the Contract Documents as necessary to produce the results indicated by the Contract Documents. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all. In cases of disagreement, the following order of precedence shall generally govern (top item receiving priority of interpretation):

- Signed Agreement
- Addendum to the Contract Documents, including approved changes
- Supplemental General Conditions
- General Conditions
- Other Bidding Requirements and Contract Forms
- Special Provisions to the Standard Technical Specifications
- Special Specifications
- Standard Technical Specifications

Drawings (figured dimensions shall govern over scaled dimensions)
Project Safety Manual (if applicable),

with the understanding that a common sense approach will be utilized as necessary so that the Contract Documents produce the intended response.

3.1.2 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

3.2 Reporting and Resolving Discrepancies: If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and any provisions of any such law or regulation applicable to the performance of the Work or of any such standard, specification, manual or code or instructions of any Supplier, CONTRACTOR shall report it to Owner's Representative in writing at once, and CONTRACTOR shall not proceed with the Work affected thereby until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.3.1 or 3.3.2. CONTRACTOR shall be liable to OWNER for failure to report any such conflict, error, ambiguity or discrepancy of which CONTRACTOR knew or reasonably should have known.

3.3 Modifying and Supplementing Contract Documents:

3.3.1 The Contract Documents may be modified to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions by change order or contract amendment.

3.3.2 In addition, the requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, in one or more of the following ways:

- .1 Field Order.
- .2 Review of a Shop Drawing or sample.
- .3 Written interpretation or clarification.

3.4 Reuse of Documents Prohibited: CONTRACTOR and any Subcontractor or Supplier or other person or organization 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 E/A or E/A's consultant, and (ii) shall not reuse any of such Drawings, Specifications, other documents or copies on extensions of the Project or any other project without written consent of OWNER and E/A.

3.5 In the event of the breach by the OWNER or CONTRACTOR of any of its obligations under the Contract, so as to support a claim by the other party, the provisions of this Contract will be equitably construed to allow the resolution of such a claim and all of the other provisions of this Contract shall continue in full force and effect as to the rights, responsibilities, and remedies of the OWNER and CONTRACTOR.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

4.1 Availability of Lands: The OWNER will provide access to all land and interests in land required for the Work and will notify CONTRACTOR of any restrictions in such access. CONTRACTOR may make a claim if OWNER fails to provide timely access to the Work.

CONTRACTOR must obtain any additional temporary construction facilities, stockpiling or storage sites not otherwise provided.

4.2 Subsurface and Physical Conditions:

4.2.1 CONTRACTOR specifically represents that it has carefully examined the plans, the geotechnical report, if any, and the site of the proposed Work and is thoroughly familiar with all of the conditions surrounding construction of the Project, having had the opportunity to conduct any and all additional inquiry, tests and investigation that he/she deems necessary and proper. CONTRACTOR acknowledges the receipt of the geotechnical report, if any, and agrees that the report, while it is an accurate record of the geotechnical conditions at the boring locations, is not a guarantee of specific site conditions which may vary between boring locations.

4.2.2 CONTRACTOR must notify OWNER in writing as soon as reasonably possible, but no later than three (3) calendar days, if unforeseen conditions are encountered at the site which are (i) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (ii) unknown physical conditions of an unusual nature, that differ materially from those normally encountered in the type of work being performed under this Contract. CONTRACTOR may not disturb the conditions until OWNER conducts an investigation. Owner's Representative and E/A will promptly investigate such conditions with E/A. If it is determined that such conditions differ materially and cause an increase or decrease in the CONTRACTOR's cost of or time required for performance of any part of the Work, Owner's Representative will recommend an equitable adjustment in the Contract Amount or Contract Time, or both. If it is determined that such conditions are not materially different from those indicated in the Contract Documents, Owner's Representative will notify CONTRACTOR in writing of such findings and the Contract will not be adjusted. CONTRACTOR may dispute such a determination in accordance with Article 16.

4.2.3 Notwithstanding any other provision of this Contract, CONTRACTOR is solely responsible for the location and protection of any and all public utility lines and utility customer service lines in the Work area. "Public utility lines" means the utility distribution and supply system, and "utility customer service lines" means the utility lines connecting customers to the utility distribution and collection system. Generally, existing utility customer service line connections are not shown on the Drawings. CONTRACTOR shall notify "One Call" and exercise due care to locate, mark, uncover and otherwise protect all such lines in the construction zone and any of CONTRACTOR's work or storage areas. CONTRACTOR's responsibility for the location and protection of utilities is primary and nondelegable. **CONTRACTOR shall indemnify or reimburse such expenses or costs (including fines that may be levied against OWNER) that may result from unauthorized or accidental damage to all public lines and utility customer service lines in the work area. OWNER reserves the right to repair any damage CONTRACTOR causes to such utilities at CONTRACTOR's expense. If a public line and/or customer service line is damaged by CONTRACTOR, CONTRACTOR shall give verbal notice within one (1) hour and written notice within twenty-four (24) hours to the Owner's Representative.**

4.2.4 CONTRACTOR shall take reasonable precaution to avoid disturbing primitive records and antiquities of archaeological, paleontological or historical significance. No objects of this nature shall be disturbed without written permission of OWNER and Texas Historical Commission. When such objects are uncovered unexpectedly, CONTRACTOR shall stop all Work in close proximity and notify Owner's Representative and Texas Historical Commission of their presence and shall not disturb them until written permission and permit to do so is granted. All primitive rights and antiquities uncovered on OWNER's property shall remain property of State of Texas, Texas Historical Commission conforming to Texas Natural Resources Code. If it is determined by OWNER, in consultation with Texas Historical Commission, that exploration or excavation of primitive records or antiquities on Project site is necessary to avoid loss, CONTRACTOR shall cooperate in salvage work attendant to preservation. If the Work stoppage or salvage work causes an increase in CONTRACTOR's cost of, or time required for, performance of the Work, the Contract Amount and/or Contract Time will be equitably adjusted.

4.3 Reference Points: Unless otherwise specified, all control lines and bench marks suitable for use in layout will be furnished by OWNER. Lay out of the Work shall be performed in accordance with Division 1. Controls, bench marks and property boundary markers shall be carefully preserved by CONTRACTOR by use of flags, staffs or other visible devices and in case of destruction or removal by CONTRACTOR or its employees, such controls and bench marks shall be replaced by a Registered Professional Land Surveyor at CONTRACTOR's expense. City of Austin survey monuments damaged by CONTRACTOR will be reestablished by OWNER at CONTRACTOR's expense.

4.4 Hazardous Materials:

4.4.1 To the extent provided by applicable law, OWNER shall be responsible for any hazardous material uncovered or revealed at the site which was not shown, indicated or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the site. CONTRACTOR shall immediately notify Owner's Representative of any suspected hazardous materials encountered before or during performance of the Work and shall take all necessary precautions to avoid further disturbance of the materials.

4.4.2 CONTRACTOR shall be responsible for any hazardous materials brought to the site by CONTRACTOR, Subcontractor, Suppliers or anyone else for whom CONTRACTOR is responsible.

4.4.3 No asbestos-containing materials shall be incorporated into the Work or brought on Project site without prior approval of OWNER. The CONTRACTOR shall not knowingly use, specify, request or approve for use any asbestos containing materials or lead-based paint without the OWNER'S written approval. When a specific product is specified, the CONTRACTOR shall endeavor to verify that the product does not include asbestos containing material.

4.4.4 Refer to Division 1 for hazardous material definitions and procedures.

.1 Unless otherwise expressly provided in the Contract Documents to be part of the Work, CONTRACTOR is not responsible for any unexpected Hazardous Materials encountered at the site. Upon encountering any Hazardous Conditions, CONTRACTOR must stop Work immediately in the affected area and duly notify OWNER and, if required by applicable law or regulations, all government or quasi-government entities with jurisdiction over the Project or site.

- .2 Upon receiving notice of the presence of suspected Hazardous Materials, OWNER shall take the necessary measures required to ensure that the Hazardous Materials are remediated or rendered harmless. Such necessary measures shall include OWNER retaining qualified independent experts to (i) ascertain whether Hazardous Materials have actually been encountered, and, if they have been encountered, (ii) prescribe the remedial measures that OWNER must take either to remove the Hazardous Materials or render the Hazardous Materials harmless.
- .3 CONTRACTOR shall be obligated to resume Work at the affected area of the Project only after OWNER's Representative provides written certification that (i) the Hazardous Materials have been removed or rendered harmless and (ii) all necessary approvals have been obtained from all government and quasi-government entities having jurisdiction over the Project or site. The CONTRACTOR shall be responsible for continuing the Work in the unaffected portion of the Project and site.
- .4 CONTRACTOR will be entitled, in accordance with these General Conditions, to an adjustment in its Contract Amount and/or Contract Time(s) to the extent CONTRACTOR's cost and/or time of performance have been adversely impacted by the presence of Hazardous Materials.
- .5 Notwithstanding the preceding provisions of this Section 4.1, OWNER is not responsible for Hazardous Materials introduced to the Site by CONTRACTOR, Subcontractors or anyone for whose acts they may be liable. **CONTRACTOR shall indemnify, defend and hold harmless OWNER and OWNER's officers, directors, employees and agents from and against all claims, losses, damages, liabilities and expenses, including attorneys' fees and expenses, arising out of or resulting from those hazardous materials introduced to the site by CONTRACTOR, Subcontractors or anyone for whose acts they may be liable.**

4.4.5 CONTRACTOR shall be responsible for use, storage and remediation of any hazardous materials brought to the Site by CONTRACTOR, Subcontractors, Suppliers or anyone else for whom CONTRACTOR is responsible.

ARTICLE 5 - BONDS AND INSURANCE

5.1 Surety and Insurance Companies: All bonds and insurance required by the Contract Documents shall be obtained from solvent surety or insurance companies that are duly licensed by the State of Texas and authorized to issue bonds or insurance policies for the limits and coverages required by the Contract Documents. The bonds shall be in a form acceptable to OWNER and shall be issued by a surety which complies with the requirements of Texas Insurance Code, Title 12, Chapter 3503. The surety must obtain reinsurance for any portion of the risk that exceeds 10% of the surety's capital and surplus. For bonds exceeding \$100,000, the surety must also hold a certificate of authority from the U.S. Secretary of the Treasury or have obtained reinsurance for any liability in excess of \$1,000,000 from a reinsurer that is authorized as a reinsurer in Texas or holds a certificate of authority from the U.S. Secretary of the Treasury. In the event that the proposed surety for a contract award in excess of \$100,000 does not hold a certificate of authority from the

U.S. Secretary of the Treasury and/or its proposed reinsurer does not hold a certificate of authority from the U.S. Secretary of the Treasury, the OWNER may require additional financial solvency information from the Bidder/Contractor and the proposed surety company and/or reinsurer as part of the 00400 Statement of Bidders Experience and determination of bidder responsibility in the award of the Contract.

5.2 Workers' Compensation Insurance Coverage:

5.2.1 Definitions:

- .1** Certificate of coverage ("certificate") - A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement (DWC-81, DCW-82, DCW-83, or DCW84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on the Project, for the duration of the Project.
- .2** Duration of the Project - includes the time from the beginning of the Work on the Project until the CONTRACTOR's/ person's Work on the Project has been completed and accepted by OWNER.
- .3** Persons providing services on the Project ("subcontractor" in Texas Labor Code, Section 406.096) - includes all persons or entities performing all or part of the services the CONTRACTOR has undertaken to perform on the Project, regardless of whether that person contracted directly with the CONTRACTOR and regardless of whether that person has employees. This includes, without limitation, independent contractors, Subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the Project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the Project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

5.2.2 CONTRACTOR shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all employees of the CONTRACTOR providing services on the Project, for the duration of the Project.

5.2.3 CONTRACTOR must provide a certificate of coverage to OWNER prior to being awarded the Contract.

5.2.4 If the coverage period shown on the CONTRACTOR's current certificate of coverage ends during the duration of the Project, the CONTRACTOR must, prior to the end of the coverage period, file a new certificate of coverage with OWNER showing that coverage has been extended.

5.2.5 CONTRACTOR shall obtain from each person providing services on the Project, and provide to OWNER:

- .1** A certificate of coverage, prior to that person beginning Work on the Project, so OWNER will have on file certificates of coverage showing coverage for all persons providing services on the Project; and
- .2** No later than seven (7) days after receipt by CONTRACTOR, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the Project.

- 5.2.6** CONTRACTOR shall retain all required certificates of coverage for the duration of the Project and for one (1) year thereafter.
- 5.2.7** CONTRACTOR shall notify OWNER in writing by certified mail or personal delivery, within ten (10) days after CONTRACTOR knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the Project.
- 5.2.8** CONTRACTOR shall post on each Project site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services on the Project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.
- 5.2.9** CONTRACTOR shall contractually require each person with whom it contracts to provide services on a Project, to:
- .1** Provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all of its employees providing services on the Project, for the duration of the Project;
 - .2** Provide to CONTRACTOR, prior to that person beginning Work on the Project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the Project, for the duration of the Project;
 - .3** Provide CONTRACTOR, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the Project;
 - .4** Obtain from each other person with whom it contracts, and provide to CONTRACTOR: a) a certificate of coverage, prior to the other person beginning Work on the Project; and b) a new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the Project;
 - .5** Retain all required certificates of coverage on file for the duration of the Project and for one (1) year thereafter;
 - .6** Notify OWNER in writing by certified mail or personal delivery, within ten (10) days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the Project; and
 - .7** Contractually require each person with whom it contracts, to perform as required by paragraphs 5.2.9.1 - 5.2.9.7, with the certificates of coverage to be provided to the person for whom they are providing services.
- 5.2.10** By signing this Contract or providing or causing to be provided a certificate of coverage, CONTRACTOR is representing to OWNER that all employees of the CONTRACTOR who will provide services on the Project will be covered by workers' compensation coverage for the duration of the Project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the Texas Worker's Compensation Commission's Division of Self- Insurance Regulation. Providing false or misleading information

may subject CONTRACTOR to administrative penalties, criminal penalties, civil penalties, or other civil actions.

5.2.11 CONTRACTOR's failure to comply with any of these provisions is a breach of Contract by CONTRACTOR which entitles OWNER to declare the Contract void if CONTRACTOR does not remedy the breach within ten (10) days after receipt of notice of breach from OWNER.

5.3 Other Bond and Insurance Requirements: For additional insurance requirements, refer to the Supplemental General Conditions.

5.4 Bonds:

5.4.1 General.

- .1 Bonds, when required, shall be executed on forms furnished by or acceptable to OWNER. All bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.
- .2 If the surety on any bond furnished by CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in the State of Texas or it ceases to meet the requirements of the preceding paragraph, CONTRACTOR shall within ten (10) days thereafter substitute another bond and surety, both of which must be acceptable to OWNER.
- .3 When Performance Bonds and/or Payment Bonds are required, each shall be issued in an amount of one hundred percent (100%) of the Contract Amount as security for the faithful performance and/or payment of all CONTRACTOR's obligations under the Contract Documents. Performance Bonds and Payment Bonds shall be issued by a solvent surety company authorized to do business in the State of Texas, and shall meet any other requirements established by law or by OWNER pursuant to applicable law. Any surety duly authorized to do business in Texas may write Performance and Payment Bonds on a project without reinsurance to the limit of ten percent (10%) of its capital and surplus. Such a surety must reinsure any obligations over ten percent (10%).

5.4.2 Performance Bond.

- .1 If the Contract Amount exceeds \$100,000, CONTRACTOR shall furnish OWNER with a Performance Bond in the form set out in Section 00610.
- .2 If the Contract Amount exceeds \$25,000 but is less than or equal to \$100,000, CONTRACTOR shall furnish OWNER with a Performance Bond in the form set out in Section 00610, unless the original Contract Time is 60 Calendar Days/40 Working Days or less, in which case CONTRACTOR can agree to the following terms and conditions for payment in lieu of providing a Performance Bond: no moneys will be paid to CONTRACTOR until completion and acceptance of the Work by OWNER; CONTRACTOR shall be entitled to receive 95% of the Contract Amount following Final Completion, and the remaining 5% of the Contract Amount following the one (1) year warranty period.
- .3 If the Contract Amount is less than or equal to \$25,000, CONTRACTOR will not be required to furnish a Performance Bond; provided that no moneys will be paid to CONTRACTOR until completion and acceptance of the Work by OWNER under the following terms and conditions: CONTRACTOR shall be entitled to receive 95% of the Contract Amount following Final Completion, and the remaining 5% of the Contract Amount following the one (1) year warranty period.

- .4 If a Performance Bond is required to be furnished, it shall extend for the one (1) year warranty period.

5.4.3 Payment Bond.

- .1 If the Contract Amount exceeds \$50,000, CONTRACTOR shall furnish OWNER with a Payment Bond in the form set out in Section 00620.
- .2 If the Contract Amount is less than or equal to \$50,000, CONTRACTOR will not be required to furnish a Payment Bond; provided that no moneys will be paid to CONTRACTOR until completion and acceptance of the Work by OWNER under the terms and conditions specified in paragraph 5.4.2.3.

5.4.4 Maintenance Bond: If the Contract Documents contemplate a period of maintenance beyond the one (1) year contractual warranty period, OWNER agrees that any bond to be required for such maintenance work will be in the amount of the maintenance work during any extended maintenance period.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.1 Supervision and Superintendence:

6.1.1 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. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

6.1.2 CONTRACTOR shall have a competent, qualified Superintendent on the Work at all times that work is in progress. To be qualified, at a minimum, the Superintendent must be effective at (a) communicating both verbally and in writing with the OWNER's representative; (b) receiving and fulfilling instructions from the Owner's Representative; (c) supervising and directing the construction of the Work; (d) reading and interpreting the plans and specifications; (e) writing, preparing and submitting necessary paperwork; and (f) understanding work sequencing and scheduling. The Superintendent will be CONTRACTOR's representative on the Work and shall have the authority to act on the behalf of CONTRACTOR. All communications given to the Superintendent shall be as binding as if given to CONTRACTOR. Either CONTRACTOR or the Superintendent shall provide a cellular telephone number and an emergency and home telephone number at which one or the other may be reached if necessary when work is not in progress. The Superintendent must be an employee of the CONTRACTOR, unless such requirement is waived in writing by the Owner's Representative. If the CONTRACTOR proposes a management structure with a Project Manager supervising, directing, and managing construction of the work in addition to or in substitution of a Superintendent, the requirements of these Construction Documents with respect to the Superintendent shall likewise apply to any such Project Manager.

- .1 CONTRACTOR shall present the resume of the proposed Superintendent to the Owner's Representative showing evidence of experience and successful superintendence and direction of work of a similar scale and complexity. If, in the opinion of the Owner's Representative, the proposed Superintendent does

not indicate sufficient experience in line with the Work, he/she will not be allowed to be the designated Superintendent for the Work.

- .2 The Superintendent shall not be replaced without Written Notice to Owner's Representative. If CONTRACTOR deems it necessary to replace the Superintendent, CONTRACTOR shall provide the necessary information for approval, as stated above, on the proposed new Superintendent.
- .3 A qualified substitute Superintendent may be designated in the event that the designated Superintendent is temporarily away from the Work, but not to exceed a time limit acceptable to the Owner's Representative. CONTRACTOR shall replace the Superintendent upon OWNER's request in the event the Superintendent is unable to perform to OWNER's satisfaction.

6.2 Labor, Materials and Equipment:

- 6.2.1** CONTRACTOR shall maintain a work force adequate to accomplish the Work within the Contract Time. CONTRACTOR agrees to employ only orderly and competent workers, skillful in performance of the type of Work required under this Contract. CONTRACTOR, Subcontractors, Sub-subcontractors, and their employees may not use or possess any alcoholic or other intoxicating beverages, illegal drugs or controlled substances while on the job or on OWNER's property, nor may such workers be intoxicated, or under the influence of alcohol or drugs, on the job. Subject to the applicable provisions of Texas law, CONTRACTOR, Subcontractors, Sub-subcontractors, and their employees may not use or possess any firearms or other weapons while on the job or on OWNER'S property. If OWNER or Owner's Representative notifies CONTRACTOR that any worker or representative of Contractor is incompetent, disorderly, abusive, or disobedient, has knowingly or repeatedly violated safety regulations, has possessed any firearms in contravention of the applicable provisions of Texas law, or has possessed or was under the influence of alcohol or drugs on the job, CONTRACTOR shall immediately remove such worker or representative, including an officer or owner of CONTRACTOR, from performing Contract Work, and may not employ such worker or representative again on Contract Work without OWNER's prior written consent. CONTRACTOR shall at all times maintain good discipline and order on or off the site in all matters pertaining to the Project. Workers on Project shall be paid not less than wage rates, including fringe benefits, as published by the Department of Labor (DOL) for Building Construction and Heavy and Highway Trades "AS APPLICABLE" and/or the minimum wage required by City of Austin Ordinance No. 20160324-015, whichever is higher. The Total Minimum Wage required can be met using any combination of cash and non-cash qualified fringe benefits provided the cash component meets or exceeds the minimum wage required.
- 6.2.2** Unless otherwise specified in Division 1, CONTRACTOR shall provide and pay for all 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 furnishing, performance, testing, start-up and completion of the Work.
- 6.2.3** All materials and equipment shall be of good quality and new (including new products made of recycled materials, pursuant to Section 361.426 of the Texas Health & Safety Code), except as otherwise provided in the Contract Documents. If required by Owner's Representative, CONTRACTOR shall furnish satisfactory evidence (reports of required tests, manufacturer's certificates of compliance with material requirements, mill reports, etc.) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected,

erected, used, cleaned and conditioned in accordance with instructions of the applicable Supplier, except as otherwise provided in the Contract Documents.

6.2.4 Substitutes and "Approved Equal" Items:

- .1** 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 specification or description is intended to establish the type, function and quality required. Unless the specification or description contains words reading that no like, equivalent or "approved equal" item or no substitution is permitted, other items of material or equipment of other Suppliers may be submitted by CONTRACTOR, at CONTRACTOR'S sole risk, including disruptions to the Critical Path of the Progress Schedule, to E/A through Owner's Representative under the following circumstances:
 - 1.1** "Approved Equal": If in E/A's sole discretion 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, it may be considered by E/A as an "approved equal" item, in which case review of the proposed item may, in E/A's sole discretion, be accomplished without compliance with some or all of the requirements for evaluation of proposed substitute items. CONTRACTOR shall provide E/A with the documentation required for E/A to make its determination.
 - 1.2** Substitute Items: If in E/A's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "approved equal" item under subparagraph 6.2.4.1.1, it will be considered a proposed substitute item. CONTRACTOR shall submit sufficient information as provided in Division 1 to allow E/A to determine that the item of material or equipment proposed is essentially equivalent to that named and a substitute therefor.
- .2** Substitute Construction Methods and Procedures: If a specific means, method, technique, sequence or procedure of construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may, at CONTRACTOR'S sole risk, including disruptions to the Critical Path of the Progress Schedule, with prior approval of E/A furnish or utilize a substitute means, method, technique, sequence, or procedure of construction. CONTRACTOR shall submit sufficient information to Owner's Representative to allow E/A, in E/A's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by E/A will be same as that provided for substitute items in Division 1.
- .3** E/A's Evaluation: E/A will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to subparagraphs 6.2.4.1.1 and 6.2.4.1.2. E/A will be the sole judge of acceptability. No "approved equal" or substitute shall be ordered, installed, or utilized until E/A's review is complete, which will be evidenced by either a Change Order or completion of the Shop Drawing review procedure. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety bond with respect to any "approved equal" or substitute or for any other delay or disruption to the Critical Path of the Project Schedule attributable to any such substitution. OWNER shall not be responsible for any delay due to review time for any "approved equal" or substitute.

- .4 CONTRACTOR's Expense: All data and documentation to be provided by CONTRACTOR in support of any proposed "approved equal" or substitute item will be at CONTRACTOR's expense.
- .5 The approval of the E/A will not relieve the CONTRACTOR from primary responsibility and liability for the suitability and performance of any proposed substitute item, method or procedure and will not relieve CONTRACTOR from its primary responsibility and liability for curing defective Work and performing warranty work, which the CONTRACTOR shall cure and perform, regardless of any claim the CONTRACTOR may choose to advance against the E/A or manufacturer.

6.2.5 CONTRACTOR agrees to assign to OWNER any rights it may have to bring antitrust suits against its Suppliers for overcharges on materials incorporated in the Project growing out of illegal price fixing agreements. CONTRACTOR further agrees to cooperate with OWNER should OWNER wish to prosecute suits against Suppliers for illegal price fixing.

6.3 Progress Schedule: Unless otherwise provided in Division 1, CONTRACTOR shall adhere to the Baseline Schedule established in accordance with paragraph 2.6 as it may be adjusted from time to time as provided below:

6.3.1 CONTRACTOR shall submit to Owner's Representative for review and approval any proposed adjustments in the Progress Schedule that will not change the Contract Times or Milestones on a monthly basis. Any such proposed adjustments must be substantiated with documentation of any changes to the underlying logic of the Progress Schedule. CONTRACTOR's Progress Schedule must show how the CONTRACTOR will consistently advance the progress of the Work in accordance with the Critical Path of the Work and the Contract Time or Milestones. Such adjustments will conform generally to the Progress Schedule then in effect and additionally will comply with any provisions of Division 1 applicable thereto.

6.3.2 Proposed adjustments in the Progress Schedule that will change the Contract Times or Milestones shall be submitted in accordance with the requirements of Article 12. Any such proposed adjustments must be substantiated with documentation of any changes to the underlying logic of the Progress Schedule. Such adjustments may only be made by a Change Order or Time Extension Request in accordance with Article 12.

6.4 Concerning Subcontractors, Suppliers and Others:

6.4.1 Assignment: CONTRACTOR agrees to retain direct control of and give direct attention to the fulfillment of this Contract. CONTRACTOR agrees not to, by Power of Attorney, or otherwise, assign said Contract without the prior written consent of OWNER. In addition, without OWNER'S written consent, the CONTRACTOR will not subcontract the performance of the entire Work or the supervision and direction of the Work.

6.4.2 Award of Subcontracts for Portions of the Work: CONTRACTOR shall not employ any Subcontractor, Supplier or other person or organization, whether initially or as a substitute, against whom OWNER may have reasonable objection. OWNER will communicate such objections by Written Notice. If OWNER requires a change without good cause of any Subcontractor, person or organization previously accepted by OWNER, the Contract Amount shall be increased or decreased by the difference in the cost occasioned by any such change, and appropriate Change Order shall be issued. CONTRACTOR shall not substitute any Subcontractor, person or

organization that has been accepted by OWNER, unless the substitute has been accepted in writing by OWNER. No acceptance by OWNER of any Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of OWNER to reject defective Work.

- 6.4.3** CONTRACTOR shall enter into written agreements with all Subcontractors and Suppliers which specifically binds the Subcontractors or Suppliers to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and E/A. The OWNER reserves the right to specify that certain requirements shall be adhered to by all Subcontractors and Sub-subcontractors as indicated in other portions of the Contract Documents and these requirements shall be made a part of the agreement between CONTRACTOR and Subcontractor or Supplier. Subject to and in accordance with the above requirements, the CONTRACTOR must provide and will be deemed for all purposes to have provided in its contracts with major Subcontractors or Suppliers on the Project (those contracts of more than \$10,000) the following specific provision: alternative dispute resolution (paragraphs 16.2 and 16.3), which shall be mandatory in the event of a subcontractor or supplier claim and a prerequisite for the submission of any derivative claim. The CONTRACTOR's standard subcontract form is subject to the OWNER's review and approval. The OWNER may request and the CONTRACTOR will provide within five (5) working days a copy of any subcontract requested by the OWNER.
- 6.4.4** CONTRACTOR shall be fully responsible to OWNER for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier or other person or organization any contractual relationship between OWNER and any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of OWNER or E/A to pay or to see to the payment of any moneys due any such Subcontractor, Supplier or other person or organization except as may otherwise be required by laws and regulations.
- 6.4.5** CONTRACTOR shall be solely responsible for efficiently scheduling and coordinating the Work of Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR in order to avoid any delays or inefficiencies in the prosecution of the Work. CONTRACTOR shall require all Subcontractors, Suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with Owner's Representative through CONTRACTOR.
- 6.4.6** The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing or delineating the Work to be performed by any specific trade.
- 6.4.7** CONTRACTOR shall pay each Subcontractor and Supplier their appropriate share of payments made to CONTRACTOR not later than ten (10) Calendar Days of CONTRACTOR's receipt of payment from OWNER. Upon request from Owner, the CONTRACTOR has two (2) Working Days to provide documentation verifying Payment to Subcontractor(s). The CONTRACTOR is required to notify the Subcontractor(s) in writing of rejection of Application for Payment within two (2) Working Days following notification by Owner. Failure of CONTRACTOR to make payments to Subcontractors or for labor, materials or equipment in accordance to this contract, may be cause to reject future Bids by the CONTRACTOR in accordance

with Section 00100 9.2.4 and may be cause to reject payment in accordance with 00700 14.4.1.3.

6.4.8 To the extent allowed by Texas law, the OWNER shall be deemed to be a third party beneficiary to each subcontract and may, if OWNER elects, following a termination of the CONTRACTOR, require that the Subcontractor(s) perform all or a portion of unperformed duties and obligations under its subcontract(s) for the benefit of the OWNER, rather than the CONTRACTOR; however, if the OWNER requires any such performance by a Subcontractor for the OWNER's direct benefit, then the OWNER shall be bound and obligated to pay such Subcontractor the reasonable value for all Work performed by such Subcontractor to the date of the termination of the CONTRACTOR, less previous payments, and for all Work performed thereafter. In the event that the OWNER elects to invoke its right under this section, OWNER will provide notice of such election to the CONTRACTOR and the affected Subcontractor(s).

6.5 Patent Fees and Royalties:

6.5.1 CONTRACTOR shall be responsible at all times for compliance with applicable patents or copyrights encompassing, in whole or in part, any design, device, material, or process utilized, directly or indirectly, in the performance of the Work or the formulation or presentation of its Bid.

6.5.2 CONTRACTOR shall pay all royalties and license fees and shall provide, prior to commencement of Work hereunder and at all times during the performance of same, for lawful use of any design, device, material or process covered by letters, patent or copyright by suitable legal agreement with the patentee, copyright holder, or their duly authorized representative whether or not a particular design, device, material, or process is specified by OWNER.

6.5.3 **CONTRACTOR shall defend all suits or claims for infringement of any patent or copyright and shall save OWNER harmless from any loss or liability, direct or indirect, arising with respect to CONTRACTOR's process in the formulation of its Bid or the performance of the Work or otherwise arising in connection therewith. OWNER reserves the right to provide its own defense to any suit or claim of infringement of any patent or copyright in which event CONTRACTOR shall indemnify and save harmless OWNER from all costs and expenses of such defense as well as satisfaction of all judgments entered against OWNER.**

6.5.4 OWNER shall have the right to stop the Work and/or terminate this Agreement at any time in the event CONTRACTOR fails to disclose to OWNER that CONTRACTOR's work methodology includes the use of any infringing design, device, material or process.

6.6 Permits, Fees: Unless otherwise provided in the Supplemental General Conditions, CONTRACTOR shall obtain and pay for all construction permits, licenses and fees required for prosecution of the Work.

6.7 Laws and Regulations:

6.7.1 CONTRACTOR shall give all notices and comply with all laws and regulations applicable to furnishing and performing the Work, including arranging for and

obtaining any required inspections, tests, approvals or certifications from any public body having jurisdiction over the Work or any part thereof. Except where otherwise expressly required by applicable laws and regulations, neither OWNER nor E/A shall be responsible for monitoring CONTRACTOR's compliance with any laws and regulations.

6.7.2 Maintaining clean water, air and earth or improving thereon shall be regarded as of prime importance. CONTRACTOR shall plan and execute its operations in compliance with all applicable Federal, State and local laws and regulations concerning control and abatement of water pollution and prevention and control of air pollution.

6.7.3 If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to laws or regulations, CONTRACTOR shall bear all claims, costs, losses and damages arising therefrom; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with laws and regulations, but this does not relieve CONTRACTOR of CONTRACTOR's obligations under Article 3.

6.8 Taxes:

6.8.1 CONTRACTOR shall pay only those sales, consumer, use and other similar taxes required to be paid by CONTRACTOR in accordance with the laws and regulations of the State of Texas in the performance of this public works contract.

6.8.2 OWNER is an exempt organization as defined by Chapter 11 of the Property Tax Code of Texas and is thereby exempt from payment of Sales Tax under Chapter 151, Limited Use Sales, Excise and Use Tax, Texas Tax Code, and Article 1066 (C), Local Sales and Use Tax Act, Revised Civil Statutes of Texas.

6.9 Use of Premises:

6.9.1 CONTRACTOR shall confine construction equipment, the storage of materials and equipment and the operations of workers to the site and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by laws and regulations, right-of-way, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any adjacent land or areas, resulting from the performance of the Work. Should any claim be made by any such owner or occupant because of or in connection with the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law. **CONTRACTOR shall indemnify, defend and hold harmless OWNER, E/A, E/A'S Consultants and anyone directly or indirectly employed by any of them from and against all claims, costs, losses and damages (including court costs and reasonable attorney's fees) arising out of or resulting from any claim or action, legal or equitable, brought by any such owner or occupant against OWNER, E/A or any other party indemnified hereunder to the extent caused by or based upon performance of the work or failure to perform the Work.**

6.9.2 During the progress of the Work and on a daily basis, CONTRACTOR shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work, CONTRACTOR shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery and surplus materials. CONTRACTOR shall leave the site clean and ready for occupancy by OWNER at Substantial Completion of the Work. CONTRACTOR shall, at a minimum, restore to original condition all property not designated for alteration by the Contract Documents. If the CONTRACTOR fails to clean up at the completion of the Work, OWNER may do so and the cost thereof will be charged against the CONTRACTOR.

6.9.3 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 property to stresses or pressures that will endanger it.

6.10 Record Documents: CONTRACTOR shall maintain in a safe place at the site, or other location acceptable to OWNER, one (1) record copy of all Drawings, Specifications, Addenda, Change Orders, Change Directives, Field Orders and written interpretations and clarifications (issued pursuant to paragraph 9.5) in good order and annotated to show all changes made during construction. These record documents together with all final samples and all final Shop Drawings will be available to OWNER and E/A for reference during performance of the Work. Upon Substantial Completion of the Work, these record documents, samples and Shop Drawings shall be promptly delivered to Owner's Representative.

6.11 Safety and Protection:

6.11.1 CONTRACTOR shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Upon request, and prior to installation of measures, CONTRACTOR shall submit a site security plan for approval by OWNER. By reviewing the plan or making recommendations or comments, OWNER will not assume liability nor will CONTRACTOR be relieved of liability for damage, injury or loss. 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 Work 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, but not limited to, trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and underground facilities not designated for removal, relocation or replacement in the course of construction.

6.11.2 CONTRACTOR shall comply with all applicable laws and regulations of any public body having jurisdiction for safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of underground facilities, and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property referred to in paragraph 6.11.1.2 and 6.11.1.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, Subcontractor, Supplier or any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or

Specifications or to the acts or omissions of OWNER, or E/A, or E/A's consultant 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 faults or negligence of CONTRACTOR or any Subcontractor, Supplier or other person or organization directly or indirectly employed by any of them). CONTRACTOR's duties and responsibilities for safety and protection of the Work shall continue until such time as all the Work is completed and Owner's Representative has issued a notice to OWNER and CONTRACTOR in accordance with Article 14 that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion). Without limitation, CONTRACTOR shall comply with the following specific provisions:

It shall be the duty and responsibility of CONTRACTOR and all of its subcontractors to be familiar with and comply with 29 USC Section 651, et seq., the Occupational Safety and Health Act of 1970, as amended ("OSHA") and to enforce and comply with all provisions of this Act.

The CONTRACTOR and all of its subcontractors shall comply with all applicable requirements of Subpart P of Part 1926 of 29 C.F.R, OSHA Safety and Health Standards, Texas Health and Safety Code Section 756.023, as amended, and shall submit a unit price for the particular excavation safety systems to be utilized by the Contractor for all excavations which exceed a depth of five feet (5').

Before commencing any excavation which will exceed a depth of five feet (5'), the CONTRACTOR shall provide the Owner with detailed plans and specifications regarding the safety systems to be utilized. Said plans and specifications shall include a certification from a Texas licensed professional engineer indicating full compliance with the OSHA provisions cited above.

6.11.3 Safety Representative: CONTRACTOR shall designate in writing a qualified and experienced safety representative (the "Safety Representative") at the site whose duties and responsibilities shall include safety training; identifying and mitigating hazardous conditions and unsafe work practices; and developing, maintaining and supervising the implementation of safe work practices and safety programs as deemed necessary and appropriate for the Project. The term "Safety Representative" includes any designated Safety Supervisor, Superintendent or Safety Manager. The Safety Representative shall exercise due diligence in the execution of all Project related safety duties. Upon request of OWNER, CONTRACTOR shall provide certifications or other acceptable documentation of the Safety Representative's qualifications. The following requirements will be effective as of September 1, 2010:

- .1 The Safety Representative shall present certification of completion of the OSHA 30-hour Construction Industry Training Outreach Program described at: http://www.osha.gov/dte/outreach/construction_generalindustry/construction.html
- .2 The Safety Representative shall verify that all construction workers (defined as persons covered by a prevailing wage determination) on the job site, whether employed by the CONTRACTOR or subcontractors, have completed the OSHA 10-hour Construction Industry Training Outreach Program described at: http://www.osha.gov/dte/outreach/construction_generalindustry/construction.html. The Safety Representative must receive a certificate of training completion before allowing a worker on site and shall have all such certificates available for inspection by the OWNER.
- .3 The Safety Representative shall ensure that workers, including designated competent persons, have completed all applicable OSHA specific or other training needed to perform their job assignments. Training topics applicable

to the scope of the current Project may include, but are not limited to, scaffolds, fall protection, cranes, excavations, electrical safety, tools, concrete and masonry construction, steel erection, operation of motor vehicles and mechanized equipment.

- .4 The Safety Representative shall post notice on the site of the Work stating that all workers shall have completed OSHA Construction Industry Training. The Owner may require, and the Safety Representative should consider providing a means of readily identifying workers who have completed the required training to monitor compliance with these requirements.
- .5 The Safety Representative shall ensure that all required OSHA and Workers Compensation notices to workers are posted in English and Spanish at one or more conspicuous locations on the work site.

6.11.4 Hazard Communication Programs: 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 and regulations.

6.11.5 Emergencies:

- .1 In emergencies affecting the safety or protection of persons or the Work at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from OWNER or E/A, is obligated to act reasonably to prevent threatened damage, injury or loss and to mitigate damage or loss to the Work. CONTRACTOR shall give Owner's Representative telephone notification as soon as reasonably practical and a prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If Owner's Representative determines that a change in the Contract Documents is required because of the action taken by CONTRACTOR in response to such an emergency, a Change Directive or Change Order will be issued to document the consequences of such action; otherwise OWNER will not be responsible for CONTRACTOR's emergency action.
- .2 Authorized agents of CONTRACTOR shall respond immediately to call-out at any time of any day or night when circumstances warrant the presence on Project site of CONTRACTOR or his agent to protect the Work or adjacent property from damage, restriction or limitation or to take such action or measures pertaining to the Work as may be necessary to provide for the safety of the public. Should CONTRACTOR and/or their agent fail to respond and take action to alleviate such an emergency situation, OWNER may direct other forces to take action as necessary to remedy the emergency condition, and OWNER will deduct any cost of such remedial action from the funds due CONTRACTOR under this Contract.
- .3 In the event there is an accident involving injury to any individual or damage to any property on or near the Work, CONTRACTOR shall provide to Owner's Representative verbal notification within one (1) hour and written notification within twenty-four (24) hours of the event and shall be responsible for recording the location of the event and the circumstances surrounding the event through photographs, interviewing witnesses, obtaining medical reports, police accident reports and other documentation that describes the event. Copies of such documentation shall be provided to Owner's Representative, for OWNER's and E/A's records, within forty-eight (48) hours of the event.

Contractor shall cooperate with OWNER on any OWNER investigation of any such incident.

6.11.6 Rest Breaks:

- .1 Except as provided in subsection 6.11.6.2 below, an employee performing construction activity at a construction site is entitled to a rest break of not less than ten (10) minutes for every four (4) hours worked. No employee may be required to work more than 3.5 hours without a rest break. A rest break means a break from work within working hours, excluding meal breaks, during which an employee may not work. A rest break shall be scheduled as near as possible to the midpoint of the work period.
- .2 An employee is not entitled to a rest break under subsection 6.11.6.1 on any day the employee works less than 3.5 hours or spends more than half of his or her work time engaged in non-strenuous labor in a climate controlled environment.
- .3 A sign describing the requirements of this Section 6.11.6 in English and Spanish shall be posted by the employer in each establishment subject to the requirement of a rest break in a conspicuous place or places where notices to employees are customarily posted, in accordance with the OWNER's then current rules for size, content, and location of such signage.
- .4 The violation of Ordinance No. 20100729-047, enacted July 29, 2010, which establishes the rest break requirements set forth above, may be enforced with criminal penalties and civil remedies, as set forth in the Ordinance.

6.11.7 If the Contractor fails to carry out the Work in accordance with the Contract Documents so that a safety violation has occurred, the Owner may order the Contractor to stop the Work or any portion thereof, until the cause for such order has been eliminated. However, the right of the Owner to stop the Work under this paragraph shall not give rise to a duty on the part of the Owner to supervise the Contractor's Work or to control the Contractor's means and methods or to exercise this right for the benefit of the Contractor or any other person or entity. All time lost due to Project shut down will be the Contractor's sole responsibility, will be charged against the Contract Time, and the Contractor will be responsible for any and all expenses incurred. This provision is in addition to and supplemental to the applicable provisions of the Project's ROCIP Safety Manual.

6.11.8 Confined Space Program

- .1 Contractor acknowledges and agrees that the Owner is temporarily transferring management and control of the site of the Work to the Contractor for the purpose of constructing the Project. The Contractor's responsibilities to manage the Work includes the responsibility to manage the property for purposes of compliance with 29 CFR 1926 subpart AA. To the best of Owner's knowledge and belief, Owner has provided the following information in the plans and specifications and other Contract Documents: (i) the location of each known permit space, (ii) the hazards or potential hazards in each space or the reason it is a permit space; and (iii) any precautions that the Owner or any previous contractor has implemented for the protection of employees in the permit space. This transfer will result in the Contractor being both the host employer and the controlling contractor for this portion of the Work.

6.12 Continuing the Work: 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, except as OWNER and CONTRACTOR may otherwise agree in writing.

6.13 CONTRACTOR's General Warranty and Guarantee:

6.13.1 CONTRACTOR warrants and guarantees to OWNER that all Work will conform to the plans and specifications, be performed in a good and workmanlike manner in accordance with the Contract Documents and will not be defective. This warranty will survive the termination or expiration of the Contract. 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 or Suppliers; or
- .2 normal wear and tear under normal usage.

6.13.2 CONTRACTOR's obligation to perform and complete the Work in a good and workmanlike manner 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 Owner's Representative and/or E/A;
- .2 recommendation of any progress or final payment by Owner's Representative;
- .3 the issuance of a certificate of Substantial Completion or any payment by OWNER to CONTRACTOR under the Contract Documents;
- .4 use or occupancy of the Work or any part thereof by OWNER;
- .5 any acceptance by OWNER or any failure to do so;
- .6 any review of a Shop Drawing or sample submittal;
- .7 any inspection, test or approval by others; or
- .8 any correction of defective Work by OWNER.

6.14 INDEMNIFICATION:

6.14.1 CONTRACTOR shall defend, indemnify and hold harmless OWNER, E/A, E/A'S Consultants and Sub consultants and their respective officers, directors, partners, employees, agents and other Consultants and any of them (the "INDEMNIFIED PARTIES") 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 resulting from the performance of the Work, provided that any such claim, cost, loss or damage:

- .1 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, and**

- .2 Is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of the INDEMNIFIED PARTIES hereunder or whether liability is imposed upon such INDEMNIFIED PARTY by laws and regulations regardless of the negligence of any such person or entity.**

In the event that indemnification of the INDEMNIFIED PARTIES is prohibited by law, CONTRACTOR shall nonetheless be solely responsible for any liability arising out of or resulting from the performance of the Work, subject to the limitations set forth above, and shall indemnify and hold harmless the remaining INDEMNIFIED PARTIES, who may be legally indemnified, from such liability of the CONTRACTOR and the associated costs described above.

- 6.14.2 The indemnification obligation under paragraph 6.14.1 shall not be limited in any way by any limitation on the amount or type of damages, or compensation or benefits payable by or for CONTRACTOR or any such Subcontractor, Supplier or other person or organization under workers' compensation acts, disability benefit acts or other employee benefit acts.**
- 6.14.3 The obligations of CONTRACTOR under paragraph 6.14.1 shall not extend to the liability of OWNER, E/A, E/A's consultants, and their officers, directors, partners, employees or agents caused primarily by negligent preparation of maps, drawings, surveys, designs or specifications upon which is placed the applicable state-authorized design professional seal of OWNER's, E/A's or E/A's consultant's officers, directors, partners, employees or agents.**
- 6.14.4 In the event CONTRACTOR fails to follow OWNER's directives concerning use of the site, scheduling or course of construction, or engages in other conduct which proximately causes damage to property based on inverse condemnation or otherwise, then and in that event, CONTRACTOR shall indemnify OWNER against all costs resulting from such claims.**
- 6.14.5 In the event CONTRACTOR unreasonably delays progress of the work being done by others on the site so as to cause loss for**

which OWNER becomes liable, then CONTRACTOR shall indemnify OWNER from and reimburse OWNER for such loss.

- 6.15 Survival of Obligations:** All representations, indemnifications, warranties and guarantees made in, required by or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Agreement.
- 6.16 Losses from Natural Causes:** Unless otherwise specified, all loss or damage to CONTRACTOR arising out of the nature of the Work to be done or from action of the elements, floods or from unforeseeable circumstances in prosecution of the Work or from unusual obstructions or difficulties which may be encountered in prosecution of the Work, shall be sustained and borne by CONTRACTOR at its own cost and expense.
- 6.17 Notice of Claim:** Should CONTRACTOR suffer injury or damage to person or property because of any error, omission or act of OWNER or of any of OWNER's employees or agents or others for whose acts OWNER is liable, a Claim must be made to the other party within thirty (30) calendar days of the event giving rise to such injury or damage. The provisions of this paragraph 6.17 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or statute of repose.
- 6.18 Liquidated Damages:** CONTRACTOR or its Surety shall be liable for liquidated damages for the failure of the CONTRACTOR to timely complete the Work or any portion thereof within the Contract Time.

ARTICLE 7 - OTHER WORK

- 7.1** OWNER may perform other work related to the Project at the site by OWNER's own forces, or let other contracts therefor, or have other work performed by utility owners. CONTRACTOR and OWNER agree to and shall use best efforts to cooperate and coordinate the Work with others performing work and other work related to the Project in order to avoid conflicts and delays in the Work. If CONTRACTOR believes that delay or additional cost is involved because of such action by OWNER, CONTRACTOR may make a Claim as provided in Article 11 or 12.
- 7.2** CONTRACTOR shall afford other contractors who are in a contract with OWNER and each utility owner (and OWNER, if OWNER is performing the additional work with OWNER's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly connect and coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, CONTRACTOR shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of Owner's Representative and the other contractors whose work will be affected. CONTRACTOR shall promptly remedy damage wrongfully caused by CONTRACTOR to completed or partially completed construction or to property of the OWNER or separate contractors.
- 7.3** If the proper execution or results of any part of CONTRACTOR's Work depends upon work performed by others under this Article 7, CONTRACTOR shall inspect such other work and promptly report to Owner's Representative 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 report will constitute an acceptance of such other work as fit and proper for integration with CONTRACTOR's Work except for latent or non-apparent defects and deficiencies in such other work.

- 7.4** OWNER shall provide for coordination of the activities of the OWNER's own forces and of each separate contractor with the Work of CONTRACTOR, who shall cooperate with them. CONTRACTOR shall participate with other separate contractors and Owner's Representative in reviewing their construction Progress Schedules when directed to do so. On the basis of such review, CONTRACTOR shall make any revisions to the construction Progress Schedule deemed necessary after a joint review and mutual agreement. The agreed upon construction Progress Schedules shall then constitute the Progress Schedules to be used by CONTRACTOR, separate contractors and OWNER until subsequently revised.
- 7.5** Costs caused by delays or by improperly timed activities or defective construction shall be borne by the party responsible therefor.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

- 8.1** Prior to the start of construction, OWNER will designate in writing a person or entity to act as Owner's Representative during construction. Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through Owner's Representative.
- 8.2** OWNER 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. OWNER is not responsible for any failure of CONTRACTOR to comply with laws and regulations applicable to furnishing or performing the Work. OWNER is not responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents. Failure or omission of OWNER to discover, or object to or condemn any defective Work or material shall not release CONTRACTOR from the obligation to properly and fully perform the Contract.
- 8.3** OWNER is not responsible for the acts or omissions of CONTRACTOR, or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work. CONTRACTOR acknowledges and agrees that OWNER'S direction to perform Work in accordance with the approved Progress Schedule is not a demand for acceleration or a dictation of CONTRACTOR'S means or methods.
- 8.4** Information or services under the OWNER's control shall be furnished by the OWNER with reasonable promptness to avoid delay in orderly progress of the Work. The OWNER shall have a reasonable amount of time to investigate site conditions, review submittals, analyze requests for changes, and to make other decisions in the orderly administration of the Contract. CONTRACTOR must notify the OWNER in writing, if the time for the investigation, review, analysis of any submittals, required for changes or otherwise required for OWNER'S decision, impacts in any way the Critical Path of the approved Progress Schedule.
- 8.5** The foregoing are in addition to other duties and responsibilities of the OWNER enumerated herein and especially those in respect to Article 4 (Availability of Lands; Subsurface and Physical Conditions; Reference Points), Article 7 (Other Work) and Article 14 (Payments to CONTRACTOR and Completion).
- 8.6** **Notice of Claim:** Should OWNER suffer injury or damage to person or property because of any error, omission or act of CONTRACTOR or of any of CONTRACTOR's employees or agents or others for whose acts CONTRACTOR is liable, a Claim will be made to the other

party within thirty (30) calendar days of receipt of actual or constructive notice of the event giving rise to such injury or damage. The provisions of this paragraph 8.6 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or statute of repose.

ARTICLE 9 - ENGINEER/ARCHITECT'S STATUS DURING CONSTRUCTION

9.1 E/A's Authority and Responsibilities:

9.1.1 The duties and responsibilities and the limitations of authority of E/A during construction, as set forth in the Contract Documents, may be assigned or assumed by the OWNER, but shall not be extended without written consent of OWNER and/or E/A. The assignment of any authority, duties or responsibilities to E/A under the Contract Documents, or under any agreement between OWNER and E/A, or any undertaking, exercise or performance thereof by E/A, is intended to be for the sole and exclusive benefit of OWNER and not for the benefit of CONTRACTOR, Subcontractor, Supplier, or any other person or organization, or for any surety or employee or agent of any of them.

9.1.2 E/A 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. E/A is not responsible for any failure of CONTRACTOR to comply with laws and regulations applicable to the furnishing or performing the Work. E/A is not responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents. Failure or omission of E/A to discover, or object to or condemn any defective Work or material shall not release CONTRACTOR from the obligation to properly and fully perform the Contract.

9.1.3 E/A is not responsible for the acts or omissions of CONTRACTOR, or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

9.1.4 If OWNER and E/A agree, E/A will review the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds and certificates of inspection, tests and approvals and other documentation required to be delivered by Article 14, but only 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.

9.1.5 The limitations upon authority and responsibility set forth in this paragraph 9.1 shall also apply to E/A's Consultants, Resident Project Representative and assistants.

9.2 E/A as Owner's Representative: E/A may be designated as the Owner's Representative under paragraph 8.1.

9.3 Visits to Site: If OWNER and E/A agree, E/A will make visits to the site at intervals appropriate to the various stages of construction as E/A 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, E/A will endeavor for the benefit of OWNER to determine, in general, if the Work is proceeding in accordance with the Contract Documents. E/A will not be required to make exhaustive or continuous on-site

inspections to check the quality or quantity of the Work. E/A'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 on-site observations, E/A will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defective Work. E/A's visits and on-site observations are subject to all the limitations on E/A's authority and responsibility set forth in paragraph 9.1.

- 9.4 Resident Project Representative:** If OWNER and E/A agree, E/A will furnish a Resident Project Representative to assist E/A in providing more continuous observation of the Work. The responsibilities and authority and limitations of any such Resident Project Representative and assistants will be as provided in paragraph 9.1 and in the Supplemental General Conditions. OWNER may designate another representative or agent to represent OWNER at the site who is not E/A, E/A's consultant, agent or employee.
- 9.5 Clarifications and Interpretations:** E/A may determine that written clarifications or interpretations of the requirements of the Contract Documents (in the form of drawings or otherwise) are necessary. Such written clarifications or interpretations will be consistent with the intent of and reasonably inferable from the Contract Documents, will be issued with reasonable promptness by Owner's Representative and will be binding on OWNER and CONTRACTOR. If OWNER or CONTRACTOR believes that a written clarification or interpretation justifies an adjustment in the Contract Amount or the Contract Times, OWNER or CONTRACTOR may make a Claim therefor as provided in Article 11 or 12.
- 9.6 Rejecting Defective Work:** E/A will recommend that OWNER disapprove or reject Work which E/A believes to be defective, or believes will not produce a completed Project that conforms to the Contract Documents or will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
- 9.7 Shop Drawings:** Refer to Division 1 for E/A's authority concerning Shop Drawings.

ARTICLE 10 - CHANGES IN THE WORK

10.1 Changes:

- 10.1.1** 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 in the Work will be authorized by Change Order, Change Directive or Field Order. In the event that the OWNER and the CONTRACTOR are unable to negotiate the terms of a Change Order for the performance of additional Work, the OWNER may, at its election, perform such additional Work with its own forces or with another contractor and such work will be considered "Other Work" in accordance with Article 7.
- 10.1.2** Changes in the Work shall be performed under applicable provisions of the Contract Documents, and CONTRACTOR shall proceed promptly, unless otherwise provided in the Change Order, Change Directive or Field Order. CONTRACTOR's proposals for changes in the Contract Amount and/or Contract Time shall be submitted within ten (10) Calendar Days of request by Owner's Representative, including impacts to the approved Progress Schedule, unless Owner's Representative grants an extension. OWNER will review each proposal and respond to CONTRACTOR within ten (10) Calendar Days. After review by OWNER, CONTRACTOR shall provide any supporting data requested by Owner's Representative within seven (7) Calendar Days, unless Owner's Representative grants an extension. OWNER will determine within seven (7) Calendar Days whether to pursue the change in Work.

- 10.1.3** CONTRACTOR shall not be entitled to an increase in the Contract Amount or an extension of the Contract Times with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in paragraphs 3.3.1 and 3.3.2, except in the case of an emergency as provided in paragraph 6.11.5 or in the case of uncovering Work as provided in paragraph 13.4.
- 10.1.4** Except in the case of an emergency as provided in paragraph 6.11.5, a Change Order or Change Directive is required before CONTRACTOR commences any activities associated with a change in the Work which, in CONTRACTOR 's opinion, will result in a change in the Contract Amount and/or Contract Times.
- 10.1.5** If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Amount or Contract Times) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

10.2 Change Orders:

- 10.2.1** OWNER and CONTRACTOR shall execute appropriate written Change Orders covering:
- .1** a change in the Work;
 - .2** the amount of the adjustment in the Contract Amount, if any; and
 - .3** the extent of the adjustment in the Contract Time, if any.
- 10.2.2** An executed Change Order shall represent the complete, equitable, and final amount of adjustment in the Contract Amount and/or Contract Time owed to CONTRACTOR or OWNER as a result of the occurrence or event causing the change in the Work encompassed by the Change Order.

10.3 Change Directives:

- 10.3.1** Without invalidating the Contract, OWNER may, by written Change Directive, using the Force Account method, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Amount and Contract Time being adjusted as necessary. "Force Account" means a basis of payment for the direct performance of Work with payment based on the actual cost of the labor, equipment and materials furnished and consideration for overhead and profit as set forth in Section 11.5, below. A Change Directive shall be used in the absence of complete and prompt agreement on the terms of a Change Order. Where practicable, any items of Work that may be agreed upon, prior to the performance of Work under this Section, will be included in a separate Change Order. For example, the cost of the installation of additional asphalt may be agreed upon based on the unit prices in the Bid.
- 10.3.2** If the Change Directive provides for an adjustment to the Contract Amount, the adjustment shall be based on the method provided in paragraph 11.5.
- 10.3.3** A Change Directive shall be effective immediately and shall be recorded later by preparation and execution of an appropriate Change Order.
- 10.3.4** Upon receipt of a Change Directive, CONTRACTOR shall promptly proceed with the change in the Work involved, provided, prior to the commencement of any Work under this section, the CONTRACTOR must submit its proposed Work plan, anticipated schedule, and a list of its work force and equipment proposed to be

used in the Work for OWNER'S approval. Upon such approval, CONTRACTOR must promptly commence and make continuous progress in the Work. The OWNER reserves the right to withhold payment for low production or lack of progress.

10.4 Field Order:

10.4.1 Owner's Representative may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Amount 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. These shall be accomplished by written Field Order and shall be binding on OWNER and on CONTRACTOR who shall perform the Work involved promptly.

10.4.2 If CONTRACTOR believes that a Field Order would require an adjustment in the Contract Amount and/or Contract Times, CONTRACTOR shall make a prompt written request to Owner's Representative for a Change Order. Any request by CONTRACTOR for an adjustment in Contract Amount and/or Contract Times must be made in writing prior to beginning the work covered by the Field Order.

10.5 No Damages for Delay: CONTRACTOR shall receive no compensation for delays or hindrances to the Work, except when direct and unavoidable extra cost to CONTRACTOR is caused by failure of OWNER to provide information or material, if any, which is to be furnished by OWNER or access to the Work and only to the extent that such acts continue after the CONTRACTOR furnishes OWNER with written notice of such failure. When such extra compensation is claimed a written statement thereof shall be presented by CONTRACTOR to OWNER and if by OWNER found correct shall be approved. If delay is caused by specific orders given by OWNER to stop work or by performance of extra Work or by failure of OWNER to provide material or necessary instructions for carrying on the Work, then such delay will entitle CONTRACTOR to an equivalent extension of time, CONTRACTOR's application for which shall, however, be subject to approval of OWNER. No such extension of time shall release CONTRACTOR or surety on its performance bond from all CONTRACTOR's obligations hereunder which shall remain in full force until discharge of the Contract. In no event shall the CONTRACTOR be entitled to any compensation or recovery of any special damages in connection with any delays, including without limitation: consequential damages, lost opportunity costs, impact damages, or other similar damages. The OWNER'S exercise of any of its rights or remedies under the Contract Documents (including without limitation ordering changes in the Work, or directing suspension, rescheduling, or correction of the Work), regardless of the extent or frequency of the OWNER'S exercise of such rights or remedies, shall not be construed as active interference in the CONTRACTOR'S performance of the Work. Except as otherwise provided herein, an extension of Contract Time, to the extent permitted under Article 12, shall be the sole remedy of the CONTRACTOR for any acknowledged delays.

ARTICLE 11 - CHANGE OF CONTRACT AMOUNT

11.1 The Contract Amount is stated in the Agreement and, including authorized adjustments, is the total amount payable by OWNER to CONTRACTOR for performance of the Work under the Contract Documents.

11.2 The original Contract Amount may not be increased by more than twenty-five percent (25%) and it may not be decreased more than twenty-five percent (25%) without the consent of the CONTRACTOR to such decrease, except in the event of a termination for convenience under paragraph 15.2 or the failure of the City Council to appropriate sufficient

funding for the Project, in which events it is agreed that the consent of the CONTRACTOR will not be required.

11.3 The Contract Amount shall only be changed by a Change Order. Any claim for an adjustment in the Contract Amount shall be made by Written Notice delivered by the party making the Claim to the other party promptly (but in no event later than thirty (30) calendar days) after the start of the occurrence or event giving rise to the Claim and stating the general nature of the Claim. Notice of the amount of the Claim with supporting data shall be delivered within thirty (30) calendar days after Written Notice of Claim is delivered by claimant, and shall represent that the adjustment claimed covers all known amounts to which claimant is entitled as a result of said occurrence or event. If OWNER and CONTRACTOR cannot otherwise agree, all Claims for adjustment in the Contract Amount shall be determined as set out in Article 16.

11.4 Determination of Value of Work:

11.4.1 The value of any Work covered by a Change Order for an adjustment in the Contract Amount will be determined by one or more of the following methods:

- .1** by application of unit prices contained in the Contract Documents to the quantities of the items involved.
- .2** by a mutually agreed unit price, or lump sum properly itemized and supported by sufficient substantiating data, including documentation by subcontractors performing the work, to permit evaluation.
- .3** by cost of Work plus CONTRACTOR's fee for all overhead costs and profit (determined as provided in paragraph 11.5).
- .4** No cost will be included in the change order for time spent preparing the change order, nor will costs be included for an estimate of time to negotiate the change order costs for machinery, tools, or equipment as described in subparagraph 11.5.3

11.4.2 Before using the method described in paragraph 11.4.1.3, OWNER and CONTRACTOR agree to negotiate a Change Order using the methods identified in paragraphs 11.4.1.1 and 11.4.1.2, as appropriate, to determine the adjustment in the Contract Amount.

11.5 Cost of Work: If neither of the methods defined in paragraphs 11.4.1.1 nor 11.4.1.2 can be agreed upon before a change in the Work is commenced which will result in an adjustment in the Contract Amount, then the change in the Work will be performed by Change Directive, using the Force Account method, and payment will be made as follows:

11.5.1 For all personnel, CONTRACTOR will receive actual field cost wage rates for each hour that said personnel are actually engaged in such Work, as substantiated by its certified payroll, to which will be added an amount equal to twenty-five percent (25%) of the sum thereof as compensation for CONTRACTOR's total overhead, profit, and small tools. No separate charge will be made by CONTRACTOR or its Subcontractor(s) for organization or overhead expenses. In no case will the rate of wage be less than the minimum shown in the Contract for a particular category. CONTRACTOR will also receive an amount equal to 55% of the wages paid personnel, excluding the 25% compensation provided above, for CONTRACTOR's and any effected Subcontractor's cost of premiums on public liability insurance, workers' compensation insurance, social security and unemployment insurance. The cost for superintendence, project management, and other salaried employees are considered as included in the twenty five percent (25%) total overhead, profit, and small tools mark-up unless considered necessary and ordered by Owner.

- 11.5.2** CONTRACTOR will receive the actual cost, including freight charges, of the materials used and installed on such Work, to which costs will be added a sum equal to twenty-five percent (25%) thereof as compensation for CONTRACTOR's and any affected Subcontractor's total overhead and profit. In case material invoices indicate a discount may be taken, the actual cost will be the invoice price minus the discount.
- 11.5.3** For machinery, trucks, power tools, or other similar equipment (the "equipment") agreed to be necessary by OWNER and CONTRACTOR, OWNER will allow CONTRACTOR the Regional and Model Year adjusted Monthly Ownership Cost divided by 176 plus the Hourly Estimated Operating Costs as given in the latest edition of the "Rental Rate Blue Book" as published by EquipmentWatch (1-800-669-3282) for each hour that said equipment is in use on such work. The established equipment rates will be paid for each hour that the equipment is utilized in the Work. In the event that the equipment is used intermittently during the Work, full payment for an eight-hour day will be made if the equipment is not idle more than four (4) hours of the day. If the equipment is idle more than four (4) hours in a day, then payment will be made only for the actual hours worked. No additional compensation will be allowed on the equipment for CONTRACTOR's or any affected Subcontractor's overhead and profit. OWNER may accept an actual rental invoice in lieu of the method of calculation set forth in paragraph 11.5.3 for equipment rented exclusively for Force Account Work or for equipment not included in the Rental Rate Blue Book.
- 11.5.4** For Subcontractors, CONTRACTOR will receive the approved actual invoice cost plus 5% as compensation for CONTRACTOR's total overhead and profit.
- 11.5.5** CONTRACTOR will receive an additional 1% of the total of 11.5.1, 11.5.2, 11.5.3, and 11.5.4 as compensation for increased bond costs.
- 11.5.6** The compensation, as herein provided for, shall be received by CONTRACTOR and any affected Subcontractor as payment in full for work done by Change Directive and will include use of small tools, and total overhead expense and profit. CONTRACTOR and Owner's Representative shall compare records of work done by Change Directive at the end of each day. Copies of these records will be made upon forms provided for this purpose by OWNER and signed by both Owner's Representative and CONTRACTOR, with one copy being retained by OWNER and one by CONTRACTOR. Refusal by CONTRACTOR to sign these records within two (2) working days of presentation does not invalidate the accuracy of the record.

11.6 Unit Price Work:

- 11.6.1** Where the Contract Documents provide that all or part of the Work is to be unit price Work, initially the Contract Amount will be deemed to include for all unit price work an amount equal to the sum of the established unit price for each separately identified item of unit price work times the estimated quantity of each item as indicated in the Bid. 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 Amount. Determinations of the actual quantities and classifications of unit price work performed by CONTRACTOR will be made by Owner's Representative. Owner's Representative will review with CONTRACTOR the preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise).
- 11.6.2** When "plan quantity" is indicated for a Bid item, CONTRACTOR shall be paid amount specified in the Contract Documents without any measurements.

- 11.6.3** 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.
- 11.6.4** A Major Item is any individual Bid item in the Bid that has a total cost equal to or greater than five percent (5%) of the original Contract Amount or \$50,000, whichever is greater, computed on the basis of Bid quantities and Contract unit prices.
- 11.6.5** OWNER or CONTRACTOR may make a Claim for an adjustment in the Contract Amount in accordance with Article 11 if:
- .1 the actual quantity of any Major Item should become as much as twenty percent (20%) more than or twenty percent (20%) less than that in the Bid; or
 - .2 CONTRACTOR presents documentation contesting accuracy of "plan quantity" and Owner's Representative verifies quantity and determines original value is in error by five percent (5%) or more;

Provided, however, in the event a Major Item is reduced by twenty percent (20%) or more of the amount in the Bid, no additional Article 11 profit or overhead will be added, if, due to other additions in the Work, the net value of the Contract Amount is not reduced.

ARTICLE 12 - CHANGE OF CONTRACT TIMES

12.1 Working Day and Calendar Day Contracts:

- 12.1.1** The Contract Times (or Milestones) may only be changed by Change Order or Time Extension Request duly executed by both CONTRACTOR and Owner's Representative. Any claim for an adjustment of the Contract Times (or Milestones) shall be made by Written Notice delivered by the party making the Claim to the other party promptly (but in no event later than thirty (30) calendar days after the start of the occurrence or event giving rise to the delay) and stating the general nature of the delay. Notice of the extent of the delay with supporting data shall be delivered within thirty (30) calendar days after Written Notice of Claim is delivered by claimant, and shall represent that the adjustment claimed is the entire adjustment to which claimant is entitled as a result of said occurrence or event. If OWNER and CONTRACTOR cannot otherwise agree, all Claims for adjustment in the Contract Times (or Milestones) shall be determined as set out in Article 16. No Claim for an adjustment in the Contract Times (or Milestones) will be valid if not submitted in accordance with the requirements of this paragraph.
- 12.1.2** When CONTRACTOR is at fault and OWNER stops the Work, so that corrections in the Work can be made by CONTRACTOR, no extension in time will be allowed.
- 12.1.3** When CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay. If performance by the CONTRACTOR or OWNER is interrupted by any occurrence not occasioned by its own conduct, whether such occurrence be an act of god or the result of war, riot, civil commotion, sovereign conduct, or the conduct of a third party, then such performance will be excused for a period of time necessary to remedy its effects, provided, however, in such an

event, a conference will be held within three (3) business days to establish a proposed new Progress Schedule for the Project.

12.1.4 OWNER will consider time extension requests and may grant CONTRACTOR an extension of time because of:

- .1** Changes ordered in the work which justify additional time.
- .2** Failure of materials or products being at the Project site due to delays in transportation or failures of Suppliers, which are not the result of CONTRACTOR's, Subcontractor's or Supplier's negligence. The request for an extension of time shall be supported by a citation of acts demonstrating that the delays are beyond CONTRACTOR's control, including, but not limited to, CONTRACTOR's efforts to overcome such delays documented as follows:
 - a)** Copy of purchase order for delayed item(s) indicating date ordered by CONTRACTOR/ Subcontractor and date purchase order received by Supplier.
 - b)** If item(s) require Shop Drawings or other submittal information in accordance with the Contract Documents, provide record of date submittal(s) forwarded to Owner's Representative, date submittal(s) returned to CONTRACTOR, and date submittal(s) forwarded to Supplier.
 - c)** Copy of document(s) from Supplier, on Supplier's letterhead, indicating date(s) item(s) would be ready for shipment and/or actual shipment date(s).
 - d)** Copies of all correspondence between CONTRACTOR / Subcontractor and Supplier indicating CONTRACTOR / Subcontractor's efforts to expedite item(s).
 - e)** If item(s) are being purchased by a Subcontractor, provide correspondence, meeting notes, etc., that reflect CONTRACTOR's efforts with the Subcontractor to expedite delivery of the item(s).
- .3** When acts of OWNER, E/A, utility owners or other contractors employed by OWNER delay progress of work through no fault of CONTRACTOR. The CONTRACTOR will only be entitled to an extension of time for delays that affect the Critical Path of the Work and that are not caused by the CONTRACTOR.
- .4** When CONTRACTOR is delayed by strikes, lockouts, fires, losses from natural causes, or other unavoidable cause or causes beyond CONTRACTOR's control.

12.2 Calendar Day Contracts:

12.2.1 Under a Calendar Day Contract, CONTRACTOR may be granted an extension of time because of unusual inclement weather, including but not limited to unusual rainfall events, which are beyond the normal rainfall recorded and expected for Austin, Texas. However, the CONTRACTOR will not be granted an extension of time for "normal rainfall", as described below.

12.2.2 "Unusual Inclement Weather" is defined as a rain event or other weather related event which occurs at the site and is of sufficient magnitude to prevent CONTRACTOR from performing units of Work critical to maintaining the Progress Schedule.

- 12.2.3** Baseline Rain Day Determination. "Normal rainfall" compiled by the State climatologist, based on U.S. Weather Bureau Records for Austin, Texas, is considered a part of the Calendar Day Contract, and is not a justification for an extension of time. Listed below are the number of days in each month for which no compensatory days for rainfall events ("Rain Days") in such months may be claimed:

January.....	8 days
February.	8 days
March.	7 days
April	7 days
May.....	9 days
June	6 days
July.	5 days
August.	5 days
September	7 days
October.....	7 days
November	7 days
December.....	7 days

Rain Days in addition to the baseline Rain Day determination described above will be measured with the Owner's Representative's approval at the nearest operational public weather data collection facility to the site, including but not limited to the OWNER's early warning flood gauge system.

- 12.2.4** CONTRACTOR may receive credit in any month for Unusual Inclement Weather, and specifically for any Rain Days in that month which exceed the number of Rain Days allocated to that month, if a Claim is made in accordance with paragraph 12.1.1 and the weather event meets the definition for "Unusual Inclement Weather", and as applicable, "Rain Day" and such claimed day is a day on which Work critical to maintaining the Progress Schedule is scheduled to be performed and is otherwise capable of being performed.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

- 13.1 Notice of Defects:** Prompt notice of all defective Work of which OWNER or E/A has actual knowledge will be given to CONTRACTOR. All defective Work may be rejected, corrected or accepted as provided in Article 13. CONTRACTOR must give OWNER and E/A prompt notice of any defective Work of which CONTRACTOR has actual knowledge.
- 13.2 Access to Work:** OWNER, E/A, E/A's Consultants, other representatives and personnel of OWNER, independent testing laboratories and governmental agencies having jurisdiction will have access to the Work at reasonable times for observing, inspecting and testing. CONTRACTOR shall provide them proper and safe conditions for such access, and advise them of CONTRACTOR's site safety procedures and programs so that they may comply therewith as applicable.

13.3 Tests and Inspections:

- 13.3.1** CONTRACTOR shall give timely notice of readiness of the Work for all required inspections, tests or approvals, and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- 13.3.2** OWNER shall employ and pay for services of an independent testing laboratory to perform all inspections, tests or approvals required by the Contract Documents except:
- .1** for inspections, tests or approvals covered by paragraphs 13.3.3 and 13.3.4 below;
 - .2** that costs incurred for tests or inspections conducted pursuant to paragraph 13.4.3 shall be paid as provided in paragraph 13.4.3;
 - .3** for reinspecting or retesting defective Work, including any associated costs incurred by the testing laboratory for cancelled tests or standby time; and
 - .4** as otherwise specifically provided in the Contract Documents.
- 13.3.3** 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 Owner's Representative the required certificates of inspection or approval.
- 13.3.4** CONTRACTOR shall also be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests or approvals required for OWNER's and E/A's review of submittals covering materials, equipment, and mix designs to be incorporated in the Work.
- 13.3.5** All testing laboratories shall meet the requirements of ASTM E-329.

13.4 Uncovering Work:

- 13.4.1** If any Work (or the work of others) that is to be inspected, tested or approved is covered by CONTRACTOR without written concurrence of Owner's Representative, or if any Work is covered contrary to the written request of Owner's Representative, it must, if requested by Owner's Representative, be uncovered and recovered at CONTRACTOR's expense.
- 13.4.2** Uncovering Work as provided in paragraph 13.4.1 shall be at CONTRACTOR's expense unless CONTRACTOR has given Owner's Representative timely notice of CONTRACTOR's intention to cover the same and Owner's Representative has not acted within five (5) working days to such notice.
- 13.4.3** If Owner's Representative considers it necessary or advisable that covered Work be observed, inspected or tested, CONTRACTOR shall uncover, expose or otherwise make available for observation, inspection or testing that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, CONTRACTOR shall pay all claims, costs, losses and damages caused by, arising out of or resulting from 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 OWNER shall be entitled to an appropriate decrease in the Contract Amount, and may make a Claim therefor as provided in Article 11. If,

however, such Work is not found to be defective, CONTRACTOR shall be allowed an increase in the Contract Amount or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement and reconstruction; and CONTRACTOR may make a Claim therefor as provided in Articles 11 and 12.

13.5 OWNER May Stop the Work:

13.5.1 If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers, suitable materials, and/or equipment; or fails to furnish or perform the Work in such a way that the Work in progress or the completed Work will conform to the Contract Documents, 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 or any surety or other party.

13.5.2 If CONTRACTOR fails to correct defective Work or submit a satisfactory plan to take corrective action, with procedure and time schedule, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until cause for such order has been eliminated, or take any other action permitted by this Contract. A notice to stop the Work, based on defects, shall not stop calendar or working days charged to the Project.

13.6 Correction or Removal of Defective Work: If required by OWNER, CONTRACTOR shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by Owner's Representative, remove it from the site and replace it with Work that is not defective. CONTRACTOR shall correct or remove and replace defective Work, or submit a plan of action detailing how the deficiency will be corrected, within the time frame identified in the notice of defective Work. CONTRACTOR shall pay all claims, costs, losses and damages caused by or resulting from such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.7 Warranty period:

13.7.1 If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by laws or regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents (e.g. paragraph 14.11.2), any Work, including work performed after the Substantial Completion date, is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions:

- (i) correct such defective Work, or, if it has been rejected by OWNER, remove it from the site and replace it with Work that is not defective, and
- (ii) satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom.

If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected or the rejected Work removed and replaced, and all claims, costs, losses and damages caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR. The warranty period will be deemed to be renewed and recommenced in connection with the completed items of Work requiring correction.

- 13.7.2** In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the warranty period for that item may start to run from an earlier date if so provided in the Contract Documents.
- 13.7.3** If correction of defective Work will affect the function or use of the facility CONTRACTOR shall not proceed with correction of defective Work without prior coordination and approval of OWNER.
- 13.7.4** The obligations of the CONTRACTOR to perform warranty work will survive the acceptance of the Work and any termination of the Contract.
- 13.8 Acceptance of Defective Work:** If, instead of requiring correction or removal and replacement of defective Work, OWNER decides to accept it, OWNER may do so. CONTRACTOR shall pay all claims, costs, losses and damages attributable to OWNER's evaluation of and determination to accept such defective Work. If any such acceptance occurs prior to recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents and compensating OWNER for the diminished value of the defective Work. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER after a calculation by OWNER of the diminution in value of the defective Work.
- 13.9 OWNER May Correct Defective Work:** If CONTRACTOR fails within a reasonable time after Written Notice of OWNER to correct defective Work, or to remove and replace rejected Work, 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, OWNER may, after seven (7) calendar days' Written Notice to CONTRACTOR, correct and remedy any such deficiency. If, in the opinion of the Owner's Representative, significant progress has not been made during this seven (7) calendar day period to correct the deficiency, the OWNER may exercise any actions necessary to remedy the deficiency. In exercising the rights and remedies under this paragraph, OWNER shall proceed expeditiously. In connection with such corrective and 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, its agents and employees, OWNER's other contractors, E/A and E/A's consultants access to the site to enable OWNER to exercise the rights and remedies under this paragraph. All claims, costs, losses and damages incurred or sustained by OWNER in exercising such rights and remedies will be charged against CONTRACTOR and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work. 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. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones), or claims of damage because of any delay in the performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies hereunder.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.1 Application for Progress Payment:

- 14.1.1** Within 45 days from when the work was performed by the Contractor and Subcontractors, but not more often than once a month, CONTRACTOR shall submit to Owner's Representative for review an Application for Payment, in a form

acceptable to OWNER, 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.

- 14.1.2** Such applications shall not include requests for payment on account of changes in the Work which have been properly authorized by Change Directives but not yet included in Change Orders.
- 14.1.3** Such applications shall not include requests for payment of amounts the CONTRACTOR does not intend to pay to a Subcontractor or Supplier because of a dispute or other reason.
- 14.1.4** If payment is requested on the basis of materials or 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 be accompanied by such bills of sale, data and other procedures satisfactory to OWNER substantiating OWNER's title to such materials or equipment or otherwise protecting OWNER's interest. Payment on account of such materials or equipment will not include any amount for CONTRACTOR's overhead or profit or relieve CONTRACTOR of its obligation to protect and install such materials or equipment in accordance with the requirements of the Contract and to restore damaged or defective Work. If materials or equipment are stored at another location, at the direction of the OWNER they shall be stored in a bonded and insured facility, accessible to E/A and OWNER, and shall be clearly marked as property of OWNER. Title to materials delivered to the site of the Work or a staging area will pass to OWNER upon payment by OWNER without the necessity for further documentation. Risk of loss will not pass to OWNER until acceptance.
- 14.1.5** Where the original Contract Amount is less than \$400,000, OWNER will pay CONTRACTOR total amount of approved Application for Payment, less ten percent (10%) of amount thereof, which ten percent (10%) will be retained until final payment, less all previous payments and less all other sums that may be retained by OWNER under the terms of this Agreement. Where the original Contract Amount is \$400,000 or more, OWNER will pay CONTRACTOR total amount of approved Application for Payment, less five percent (5%) of amount thereof, which five percent (5%) will be retained until final payment, less all previous payments and less all other sums that may be retained by OWNER under the terms of this Agreement. In either case, if the Work is near completion and delay occurs due to no fault or neglect of CONTRACTOR, OWNER may pay a portion of the retained amount to CONTRACTOR. CONTRACTOR, at OWNER's option, may be relieved of the obligation to complete the Work and, thereupon, CONTRACTOR shall receive payment of the balance due under the Contract subject to the conditions stated under paragraph 15.2. A Subcontractor may submit a written request to the CONTRACTOR and Project Manager requesting release of retainage for work by the Subcontractor that has been completed and approved. The Project Manager will evaluate the request and if it is approved, the Project Manager will request the CONTRACTOR to include the request for release of an appropriate amount of retainage in the next Pay Application.
- 14.1.6** Applications for Payment shall include the following documentation:
- .1** updated Progress Schedule;
 - .2** monthly subcontractor report;
 - .3** any other documentation required under the Supplemental General Conditions.

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

14.3 Review of Applications for Progress Payment:

14.3.1 Owner's Representative will, within seven (7) calendar days after receipt of each Application for Payment, either indicate a recommendation for payment and forward the Application for processing by OWNER, or return the Application to CONTRACTOR indicating Owner's Representative's reasons for refusing to recommend payment. In the latter case, CONTRACTOR shall make the necessary corrections and resubmit the Application.

14.3.2 Owner's Representative's recommendation of any payment requested in an Application for Payment will constitute a representation by Owner's Representative, based upon Owner's Representative's on-site observations of the executed Work and on Owner's Representative's review of the Application for Payment and the accompanying data and schedules, that to the best of Owner's Representative's knowledge, information and belief:

- .1 the Work has progressed to the point indicated; and
- .2 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, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for unit price Work, and to any other qualifications stated in the recommendation).

14.3.3 By recommending any such payment, Owner's Representative will not thereby be deemed to have represented that:

- .1 exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work;
- .2 examination has been made to ascertain how or for what purpose CONTRACTOR has used money previously paid on account of the Contract Amount;
- .3 CONTRACTOR's construction means, methods, techniques, sequences or procedures have been reviewed; or
- .4 that 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.

14.4 Decisions to Withhold Payment:

14.4.1 OWNER may withhold or nullify the whole or part of any payment to such extent as may be necessary on account of:

- .1 defective Work not remedied;
- .2 third party Claims filed or reasonable evidence indicating probable filing of such Claims;
- .3 failure of CONTRACTOR to make payments properly to Subcontractors for labor, materials or equipment;

- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Amount;
- .5 damage to OWNER or another contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
- .7 failure of CONTRACTOR to submit a schedule of values in accordance with the Contract Documents;
- .8 failure of CONTRACTOR to submit a submittal schedule in accordance with the Contract Documents;
- .9 failure of CONTRACTOR to submit and update a construction Progress Schedule in accordance with the Contract Documents;
- .10 failure of CONTRACTOR to maintain a record of changes on drawings and documents;
- .11 failure of CONTRACTOR to maintain weekly payroll reports and, as applicable, provide copies of reports in a timely manner upon request of OWNER;
- .12 failure of CONTRACTOR to submit monthly subcontractor reports;
- .13 CONTRACTOR's neglect or unsatisfactory prosecution of the Work, including failure to clean up;
- .14 failure of CONTRACTOR to comply with the Austin City Code, Chapter 2-9-A, as amended, "Minority-Owned and Women-Owned Business Enterprise Procurement Program;" or
- .15 failure of CONTRACTOR to comply with any provision of the Contract Documents.

14.4.2 When the above reasons for withholding payment are removed, CONTRACTOR shall resubmit a statement for the value of Work performed. Payment will be made within thirty (30) calendar days of receipt of approved Application for Payment.

14.4.3 Subcontractors may request Partial Payment when the OWNER withholds payment of an invoice to the CONTRACTOR for any reason listed in Section 14.4.1. If payment is withheld by the OWNER, the CONTRACTOR shall notify all affected Subcontractors within two (2) working days of notice that payment is being withheld. Upon notification, Subcontractors may submit a formal written request for Partial Payment to the CONTRACTOR and OWNER. If directed by the OWNER, the CONTRACTOR shall within three (3) working days resubmit to the OWNER an invoice for the same period that includes only the work performed by the requesting Subcontractors during this period. The OWNER will review this resubmitted invoice in accordance with Section 14.3.1. Upon receipt of payment for the resubmitted invoice, CONTRACTOR shall pay the subcontractor within ten (10) Calendar Days in accordance with Section 6.4.7.

14.5 Delayed Payments: Should OWNER fail to make payment to CONTRACTOR of sum named in any Application for Payment within thirty (30) calendar days after the day on which OWNER received the mutually acceptable Application for Payment, then OWNER will pay to CONTRACTOR, in addition to sum shown as due by such Application for Payment, interest thereon at the rate specified in Government Code, Section 2251.025(b) from date due until fully paid, which shall fully liquidate any injury to CONTRACTOR growing out of such delay in payment.

14.6 Arrears: No money shall be paid by OWNER upon any claim, debt, demand or account whatsoever, to any person, firm or corporation who is in arrears to City for taxes; and City shall be entitled to counterclaim and automatically offset against any such debt, claim, demand or account in the amount of taxes so in arrears and no assignment or transfer of such debt, claim, demand or account after said taxes are due, shall affect the right of OWNER to so offset said taxes, and associated penalties and interest if applicable, against the same.

14.7 Substantial Completion:

14.7.1 When the CONTRACTOR considers that the Work, or a portion thereof which the OWNER agrees to accept separately, is substantially complete, the CONTRACTOR shall notify Owner's Representative and request a determination as to whether the Work or designated portion thereof is substantially complete. If Owner's Representative does not consider the Work substantially complete, Owner's Representative will notify CONTRACTOR giving reasons therefor. After performing any required Work, CONTRACTOR shall then submit another request for Owner's Representative to determine Substantial Completion. If Owner's Representative considers the Work substantially complete, Owner's Representative will prepare and deliver a certificate of Substantial Completion which shall establish the date of Substantial Completion, shall include a punch list of items to be completed or corrected before final payment, shall establish the time within which CONTRACTOR shall finish the punch list, and shall establish responsibilities of the OWNER and CONTRACTOR for security, maintenance, heat, utilities, damage to the Work, warranty and insurance. Failure to include an item on the punch list does not alter the responsibility of CONTRACTOR to complete all Work in accordance with the Contract Documents. If a Certificate of Occupancy is required by public authorities having jurisdiction over the Work, said certificate shall be issued before the Work or any portion thereof is considered substantially complete. The certificate of Substantial Completion shall be signed by OWNER and CONTRACTOR to evidence acceptance of the responsibilities assigned to them in such certificate.

14.7.2 OWNER shall have the right to exclude CONTRACTOR from the Work after the date of Substantial Completion, but OWNER will allow CONTRACTOR reasonable access to complete or correct items on the punch list and complete warranty work.

14.8 Partial Utilization: Use by OWNER, at OWNER's option, of any substantially completed part of the Work which: (i) has specifically been identified in the Contract Documents, or (ii) OWNER 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 in accordance with the following:

14.8.1 OWNER at any time may request CONTRACTOR 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, CONTRACTOR shall certify to Owner's Representative that such part of the Work is substantially complete and request Owner's Representative to issue a certificate of substantial Completion for that part of the Work. CONTRACTOR at any time may notify Owner's Representative that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request Owner's Representative to issue a certificate of Substantial Completion for that part of the Work. The provisions of paragraphs 14.7.1 and 14.7.2 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.

14.8.2 Such partial utilization is authorized by public authorities having jurisdiction over the Work.

14.9 Final Inspection: Upon Written Notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, Owner's Representative will make a final inspection with CONTRACTOR and provide Written Notice 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.

14.10 Final Application for Payment: CONTRACTOR may make application for final payment following the procedure for progress payments after CONTRACTOR has completed all such corrections to the satisfaction of Owner's Representative and delivered the following documents:

14.10.1 Affidavit by CONTRACTOR certifying the payment of all debts and claims;

14.10.2 Three (3) complete operating and maintenance manuals, each containing maintenance and operating instructions, schedules, guarantees, and other documentation required by the Contract Documents;

14.10.3 Record documents (as provided in paragraph 6.10);

14.10.4 Consent of surety, if any, to final payment. If surety is not provided, complete and legally effective releases or waivers (satisfactory to OWNER) of all claims arising out of or filed in connection with the Work;

14.10.5 Certificate evidencing that insurance required by the Supplemental General Conditions will remain in force after final payment and through the warranty period;

14.10.6 Non-Use of Asbestos Affidavit (After Construction);

14.10.7 Subcontractor report and all other documentation necessary for evaluation of CONTRACTOR's fulfillment of the Contract MBE/WBE or DBE goals;

14.10.8 Documentation of notice to claimants, to the extent applicable and subject to subparagraph 14.11.4;

14.10.9 Proof of performance Bond extension through warranty period, if a performance Bond was required; and

14.10.10 Any other documentation called for in the Contract Documents.

14.11 Final Payment and Acceptance:

14.11.1 If, on the basis of observation of the Work during construction, final inspection, and review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Owner's Representative is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled and there are no outstanding claims, Owner's Representative will recommend the final Application for Payment and thereby notify the OWNER, who will pay to CONTRACTOR the balance due CONTRACTOR under the terms of the Contract. If the sole remaining unfinished item to complete the Work is the reestablishment of vegetation, CONTRACTOR may execute a revegetation letter with fiscal posted (letter of credit) to ensure completion of this item. This Work must be accomplished within one hundred twenty (120) Calendar Days of the date of Final Completion of the Work. When

the permanent erosion control has been established, OWNER will initiate an inspection for final acceptance of the erosion controls. If the revegetation is not completed within the one hundred twenty (120) Calendar Days, OWNER, at its option, may complete the Work using the posted fiscal.

- 14.11.2** If the Contract measures Contract Time to Final Completion, rather than Substantial Completion, Owner's Representative will issue a letter of final acceptance to CONTRACTOR which establishes the Final Completion date and initiates the one-year warranty period. If the sole remaining unfinished item to complete the Work is the reestablishment of vegetation and CONTRACTOR has executed a revegetation letter with fiscal posted (letter of credit) to ensure completion of this item, the Owner's Representative will issue a letter of conditional acceptance to CONTRACTOR which established the Final Completion date and initiates the one-year warranty period.
- 14.11.3** Final payment is considered to have taken place when CONTRACTOR or any of its representatives negotiates OWNER's final payment check, whether labeled final or not, for cash or deposits check in any financial institution for its monetary return.
- 14.11.4** The OWNER will withhold funds sufficient to cover the amount of any unresolved contract claims from final payment for six months under the following limited conditions:
- .1** CONTRACTOR must provide written notice to the claimant (via certified mail or hand delivery) that (i) OWNER will hold funds in the amount of the disputed claim for six (6) months from the date of the receipt of the notice and (ii) CONTRACTOR and the claimant have certain alternative dispute resolution rights; and
 - .2** CONTRACTOR must provide OWNER with a copy of the receipted notice.

Provided the claimant has received notice under this section, OWNER will release the withheld funds, if the CONTRACTOR provides a bond in substantial compliance with the provisions of Section 52.231 of the Texas Property Code; when the OWNER receives a settlement or release of the claim with accompanying instructions regarding payment; upon resolution of the claim in litigation, if suit is filed within such six (6) month period and the OWNER receives written notice of such filing; or when such six (6) month period has passed, if no such bond, settlement, release, or notice of filing of suit have been received. The above provisions notwithstanding, if efforts to timely resolve a disputed claim are not being made to OWNER'S reasonable satisfaction, OWNER may, in its complete discretion, file an interpleader action and deposit the withheld funds in the registry of a court of competent jurisdiction. In addition, CONTRACTOR must include a provision in each of its subcontracts that the prevailing party in any litigation arising thereunder will be entitled to recover its costs of court and reasonable attorney's fees.

14.12 Waiver of Claims: The making and acceptance of final payment will constitute:

- 14.12.1** a waiver of claims by OWNER against CONTRACTOR, except claims arising from unsettled claims, from defective Work appearing after final inspection, from failure to comply with the Contract Documents or the terms of any warranty specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and
- 14.12.2** a waiver of all claims by CONTRACTOR against OWNER other than those previously made in writing and still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.1 OWNER May Suspend Work Without Cause: At any time and without cause, OWNER may suspend the Work or any portion thereof for a period of not more than ninety (90) calendar days by Written Notice to CONTRACTOR which will fix the date on which the Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an adjustment in the Contract Amount or an extension of the Contract Times, or both, directly attributable to any such suspension if CONTRACTOR makes an approved Claim therefor as provided in Articles 11 and 12.

15.2 OWNER May Terminate Without Cause: Upon seven (7) calendar days' Written Notice to CONTRACTOR, OWNER may, without cause and without prejudice to any right or remedy of OWNER, elect to terminate the Agreement. In such case, CONTRACTOR shall be paid (without duplication of any items):

15.2.1 for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination;

15.2.2 for reasonable demobilization costs; and

15.2.3 for anticipated profits on completed and accepted Work not previously paid and not included in separate pay items calculated to date of termination but not for anticipated profit on the entire Contract not previously paid, unabsorbed overhead, or lost opportunity.

15.3 OWNER May Terminate With Cause:

15.3.1 Upon the occurrence of any one or more of the following events:

- .1 if CONTRACTOR persistently fails to perform the Work in accordance with the Contract Documents;
- .2 if CONTRACTOR disregards laws or regulations of any public body having jurisdiction;
- .3 if CONTRACTOR disregards the authority of Owner's Representative;
- .4 if CONTRACTOR makes fraudulent statements;
- .5 if CONTRACTOR fails to maintain a work force adequate to accomplish the Work within the Contract Time;
- .6 if CONTRACTOR fails to make adequate progress and endangers successful completion of the Contract; or
- .7 if CONTRACTOR otherwise violates in any substantial way any provisions of the Contract Documents;

OWNER may, after giving CONTRACTOR (and the surety, if any) seven (7) calendar days Written Notice terminate the services of CONTRACTOR. OWNER, at its option, may proceed with negotiation with surety for completion of the Work. Alternatively, OWNER may under these circumstances exclude CONTRACTOR from the site and take possession of the Work (without liability to CONTRACTOR for trespass or conversion), 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 finish the Work as OWNER may deem expedient. In such case CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Amount exceeds all claims, costs,

losses and damages sustained by OWNER arising out of or resulting from completing the Work, such excess will be paid to CONTRACTOR. If such claims, costs, losses and damage exceed such unpaid balance, CONTRACTOR or surety shall pay the difference to OWNER. In the event that a termination for cause is found to be wrongful, the termination shall be converted to a termination without cause as set forth in Section 15.2 and CONTRACTOR'S remedy for wrongful termination is limited to the recovery of the payments permitted for termination without cause as set forth in Section 15.2.

15.3.2 Where CONTRACTOR's services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR and surety then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability. In the event OWNER terminates Contract with cause, OWNER may reject any and all Bids submitted by CONTRACTOR for up to three (3) years after the date of such termination. These sanctions will be administered in accordance with the City of Austin Purchasing Office Probation, Suspension, and Debarment Procedures for Vendors, which include notice and an opportunity for a hearing.

15.4 CONTRACTOR May Stop Work or Terminate: If through no act or fault of CONTRACTOR, the Work is suspended for a period of more than ninety (90) calendar days by OWNER or under an order of court or other public authority, or (except during disputes) Owner's Representative fails to forward for processing any mutually acceptable Application for Payment within thirty (30) calendar days after it is submitted, or (except during disputes) OWNER fails for sixty (60) calendar days after it is submitted to pay CONTRACTOR any sum finally determined by OWNER to be due, then CONTRACTOR may, upon seven (7) calendar days' Written Notice to OWNER, and provided OWNER does not remedy such suspension or failure within that time, terminate the Agreement and recover from OWNER payment on the same terms as provided in paragraph 15.2. In lieu of terminating the Agreement and without prejudice to any other right or remedy, if (except during disputes) Owner's Representative has failed to forward for processing any mutually acceptable Application for Payment within thirty (30) calendar days after it is submitted, or (except during disputes) OWNER has failed for sixty (60) calendar days after it is submitted to pay CONTRACTOR any sum finally determined by OWNER to be due, CONTRACTOR may upon seven (7) calendar days' Written Notice to OWNER stop the Work until payment of all such amounts due CONTRACTOR, including interest thereon. The provisions of this paragraph 15.4 are not intended to preclude CONTRACTOR from making a Claim under Articles 11 and 12 for an increase in Contract Amount or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping Work as permitted by this paragraph.

15.5 Discretionary Notice to Cure: In its complete discretion, OWNER may, but is not required to, provide a Notice to Cure to CONTRACTOR and its surety to cure an event of default described above and/or an anticipatory breach of contract and, if required by OWNER, to attend a meeting with OWNER, regarding the Notice to Cure, the event of default, and/or the anticipatory breach of contract. The Notice to Cure will set forth the time limit in which the cure is to be completed or commenced and diligently prosecuted. Upon receipt of any Notice to Cure, CONTRACTOR shall prepare a report describing its program and measures to affect the cure of the event of default and/or anticipatory breach of contract within the time required by the Notice to Cure. The CONTRACTOR'S report must be delivered to OWNER at least three (3) days prior to any requested meeting with the OWNER and surety.

15.6 Bankruptcy: If CONTRACTOR declares bankruptcy or is adjudged bankrupt or makes an assignment for the benefit of creditors or if a receiver is appointed for the benefit of creditors or if a receiver is appointed by reason of CONTRACTOR'S insolvency, CONTRACTOR may be unable to perform this Contract in accordance with the Contract

requirements. In such an event, OWNER may demand CONTRACTOR or its successor in interest provide OWNER with adequate assurance of CONTRACTOR'S future performance in accordance with the terms and conditions of the Contract. If CONTRACTOR fails to provide adequate assurance of future performance to OWNER'S reasonable satisfaction within ten (10) days of such a request, OWNER may terminate the CONTRACTOR'S services for cause or without cause, as set forth above. If CONTRACTOR fails to provide timely adequate assurance of its performance and actual performance, OWNER may prosecute the Work with its own forces or with other contractors on a time and material or other appropriate basis and the cost of which will be charged against the Contract balance.

15.7 Duty to Mitigate: In the event of any termination or suspension under this Contract, the CONTRACTOR agrees to and shall take all reasonable actions to mitigate its damages and any and all claims which may be asserted against the OWNER.

15.8 Responsibility during Demobilization: While demobilizing, the CONTRACTOR will take all necessary and reasonable actions to preserve and protect the Work, the site and other property of the OWNER or others at the site.

ARTICLE 16 - DISPUTE RESOLUTION

16.1 Filing of Claims:

16.1.1 Claims arising from the circumstances identified in paragraphs 3.2, 4.1, 4.2.2, 4.2.4, 6.4.2, 6.11.5.2, 6.17, 7.5, 8.6, 9.5, 10.4.2, 13.4.3, 13.8, 13.9, 15.1, 15.2, 15.3, or 15.4, or other occurrences or events, shall be made by Written Notice delivered by the party making the Claim to the other party within thirty (30) calendar days after the start of the occurrence or event giving rise to the Claim and stating the general nature of the Claim. Notice of the amount of the Claim with supporting data shall be delivered in writing within thirty (30) calendar days after Written Notice of Claim is delivered by claimant and shall represent that the adjustment claimed covers all known amounts and/or extensions of time to which claimant is entitled.

16.1.2 Within thirty (30) calendar days of receipt of notice of the amount of the Claim with supporting data, Owner's Representative and CONTRACTOR shall meet to discuss the Claim, after which an offer of settlement or notification of no settlement offer will be made to claimant. If claimant is not satisfied with the proposal presented, claimant shall have thirty (30) calendar days in which to: (i) submit additional supporting data requested by the other party; (ii) modify the initial Claim; or (iii) request Alternative Dispute Resolution.

16.2 Alternative Dispute Resolution:

16.2.1 If a dispute exists concerning a Claim, the parties agree to use the following procedure prior to pursuing any other available remedies. OWNER reserves the right to include the E/A as a party.

16.2.2 Negotiating with Previously Uninvolved Personnel: Either party may make a written request for a meeting to be held between representatives of each party within fourteen (14) Calendar Days of the request or such later period that the parties may agree to. Each party shall endeavor to include, at a minimum, one (1) previously uninvolved senior level decision maker (an owner, officer, or employee of each organization) empowered to negotiate on behalf of their organization. If a previously uninvolved senior level decision maker is unavailable due to the size of the CONTRACTOR'S organization or any other reason, the

CONTRACTOR shall nonetheless provide an appropriate senior level decision maker for the meeting. The purpose of this and any subsequent meetings will be good faith negotiations of the matters constituting the dispute. Negotiations shall be concluded within thirty (30) Calendar Days of the first meeting, unless mutually agreed otherwise. This step may be waived by a written agreement signed by both parties, in which event the parties may proceed directly to mediation as described below.

16.2.3 Mediation:

- .1 If the procedure described in 16.2.2 proves unsuccessful or is waived pursuant to its terms, the parties shall initiate the mediation process. OWNER and CONTRACTOR agree to select within thirty (30) calendar days a mediator trained in mediation skills, to assist with resolution of the dispute. OWNER and CONTRACTOR agree to act in good faith in the selection of the mediator and to give consideration to qualified individuals nominated to act as mediator. Nothing in this agreement prevents the parties from relying on the skills of a person who also is trained in the subject matter of the dispute and/or a contract interpretation expert. Should the parties fail to agree on a mediator within thirty (30) calendar days of initiation of the mediation process, the parties agree to ask the Travis County Dispute Resolution Center to select a qualified individual, which selection shall be binding on the parties.
- .2 Mediation is a forum in which an impartial person, the mediator, facilitates communication between parties to promote reconciliation, settlement, or understanding among them. The parties hereby agree that mediation, at a minimum, shall provide for (i) conducting an on-site investigation, if appropriate, by the mediator for fact gathering purposes, (ii) a meeting of all parties for the exchange of points of view and (iii) separate meetings between the mediator and each party to the dispute for the formulation of resolution alternatives. The parties agree to participate in mediation in good faith for up to thirty (30) calendar days from the date of the first mediation session, unless mutually agreed otherwise. Should the parties fail to reach a resolution of the dispute through mediation, then each party is released to pursue other remedies available to them.

16.3 Resolution of Disputes between Contractor and Subcontractor or Supplier: If a dispute exists concerning a claim between a CONTRACTOR and a Subcontractor or Supplier, the CONTRACTOR agrees to participate with such Subcontractor and/or Supplier in a process substantially paralleling the steps set out in paragraphs 16.1 and 16.2 above, including the delivery of written notices, submission of supporting data, negotiation with previously uninvolved personnel, and, if such alternative dispute resolution process is unsuccessful, mediation between the parties to the claim. If the CONTRACTOR and Subcontractor or Supplier agreement provides an alternative dispute resolution process, which provides substantially equivalent rights to those set forth herein, it may be followed, unless the CONTRACTOR and affected Subcontractor or Supplier agree to follow the process outlined above. The OWNER is not a party to the alternative dispute resolution process between the CONTRACTOR and Subcontractor or Supplier and will not pay any costs incurred in the process. Each party will be responsible for its own expenses incurred in the process, which will include an equal share of the mediation expenses, unless otherwise determined by the mediator. NOTICE: THE PROCESS SET FORTH HEREIN IS NOT A SUBSTITUTE FOR THE STATUTORY PAYMENT BOND CLAIM PROCESS.

16.4 Claim Calculation:

16.4.1 Delay Claims: The intent of paying for delay damages is to reimburse the CONTRACTOR for actual expense arising out of a compensable delay. No profit or force account markups, other than labor burden, will be allowed for delay claims by the CONTRACTOR seeking reimbursement for expenses arising out of an alleged event of delay. No consequential damages will be allowed to the CONTRACTOR in connection with any claimed delays. If the CONTRACTOR requests compensation for delay damages and the delay is determined to be compensable, then standby equipment costs and project overhead compensation will be based on the duration of the compensable delay and the following:

- .1 Standby equipment costs will not be allowed during periods when the equipment would have otherwise been idle. Standby equipment time will not exceed more than eight (8) hours per twenty-four (24) hour day, forty (40) hours per week, and one hundred seventy-six (176) hours per month. Standby equipment costs will be paid at 50 percent (50%) of the applicable Rental Rate Blue Book rates and calculated by dividing the monthly rate by one hundred seventy-six (176), multiplying the result by the number of standby hours and multiplying that number by the regional adjustment factor and the rate adjustment factor contained in the Blue Book. Operating costs will not be allowed.
- .2 Project overhead will be determined from actual costs that the CONTRACTOR will be required to document. Project overhead is defined as the administrative and supervisory expenses incurred at the work site and will not include home office overhead.

16.4.2 General: Except as limited with respect to delay claims, as set forth above, the criteria set forth in Section 11.4.1 may be used as a basis to calculate an adjustment in the Contract Amount in the resolution of a claim, provided that there will be no compensation for home office overhead.

16.5 MBE/WBE Program Progressive Sanctions: CONTRACTOR is subject to progressive sanctions for failure of CONTRACTOR to comply with Austin City Code, Chapter 2-9A, as amended: "Minority-owned and Women-owned Business Enterprise Procurement Program." Available sanctions for Program violations are set forth in Program rules adopted by the Small and Minority Business Resources Department (SMBR), as amended, and may include the following progressive sanctions for Program violations within a rolling 24-month period: (i) a period of probation for up to six (6) months for the first violation (ii) a period of suspension from bidding for up to 24 months for the second violation, and (iii) a period of debarment for up to five (5) years for the third violation. If the CONTRACTOR engages in more than one of the violations listed below at any given time, OWNER has the discretion to determine whether such actions should be counted as multiple violations of the MBE/WBE Ordinance. Program violations include:

- .1 providing false or misleading information to the OWNER in connection with the submission of a Bid, responses to request for qualifications or Proposals, Good Faith Efforts documentation, post award compliance or other Program operations;
- .2 substituting M/WBE Subcontractors without first receiving approval for such substitutions;
- .3 failure to comply with the approved Compliance Plan without an approved request for a change, an approved Change Order or other approved change to the Contract;
- .4 violation of any other provision of the "Minority-owned and Women-owned Business Enterprise Procurement Program";

- .5 providing false or misleading information to the OWNER in connection with an application for or challenge to certification, recertification or decertification as a MBE/WBE; and
- .6 bid shopping.

The Progressive Sanctions will be administered in accordance with the City of Austin Purchasing Office Probation, Suspension, and Debarment Procedures for Vendors, which includes notice and an opportunity for a hearing.

ARTICLE 17 – MISCELLANEOUS

- 17.1 Venue: In the event of any suit at law or in equity involving the Contract, venue shall be exclusively in Travis County, Texas and the laws of the State of Texas shall apply to the interpretation and enforcement of the Contract.**
- 17.2 Extent of Agreement:** This Contract represents the entire and integrated agreement between the OWNER and CONTRACTOR with respect to the subject matter hereof and supersedes all prior negotiations, representations or agreements, either written or oral.
- 17.3 Cumulative Remedies:** The rights and remedies available to the parties 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 guarantees or by other provisions of the Contract Documents, and 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. Specifically, the OWNER is not required to only assess liquidated damages, and OWNER may elect to pursue its actual damages resulting from the failure of the CONTRACTOR to complete the Work in accordance with the requirements of the Contract Documents.
- 17.4 Severability:** If any word, phrase, clause, sentence or provision of the Contract, or the application of same to any person or set of circumstances is for any reason held to be unconstitutional, invalid or unenforceable, that finding shall only effect such word, phrase, clause, sentence or provision, and such finding shall not affect the remaining portions of this Contract; this being the intent of the parties in entering into the Contract; and all provisions of the Contract are declared to be severable for this purpose.
- 17.5 Independent Contractor:** The Contract shall not be construed as creating an employer/employee relationship, a partnership, or a joint venture. CONTRACTOR is an independent contractor and CONTRACTOR's services shall be those of an independent contractor. CONTRACTOR agrees and understands that the Contract does not grant any rights or privileges established for employees of OWNER.
- 17.6 Prohibition of Gratuities:** OWNER may, by Written Notice to CONTRACTOR, terminate the Contract without liability if is determined by OWNER that gratuities were offered or given by CONTRACTOR or any agent or representative of CONTRACTOR to any officer or employee of OWNER with a view toward securing the Contract or securing favorable treatment with respect to the awarding or amending or the making of any determinations with respect to the performing of such Contract. In the event the Contract is terminated by OWNER pursuant to this provision, OWNER shall be entitled, in addition to any other rights

and remedies, to recover or withhold the amount of the cost incurred by CONTRACTOR in providing such gratuities.

17.7 Prohibition Against Personal Interest in Contracts: No officer, employee, independent consultant, or elected official of OWNER who is involved in the development, evaluation, or decision-making process of the performance of any solicitation shall have a financial interest, direct or indirect, in the Contract resulting from that solicitation. Any violation of this provision, with the knowledge, expressed or implied, of CONTRACTOR shall render the Contract voidable by OWNER.

17.8 OWNER'S Right to Audit:

17.8.1 Records means all records generated by or on behalf of CONTRACTOR and each Subcontractor and Supplier of CONTRACTOR, whether paper, electronic, or other media, which are in any way related to performance of or compliance with this Contract, including, without limitation:

- .1 accounting records;
- .2 written policies and procedures;
- .3 subcontract files (including proposals of successful and unsuccessful Bidders, Bid recaps, etc.);
- .4 original estimates and estimating work sheets;
- .5 correspondence;
- .6 Change Order files (including documentation covering negotiated settlements);
- .7 back charge logs and supporting documentation;
- .8 general ledger entries detailing cash and trade discounts earned, insurance rebates and dividends;
- .9 lump sum agreements between CONTRACTOR and any Subcontractor or Supplier;
- .10 records necessary to evaluate: Contract compliance, Change Order pricing, and any Claim submitted by CONTRACTOR or any of its payees; and
- .11 any other CONTRACTOR record that may substantiate any charge related to this Contract.

17.8.2 CONTRACTOR shall allow OWNER'S agent or its authorized representative to inspect, audit, and/or reproduce, or all three, all Records generated by or on behalf of CONTRACTOR and each Subcontractor and Supplier, upon OWNER'S written request. Further, CONTRACTOR shall allow OWNER'S agent or authorized representative to interview any of CONTRACTOR'S employees, all Subcontractors and all Suppliers, and all their respective employees.

17.8.3 CONTRACTOR shall retain all its Records, and require all its Subcontractors and Suppliers to retain their respective Records, during this Contract and for three (3) years after final payment, until all audit and litigation matters that OWNER has brought to the attention of CONTRACTOR are resolved, or as otherwise required by law, whichever is longer. OWNER'S right to inspect, audit, or reproduce Records, or interview employees of CONTRACTOR or its respective Subcontractors or Suppliers exists during this Contract, and for three (3) years after final payment, until all audit and litigation matters that OWNER has brought to CONTRACTOR'S attention are resolved, or as otherwise required by law, whichever is longer, and at

Bidding Requirements, Contract Forms and Conditions of the Contract**SUPPLEMENTAL GENERAL CONDITIONS**Section 00810

The Supplemental General Conditions contained herein amend or supplement the General Conditions, Section 00700.

ARTICLE 1 – DEFINITIONS

Add to the following definition:

1.20 Engineer/Architect (E/A): The OWNER's design professional for this contract is:

Name: Ashok Perera, PE, ENV SP

Address: 11801 Domain Boulevard, Suite 500, Austin, TX, 78758

ARTICLE 2 - PRELIMINARY MATTERS**2.4 Before Starting Construction:**

Delete 2.4.2.6 and replace with the following (changes to the original text are identified by underlining):

.6 A preliminary schedule of values for all of the Work, subdivided into component parts in sufficient detail to serve as the basis for progress payments during construction. At a minimum, the schedule of values must be broken out by trade and split between materials and labor. Prices will be deemed to include an appropriate amount of overhead and profit applicable to each item of Work;

ARTICLE 5 - BONDS AND INSURANCE**5.3 Other Bond and Insurance Requirements:****5.3.1 CONTRACTOR Provided Insurance****5.3.1.1 General Requirements.**

.1 CONTRACTOR shall carry insurance in the types and amounts indicated below for the duration of the Contract, which shall include items owned by OWNER in the care, custody and control of CONTRACTOR prior to and during construction and warranty period.

.2 CONTRACTOR must complete and forward the Certificate of Insurance, Section 00650, to OWNER before the Contract is executed as verification of coverage required below. CONTRACTOR shall not commence Work until the required insurance is obtained and until such insurance has been reviewed by OWNER. Approval of insurance by OWNER shall not relieve or decrease the liability of CONTRACTOR hereunder and shall not be construed to be a limitation of liability on the part of CONTRACTOR. CONTRACTOR must also complete and forward the Certificate of Insurance, Section 00650, to OWNER whenever a previously identified policy period has expired as verification of continuing coverage.

.3 CONTRACTOR's insurance coverage is to be written by companies authorized to do business in the State of Texas at the time the policies are issued and shall be written by companies with A.M. Best ratings of B+VII or better, except for hazardous material insurance which shall be written by companies with A.M. Best ratings of A- or better.

Bidding Requirements, Contract Forms and Conditions of the Contract

.4 All endorsements naming the OWNER as additional insured, waivers, and notices of cancellation endorsements as well as the Certificate of Insurance shall indicate: City of Austin, Capital Contracting Office, P.O. Box 1088, Austin, Texas 78767.

.5 The "other" insurance clause shall not apply to the OWNER where the OWNER is an additional insured shown on any policy. It is intended that policies required in the Contract, covering both OWNER and CONTRACTOR, shall be considered primary coverage as applicable.

.6 If insurance policies are not written for amounts specified below, CONTRACTOR shall carry Umbrella or Excess Liability Insurance for any differences in amounts specified. If Excess Liability Insurance is provided, it shall follow the form of the primary coverage.

.7 OWNER shall be entitled, upon request and without expense, to receive certified copies of policies and endorsements thereto and may make any reasonable requests for deletion or revision or modification of particular policy terms, conditions, limitations, or exclusions except where policy provisions are established by law or regulations binding upon either of the parties hereto or the underwriter on any such policies.

.8 OWNER reserves the right to review the insurance requirements set forth during the effective period of this Contract and to make reasonable adjustments to insurance coverage, limits, and exclusions when deemed necessary and prudent by OWNER based upon changes in statutory law, court decisions, the claims history of the industry or financial condition of the insurance company as well as CONTRACTOR.

.9 CONTRACTOR shall not cause any insurance to be canceled nor permit any insurance to lapse during the term of the Contract or as required in the Contract.

.10 CONTRACTOR shall be responsible for premiums, deductibles and self-insured retentions, if any, stated in policies. All deductibles or self-insured retentions shall be disclosed on the Certificate of Insurance.

.11 CONTRACTOR shall provide OWNER thirty (30) days written notice of erosion of the aggregate limits below occurrence limits for all applicable coverages indicated within the Contract.

.12 If OWNER owned property is being transported or stored off-site by CONTRACTOR, then the appropriate property policy will be endorsed for transit and storage in an amount sufficient to protect OWNER's property.

.13 The insurance coverages required under this contract are required minimums and are not intended to limit the responsibility or liability of CONTRACTOR.

5.3.1.2 Business Automobile Liability Insurance. Provide coverage for all owned, non-owned and hired vehicles. The policy shall contain the following endorsements in favor of OWNER:

- a) Waiver of Subrogation endorsement CA 0444;
- b) 30 day Notice of Cancellation endorsement CA 0244; and
- c) Additional Insured endorsement CA 2048.

Provide coverage in the following types and amounts:

Bidding Requirements, Contract Forms and Conditions of the Contract

.1 A minimum combined single limit of \$500,000 per occurrence for bodily injury and property damage. Alternate acceptable limits are \$250,000 bodily injury per person, \$500,000 bodily injury per occurrence and at least \$100,000 property damage liability each accident.

5.3.1.3 Workers' Compensation And Employers' Liability Insurance. Coverage shall be consistent with statutory benefits outlined in the Texas Workers' Compensation Act (Section 401). CONTRACTOR shall assure compliance with this Statute by submitting two (2) copies of a standard certificate of coverage (e.g. ACCORD form) to Owner's Representative for every person providing services on the Project as acceptable proof of coverage. The Certificate of Insurance, Section 00650, must be presented as evidence of coverage for CONTRACTOR. CONTRACTOR's policy shall apply to the State of Texas and include these endorsements in favor of OWNER:

- a) Waiver of Subrogation, form WC 420304; and
- b) 30 day Notice of Cancellation, form WC 420601.

The minimum policy limits for Employers' Liability Insurance coverage shall be as follows:

.1 \$100,000 bodily injury per accident, \$500,000 bodily injury by disease policy limit and \$100,000 bodily injury by disease each employee.

5.3.1.4 Commercial General Liability Insurance. The Policy shall contain the following provisions:

- a) Contractual liability coverage for liability assumed under the Contract and all contracts relative to this Project.
- b) Completed Operations/Products Liability for the duration of the warranty period.
- c) Explosion, Collapse and Underground (X, C & U) coverage.
- d) Independent Contractors coverage (Contractors/ Subcontractors work).
- e) Aggregate limits of insurance per project, endorsement CG 2503.
- f) OWNER listed as an additional insured, endorsements CG 2010 and CG 2037 or equivalent.
- g) 30 day notice of cancellation in favor of OWNER, endorsement CG 0205.
- h) Waiver of Transfer of Recovery Against Others in favor of OWNER, endorsement CG 2404.

Provide coverages A&B with minimum limits as follows:

.1 A combined bodily injury and property damage limit of \$500,000 per occurrence.

5.3.1.5 Builders' Risk Insurance. CONTRACTOR shall maintain Builders' Risk Insurance or Installation Insurance on an all risk physical loss form in the Contract Amount. Coverage shall continue until the Work is accepted by OWNER. OWNER shall be a loss payee on the policy. If off-site storage is permitted, coverage shall include transit and storage in an amount sufficient to protect property being transported or stored.

5.3.1.6 Professional Liability Insurance. For Work which requires professional engineering or professional survey services to meet the requirements of the Contract, including but not limited to excavation safety systems, traffic control plans, and construction surveying, the CONTRACTOR or Subcontractors, responsible for performing the professional services shall

Bidding Requirements, Contract Forms and Conditions of the Contract

provide Professional Liability Insurance with a minimum limit of \$500,000 per claim and in the aggregate to pay on behalf of the assured all sums which the assured shall become legally obligated to pay as damages by reason of any negligent act, error, or omission committed with respect to all professional services provided in due course of the Work of this Contract. CONTRACTOR's policy shall include the following endorsement in favor of the OWNER:

- a) 30 day Notice of Cancellation endorsement CA 0244

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.6 Permits, Fees: Add the following:

OWNER will obtain and pay for the following permits, licenses and/or fees:

6.6.1 Site Development Permit.

6.6.2 Building Permit(s). OWNER's responsibility for obtaining and paying for the Building Permit(s) shall be limited to the following where applicable: the required Electrical Service (Aid of Construction) Fee, Water and Wastewater Tap Fees, Water and Wastewater Capital Recovery Fees, and Septic Permit Fee. The OWNER's responsibility for obtaining and paying for the Building Permit(s) excludes securing and paying for the following where applicable: Driveway Permit (Concrete) Fee, Electrical Permit, Mechanical Permit, Plumbing Permit, Water Engineering Inspection Fee, Temporary Use of Right-of Way Permit, the gas company's Gas Yard Line Contribution Fee, and any other permits/fees not listed above.

ARTICLE 11 - CHANGE OF CONTRACT AMOUNT

11.4 Determination of Value of Work: Add the following to paragraph 11.4.1.2:

In the case of a Change Order determined by a mutually agreed lump sum or unit price properly itemized and supported by sufficient substantiating data, including documentation by subcontractors performing the work, to permit evaluation, the following method may be used:

COMPONENT ONE - The R.S. Means Co., Inc. 'Building Construction Cost Data' - latest edition - will be used as a basis for evaluating:

- 1a - the cost of labor (base rate, including fringe benefits),
- 1b - the cost of material and equipment to be incorporated in the Work, and
- 1c - the cost of tools, equipment and facilities necessary to accomplish the Work described in the change.

COMPONENT TWO - The costs of payroll taxes and insurance, Liability and Builder's Risk Insurance, shall be calculated as follows:

- 2a - Payroll taxes and Workers' Compensation Insurance <25% of payroll (Item 1a)>
- 2b - Liability and Builder's Risk Insurance <2% of "total costs" (Items 1a, 1b, 1c, and 2a)>

COMPONENT THREE - Overhead and profit shall be calculated as follows:

Bidding Requirements, Contract Forms and Conditions of the Contract

3a - For Subcontractors and for those portions of the Work performed by CONTRACTOR's own forces:

15% of the first \$10,000.00 of costs and 10% of the balance over \$10,000.00. ("costs" = Items 1a, 1b, and 1c, above, broken down into Contractor and Subcontractor costs).

3b - For the CONTRACTOR for that portion of the Work performed by Subcontractors:

10% of the first \$10,000.00 of the Subcontractor costs and 7.5% of the balance over \$10,000.00.

("costs" = Items 1a, 1b, and 1c, above, broken down into Subcontractor costs)

COMPONENT FOUR - Bonds

Performance and Payment Bond according to the following table ("TOTAL COST" = Items 1a, 1b, 1c, 2a, 2b, 3a, and 3b):

DOLLAR VALUE OF CONTRACT			% OF TOTAL COST OF CHANGE ORDER ADDED FOR BOND EXPENSE
\$100,000	OR	LESS	2.5
\$100,001	THRU	\$500,000	1.5
\$500,001	THRU	\$2,500,000	1.0
\$2,500,001	THRU	\$5,000,000	0.75
\$5,000,001	THRU	\$7,500,000	0.70
OVER \$7,500,000			0.65

a) The total costs for the change, whether additive or deductive, shall be the sum total of COMPONENTS ONE - FOUR.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK**13.7 Warranty Period: Add the following:**

13.7.5 OWNER will utilize a "Warranty Item Form" (attached at the end of this Section) for the purpose of providing Written Notice of warranty defects to CONTRACTOR. CONTRACTOR shall date, sign, complete and return the form to OWNER when the defect is corrected, including such information on or attached to the form to describe the nature of the repairs or corrections that were made. If the defect cannot be corrected in seven (7) Calendar Days, CONTRACTOR shall provide a written explanation to the Owner's Representative describing the repairs needed and the time required to complete the repairs.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.7 Substantial Completion: Reference 14.7.1, and one of the following three provisions:

14.7.1.1 For the Walnut Creek WWTP Gas Scrubber Renewal Project, Substantial Completion for the project will include: All items listed in Section 01010, part 1.21, testing (including Performance Acceptance Test), and start-up and commissioning of all equipment; all completed and accepted SCADA and electrical improvements to allow onsite monitoring

Bidding Requirements, Contract Forms and Conditions of the Contract

of processes and equipment have been completed; and completed and accepted training warrantees, final O&Ms, and spare parts.

A certificate of Substantial Completion will not be issued. Work that remains after Substantial Completion could include the final pavement of roadways, adjustment of structures to final grade and revegetation. Owner's Representative will issue a notice specifying what portion of the Work is partially completed for the purpose of payment and what Work remains to be done on the portion being accepted as Substantially Complete. This subsection 14.7.1.1 changes the 00700 General Conditions definition of Substantial Completion.

Bidding Requirements, Contract Forms and Conditions of the Contract

WARRANTY ITEM NO. _____ (PROJECT NAME)
The General Conditions of the Contract require that Warranty Defects be corrected within 7 days after written notice is received.

TO: _____
contractor name address / telephone / fax / email

ATTENTION OF: _____

FROM: _____
project manager name / address / telephone / fax / email

PROJECT: _____
name / location / CIP ID number

END OF ONE YEAR WARRANTY: _____

SUBJECT: _____

If checked, the damage requires immediate attention. The Contractor has been called.
 If checked, the Consultant has been asked to consult with the Contractor on the problem.

PLEASE CORRECT OR REPAIR THE FOLLOWING ITEM(S):

DATE OF REQUEST _____ **SIGNATURE** _____

Project Manager

xc:

_____ Phone No. _____
 _____ Phone No. _____
 _____ Phone No. _____
 _____ Phone No. _____

RESPONSE FROM CONTRACTOR: DATE CORRECTION WAS MADE: _____

The Contractor must endeavor to correct the defect within 7 calendar days after written notice is given. If the defect cannot be corrected in that time, Contractor shall provide a written explanation to the Owner's Representative describing the repairs needed and the time required to complete the repairs.

Description of corrections made:

DATE OF REPLY _____ **SIGNATURE** _____

When the repair is complete, the contractor should return a copy to each of the following:

_____ Phone No. _____
 _____ Phone No. _____
 _____ Phone No. _____
 _____ Phone No. _____

END

Bidding Requirements, Contract Forms and Conditions of the Contract**WAGE RATES AND PAYROLL REPORTING**Section 00830

1. PAYMENT**1.1 Classification Definitions, Building and Heavy and Highway**

1.1.1 Definitions for Building Construction and Heavy and Highway classifications shall conform to the current "Occupational Information Network (O*NET)" as approved by the U.S. Department of Labor. For interpretive guidance, the Core Task list in O*NET will be used to make prevailing wage determinations. Final classification of workers will be made by the OWNER.

1.2 Minimum Wages

1.2.1 Workers on Project shall be paid not less than wage rates, including fringe benefits, as published by the Department of Labor (DOL) or the \$15.00 minimum wage required by City of Austin Ordinance No. 20160324-015, whichever is higher. The Total Minimum Wage required can be met using any combination of cash and non-cash qualified fringe benefits provided the cash component meets or exceeds the \$15.00 minimum wage required.

1.2.2 Such wage rates shall be used throughout the Contract. If a classification is to be used, which is not listed in the attached wage rates, CONTRACTOR shall submit to OWNER rates and classification proposed for use, for approval, prior to performance of the Work.

1.2.3 All laborers and mechanics working upon the Work for this Project shall be paid unconditionally and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by Secretary of Labor under the Copeland Act, Title 29 CFR, Part 3) full wages accrued and when due, computed at rates not less than wage rates bound herein pertaining to type of Work being performed. When Work is of such a nature that both Building and Heavy and Highway wage scales are incorporated into contract, CONTRACTOR shall pay wage rates to mechanics or laborers performing Work in more than one classification at the rate indicated for each classification for time actually worked as determined by area practice applicable to type (Site Construction Crafts or Building Construction Crafts) of Work being performed without regards to skill. Salaried specialists (project superintendent and administrative personnel only) in the permanent employment of CONTRACTOR do not fall under any Wage Classification. A supervisor/foreman who is not exempt under 29 CFR Part 541 and who spends more than a substantial amount of time (20 percent) in a given workweek as a laborer or mechanic must be paid the applicable Wage Rate for the classification of work performed for all hours engaged in such work as a laborer or mechanic.

1.2.4 Wage rates shall be posted by CONTRACTOR at site(s) of Work in prominent, easily accessible places where they can be seen by all workers. The following shall also be posted by the CONTRACTOR: City of Austin wage contact posters (English and Spanish), City of Austin Equal Employment Opportunity posters (English and Spanish), Workers' Compensation Notice (English and Spanish), Texas Payday Law (English and Spanish), City Rest Break Ordinance

Bidding Requirements, Contract Forms and Conditions of the Contract

(English and Spanish), City of Austin Non-Discrimination Statement (related to Title VI of the Civil Rights Act), and Federal Notices, as appropriate.

1.3 Overtime Requirements

1.3.1 No CONTRACTOR, Subcontractor, or Sub-subcontractor contracting for any part of contract Work which may require or involve the employment of laborers or mechanics shall require or permit any laborer or mechanic in any workweek in which he is employed on such Work, to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times their basic rate of pay for all hours in excess of forty hours in such workweek.

1.3.2 Overtime wages must be calculated using the Adjusted Wage Rate specified in the Wage Rate Determination or the actual basic rate of pay, whichever is higher.

2. APPRENTICES

2.1 Locally and Federally Funded Projects

2.1.1 The terms journeyman and apprentice apply to both union and independent workers, and are not intended to imply that these positions are union workers only.

2.1.2 Apprentices and Trainees will be permitted to work as such only when they are registered, individually, under a bonafide Apprenticeship or Trainee program registered with the Bureau of Apprenticeship and Training, United States Department of Labor. The allowable ratio of Apprentices or Trainees to journeymen in any craft classification shall not be greater than the ratio permitted to CONTRACTOR as stated in the registered apprenticeship program standards. Any employee listed on a payroll at an Apprentice or Trainee wage rate, who is not registered as above, shall be paid the wage rate provided in Contract for Work employee actually performed. CONTRACTOR, Subcontractor, or Subsubcontractor shall furnish to OWNER written evidence of registration of his program for Apprentices and Trainees as well as of the appropriate ratios and wage rates, for the area of construction prior to using any Apprentices or Trainees on this Contract.

3. WITHHOLDING PAYMENTS

3.1 OWNER may withhold or cause to be withheld from CONTRACTOR as much of the accrued payments as necessary to pay laborers and mechanics employed by CONTRACTOR, Subcontractors, or Sub-subcontractors the amount of wages required to comply with the Contract. In the event of nonpayment of wages to laborers or mechanics working on the site of the Work of this Contract, OWNER may, after Written Notice to CONTRACTOR, take such action as may be necessary to cause suspension of any further payments or advance of funds to CONTRACTOR until such violations have ceased and until restitution has been made. Payments may also be withheld if CONTRACTOR fails to maintain weekly payroll reports or fails to provide copies in a timely manner upon request of Owner.

4. PAYROLLS

4.1 CONTRACTOR shall keep records showing:

Bidding Requirements, Contract Forms and Conditions of the Contract

4.1.1 The name, address and occupation of each worker employed by the CONTRACTOR or subcontractor(s) in the construction of the public work.

4.1.2 The actual per diem wages paid to each worker

4.1.3 Employee Certification. CONTRACTOR, all levels of Subcontractors shall identify in writing, the classification agreed to by all laborers and mechanics employed by them in the execution of the Contract, and pay not less than rates specified in the attached Wage Rate Determination(s). Contractor shall prepare a completed form for the signature of Employee and a witness shall sign the form in the presence of Employee. If work performed by worker is different than the trade classification agreed upon, the worker shall be paid for that work no less than the minimum prevailing wage for that specified trade.

4.1.4 Payroll Deduction Authorization Form. CONTRACTOR, Subcontractor, and Sub subcontractor shall prepare for employee signature a payroll deduction authorization form to identify all payroll deductions excluding those required by statute, such as federal income taxes, Medicare and social security.

4.2 The record shall be open at all reasonable hours to inspection by the officers and agents of the Owner as requested. CONTRACTOR will be responsible to provide copies of records as requested by the Owner within two (2) working days. Payrolls relating to this Work shall be maintained during term of Contract and preserved for a period of three (3) years thereafter by CONTRACTOR for all laborers and mechanics working on the Work.

4.3 A Statement of Compliance, a letter signed and dated by party responsible for supervising the payment of persons employed by CONTRACTOR or subcontractor shall accompany payrolls required by Owner. The Statement of Compliance letter shall identify but is not limited to:

4.3.1 Name of signatory party and title

4.3.2 Name of project, payroll period and

4.3.3 Name of CONTRACTOR or Subcontractor

4.4 The signed letter attests that the payroll complies with 29CFR issued by the Secretary of Labor.

4.5 Federal Funding. In the event that federal funding is used:

4.5.1 Contractor and all levels of Subcontractors shall submit weekly certified payroll reports and signed wage compliance statements to the Owner's designated office no later than seven (7) calendar days after the scheduled payday.

4.5.2 Contractors and all levels of Subcontractors shall pay all "mechanics and laborers" not less often than once per week, for work performed the previous week.

4.5.3 Submit to the Owner's designated office Standard Form 1413, Statement and Acknowledgement, from each subcontractor prior to the subcontractor performing work on the project.

Bidding Requirements, Contract Forms and Conditions of the Contract**5. NONCOMPLIANCE**

5.1 According to Chapter 2258 Texas Government Code Title 10A, a CONTRACTOR or subcontractor(s) who violates this section shall pay to the political subdivision on whose behalf the contract is made, \$60 for each worker employed for each calendar day or part of the day that the worker is paid less than the wage rates stipulated in the contract. A public body shall use any money collected under this section to offset the costs incurred in the administration of this chapter.

5.2 Confirmed Disciplinary action taken by CONTRACTOR against employees who provide information during an interview or investigation by the Owner on wages received, may result in suspension or debarment from consideration of award of City contracts.

6. AREA PRACTICE

6.1 Heavy and Highway Construction Rates shall be used on this Project, unless the Project consists primarily of Building Construction and Building Construction Rates are to be used.

6.1.1 Building Construction consists generally of all aspects of construction of buildings, which are sheltered enclosures with walk-in access for the purpose of housing persons, machinery, equipment or supplies, including without limitation the installation of utilities and equipment, both above and below grade level, as well as incidental demolition, grading, utilities, paving and other site work. Buildings need not be "habitable" to be classified as Building Construction and the installation of heavy machinery and/or equipment will not generally change a Building Construction project's classification.

6.1.2 The determination of Building Construction Wage Rates includes all construction trades and work necessary to complete a building, regardless of the number of contracts involved, so long as all such contracts are closely related in purpose, time and place.

6.2 For projects that involve both Building Construction and Heavy and Highway trades, the following classifications shall be used:

6.2.1 A multiple classification shall be used if Building Construction items are more than 20% of the Heavy and Highway project cost.

6.2.2 A multiple classification shall be used if Heavy and Highway Construction items are more than 20% of the Building Construction Project cost.

6.3 Split classifications/multiple wage rate schedules: When construction work requires that an employee perform work under multiple classifications or multiple wage scales, the employer must pay that worker (at least) the highest prevailing wage or the employer payroll records must accurately set forth the times spent performing the work of each classification and under each scale. For those projects that involve both Building Construction and Heavy and Highway trades, the Heavy and Highway wage rates may only be applied to workers when engaged in site work at least five (5) feet beyond the building.

7. TEXAS OPEN RECORDS ACT

Bidding Requirements, Contract Forms and Conditions of the Contract

7.1 Unless covered by an exception to mandatory disclosure under the Texas Public Information Act, Chapter 552, Texas Government Code, any and all documents submitted to the City of Austin become Public Records and are, therefore, subject to public disclosure.

Wage Rates for This Project Are Attached

END

Bidding Requirements, Contract Forms Conditions of the Contract**WAGE RATES AND PAYROLL REPORTING**

Section 00830BC

WAGE RATE DETERMINATION**Building Construction Type**

County Name: TRAVIS

Wages based on DOL Prevailing Wage Rate General Decision: TX20220271 06/17/2022 and City of Austin Ordinance #20160324-015

DOL Rate column is for information only. The Total Minimum Wage Rate is derived from the Adjusted Wage Rate Required pursuant to City Ordinance plus the DOL Fringes and can be met using any combination of cash and non-cash qualified fringe benefits, provided the cash component is at least \$15.00/hour.

Classification	DOL Rate For info Only	Adjusted Wage Rate Required Pursuant to City Ordinance	DOL Fringes	Total Minimum Wage Rate Required
Asbestos Worker/Heat & Frost Insulator (Duct, Pipe, and Mechanical System Insulation)	\$ 25.22	\$ 25.22	\$ 10.17	\$ 35.39
Boilermaker	\$ 29.47	\$ 29.47	\$ 24.10	\$ 53.57
Bricklayer	\$ 20.07	\$ 20.07	\$ -	\$ 20.07
Carpenter	\$ 26.00	\$ 26.00	\$ 9.12	\$ 35.12
Carpenter (Acoustical Ceiling Installation only)	\$ 14.00	\$ 15.00	\$ -	\$ 15.00
Carpenter (Form Work Only)	\$ 15.62	\$ 15.62	\$ 0.05	\$ 15.67
Cement Mason/Concrete Finisher	\$ 15.71	\$ 15.71	\$ -	\$ 15.71
Drywall Finisher/Taper	\$ 17.06	\$ 17.06	\$ 4.43	\$ 21.49
Drywall Hanger and Metal Stud Installer	\$ 17.47	\$ 17.47	\$ 3.45	\$ 20.92
Electrical Installer (Sound and Communication Systems, Excluding Wiring)	\$ 18.00	\$ 18.00	\$ 2.30	\$ 20.30
** Electrician (Excludes Installation of Sound and Communication Systems)	\$ 31.52	\$ 31.52	\$ 8.97	\$ 40.49
***Elevator Mechanic	\$ 43.72	\$ 43.72	\$ 36.365	\$ 80.085
Floor Layer (Carpet)	\$ 21.88	\$ 21.88	\$ -	\$ 21.88
Glazier	\$ 12.83	\$ 15.00	\$ -	\$ 15.00
HVAC Mechanic (HVAC Unit Installation Only)	\$ 23.78	\$ 23.78	\$ 6.89	\$ 30.67
Ironworker, Ornamental	\$ 26.01	\$ 26.01	\$ 7.56	\$ 33.57
Ironworker, Reinforcing	\$ 12.27	\$ 15.00	\$ -	\$ 15.00
Ironworker, Structural	\$ 20.73	\$ 20.73	\$ 5.24	\$ 25.97
*Lead Paint or Asbestos Abatement Worker	*	\$ 15.00	\$ -	\$ 15.00
Laborer, Common or General	\$ 11.44	\$ 15.00	\$ -	\$ 15.00
Laborer, Mason Tender - Brick	\$ 12.22	\$ 15.00	\$ -	\$ 15.00
Laborer, Mason Tender - Cement/Concrete	\$ 11.85	\$ 15.00	\$ -	\$ 15.00
Laborer, Pipelayer	\$ 12.45	\$ 15.00	\$ -	\$ 15.00

Bidding Requirements, Contract Forms Conditions of the Contract

Laborer, Roof Tearoff	\$ 11.28	\$ 15.00	\$ -	\$ 15.00
Operator, Backhoe/Excavator/Trackhoe	\$ 19.43	\$ 19.43	\$ 3.49	\$ 22.92
Operator, Bobcat/Skid Steer/Skid Loader	\$ 13.00	\$ 15.00	\$ -	\$ 15.00
Operator, Bulldozer	\$ 14.00	\$ 15.00	\$ -	\$ 15.00
Operator, Crane	\$ 34.85	\$ 34.85	\$ 9.85	\$ 44.70
Operator, Drill	\$ 14.50	\$ 15.00	\$ -	\$ 15.00
Operator, Forklift	\$ 16.64	\$ 16.64	\$ 6.26	\$ 22.90
Operator, Grader/Blade	\$ 19.30	\$ 19.30	\$ -	\$ 19.30
Operator, Loader	\$ 14.00	\$ 15.00	\$ -	\$ 15.00
Operator, Mechanic	\$ 18.75	\$ 18.75	\$ 5.12	\$ 23.87
Operator, Paver (Asphalt, Aggregate, and	\$ 16.03	\$ 16.03	\$ -	\$ 16.03
Operator, Roller	\$ 11.25	\$ 15.00	\$ -	\$ 15.00
Painter (Brush, Roller, and Spray, Excludes	\$ 18.76	\$ 18.76	\$ 6.35	\$ 25.11
Pipefitter (Including HVAC Pipe Installation)	\$ 33.15	\$ 33.15	\$ 15.37	\$ 48.52
Plumber, Excludes HVAC Pipe Installation	\$ 23.57	\$ 23.57	\$ 6.37	\$ 29.94
Roofer	\$ 12.00	\$ 15.00	\$ -	\$ 15.00
*Roofer, Metal	\$ 14.05	\$ 15.00	\$ -	\$ 15.00
Sheet Metal Worker (Excluding HVAC, Including HVAC Duct Installation)	\$ 27.89	\$ 27.89	\$ 16.25	\$ 44.14
HVAC Duct Installation Only	\$ 27.89	\$ 27.89	\$ 16.25	\$ 44.14
Sprinkler Fitter (Fire Sprinklers)	\$ 31.68	\$ 31.68	\$ 22.50	\$ 54.18
Tile Finisher	\$ 11.32	\$ 15.00	\$ -	\$ 15.00
Tile Setter	\$ 16.35	\$ 16.35	\$ -	\$ 16.35
Truck Driver, Dump Truck	\$ 12.39	\$ 15.00	\$ 1.18	\$ 16.18
Truck Driver, Flatbed Truck	\$ 19.65	\$ 19.65	\$ 8.57	\$ 28.22
Truck Driver, Semi-Trailer Truck	\$ 12.50	\$ 15.00	\$ -	\$ 15.00
Truck Driver, Water Truck	\$ 12.00	\$ 15.00	\$ 4.11	\$ 19.11
Waterproofers	\$ 16.30	\$ 16.30	\$ 0.06	\$ 16.36

<http://www.wdol.gov/wdol/scafiles/davisbacon/tx.html>

See below for Additional Wage Information.

Note: *Lead Paint & Asbestos Abatement and Roofer, Metal Classifications have been added to this Prevailing Wage Rate Determination pursuant to a City of Austin Prevailing Wage Survey (trades absent from DOL).

The Wage Compliance information detailed below was excerpted from DOL General Decision TX180323 or other sources.

1. ADDITIONAL TRADE INFORMATION

**Electricians - Including low voltage wiring for computers, fire/smoke alarms.

***Elevator Mechanics – 6% under 5 years based on regular hourly rate for all hours worked. 8% over 5 years based on regular hourly rate for all hours worked as Vacations Pay Credit. Also must be paid for 7 holidays - New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and Veterans Day.

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

Bidding Requirements, Contract Forms Conditions of the Contract

Unlisted classifications needed for work not included within the scope of the classifications listed may be added upon the advance approval of City of Austin Contract Administration. CONTRACTOR shall submit to City of Austin Contract Administration for review the classification, a bona fide definition of work to be performed and a proposed wage with sample payrolls conforming to area practice **prior** to the start of the job for that type of work.

2. WAGES

The Total Wage may be met by any combination of cash wages and credible "bona fide" fringe benefits paid for by the employer. Overtime wages must be calculated using the Adjusted Wage Rate specified in the Wage Rate Determination or the actual basic rate of pay, whichever is higher. City of Austin Ordinance No. 20160324-015 requires that construction workers are paid a Minimum Wage of at least \$15.00/hour. The cash portion of their compensation must meet or exceed this amount.

3. CREDITING FRINGE BENEFIT CONTRIBUTIONS TO MEET DBA/DBRA AND CITY OF AUSTIN REQUIREMENTS

The Davis-Bacon Act (and 29 CFR 5.23), list fringe benefits to be considered. Examples are:

- > Life Insurance
- > Health Insurance
- > Pension
- > Vacation
- > Holidays
- > Sick Leave

Note: The use of a truck is not a fringe benefit; a Thanksgiving turkey or Christmas bonus is not a fringe benefit. No credit may be taken for any benefit required by federal, state, or local law such as: workers compensation, unemployment compensation; or social security contributions.

Contributions to fringe benefit plans must be made regularly, e.g. daily, weekly, etc. They must be more frequent than quarterly. (See 29 CFR 5.5 (a)(1)(I)) A periodic bonus may not be counted as a fringe benefit.

4. ANNUALIZATION OF BENEFIT COSTS

If a firm provides an electrician with \$200 per month medical insurance, to calculate allowable fringe benefit credit contributions per hour, the formula ($[\$200 \times 12 \text{ months}]$ divided by 2080 hours = \$1.15 per hour) should be used.

5. PROPER DESIGNATION OF TRADE

A work classification on the wage decision for each worker must be made based on the actual type of work he/she performed and each worker must be paid no less than the wage rate on the wage decision for that classification **regardless** of his or her level of skill.

6. SPLIT CLASSIFICATION

If a firm has employees that perform work in more than one classification, it can pay the wage rates specified for each classification **ONLY** if it maintains accurate time records

Bidding Requirements, Contract Forms Conditions of the Contract

showing the amount of time spent in each classification. If accurate time records are not maintained, these employees must be paid the highest wage rate of all the classifications of work performed by each worker. Accurate time records tracking how many hours a worker performed the work of one trade and then switched to another trade must be accounted for on a daily basis and reflected on Employer Certified Payroll accordingly.

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

=====
 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).

6.1 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.

6.2 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.

6.3 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

Bidding Requirements, Contract Forms Conditions of the Contract

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.

7. WAGE DETERMINATION APPEALS PROCESS

7.1 Has there been an initial decision in the matter? This can be:

- .1** An existing published wage determination
- .2** A survey underlying a wage determination
- .3** A Wage and Hour Division letter setting forth a position on a wage determination matter
- .4** 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.

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

7.3 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.

7.3 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

7.4 All decisions by the Administrative Review Board are final.

END

Bidding Requirements, Contract Forms and Conditions of the Contract CONSTRUCTION TRAINING PROGRAM REQUIREMENTS

Section 00840

The **City of Austin Construction Training Program (the "Program")** is intended to train workers on City of Austin's construction projects in order to develop a pool of qualified, ready-to-work skilled and semi-skilled construction workers. This training commitment is not intended and shall not be used to discriminate against any applicant.

Training Requirement. Establishment of the Construction Training Requirement for each project will be based on project scope, dollar amount, and opportunities available to achieve the training requirements. The requirements will be established either prior to solicitation, or during contract negotiations, using the criteria in Charts A and B. Program requirements will be subject to availability of Trainees and Graduates.

Chart A - Evaluation Criteria
<ol style="list-style-type: none"> 1. Material cost vs labor cost 2. Scope of work 3. Schedule of values (a comprehensive list of work for a particular project) 4. Project duration and schedule 5. Unique aspects of the project 6. Available training programs for the specific training plan 7. Workforce determined by the number of workers that will be on the project enough days to establish a training program.

Chart B - CTP Training Requirement

Construction Budget	Trainee Requirement	Trainees must be a Current Enrollee, or Graduate* of a COA-Approved:
\$500K - \$2.5M	2	<ul style="list-style-type: none"> • Pipeline Organization¹⁾ or • DOL-Registered/Approved/Certified²⁾ Apprenticeship, OJT, or Bilingual Training Program
Over \$2.5M - \$5M	4	<ul style="list-style-type: none"> • Pipeline Organization¹⁾ or • DOL-Registered/Approved/Certified²⁾ Apprenticeship, OJT, or Bilingual Training Program
Over \$5M - \$10M	6	<ul style="list-style-type: none"> • Pipeline Organization¹⁾ or • DOL-Registered/Approved/Certified²⁾ Apprenticeship, OJT, or Bilingual Training Program
Over \$10M	15% of Total Workforce	<ul style="list-style-type: none"> • DOL-Registered/Certified²⁾ Apprenticeship or Bilingual Training Program for Vertical (BC) Projects • DOL-Approved/Certified²⁾ OJT or Bilingual Training Program for Horizontal (HH) Projects

* Graduates cannot satisfy more than half of the training requirement; current employees of a company may also be enrolled in a COA-Approved DOL Registered/ Approved/Certified Program to meet the requirement.

¹⁾ Click link to view [COA-Approved list of Pipeline Organizations](#) for Construction Ready Trainees.

²⁾ Click link to view [COA-Approved list of DOL-Registered/Approved/Certified](#) Apprenticeship, OJT, or Bilingual Training Programs.

1. **DEFINITIONS**

1.1 *Capital Contracting Office (CCO)* – The City of Austin's Office responsible for administering the Construction Training Program

1.2 *City's Approved Minimum Wage Rate* – a minimum wage rate established by the City of Austin for workers performing construction activities on City of Austin contracts

1.3 *Construction-Ready Trainee* - a graduate or current trainee of a Pipeline training program, enrollee or graduate of a DOL-registered Apprenticeship Program, enrollee or graduate of a DOL-approved Training Program, and/or an enrollee or graduate of a DOL-certified Bilingual Training Program.

1.4 *Pipeline* - group of organizations that provide pre-employment, pre-apprentice, or apprentice readiness training related to construction

1.5 *Training Plan*: a plan identifying how a contractor intends to meet its training requirement, subject to OWNER's review and approval

1.6 *Construction Training Program Training Report* – a form provided by the OWNER which documents the contractor's training activities and trainee status

2. **TRAINING REQUIREMENT**

2.1 The Construction Ready Trainee requirement for this project is 4 Trainees.

3. **CONTRACTOR'S RESPONSIBILITIES**

3.1 No later than 10 business days after Council Award, the CONTRACTOR shall provide a Training Plan for OWNER's approval, specifying how the CONTRACTOR intends to satisfy the contract requirement. The CONTRACTOR will have fulfilled its responsibilities under Section 00840 of the contract by having complied with the CONTRACTOR's Training Plan approved by the OWNER.

END

Bidding Requirements, Contract Forms and Conditions of the Contract

ADDENDUM
Section 00900

Notice to Bidders: *This form, Addendum, Section 00900, is included for your information only. If an actual Addendum is issued for this project, the format shown below will be used. Additionally, issued addenda will be bound at the beginning of the Project Manual following the Table of Contents at the time of contract execution.*

ADDENDUM NO. _____

Date _____, _____

City of Austin

Project Name _____

C.I.P. No. _____ IFB No.: _____

This Addendum forms a part of the Contract and corrects or modifies original Bid Documents, issued on _____, _____. **Acknowledge receipt of this addendum in space provided on bid form.** Failure to do so may subject bidder to disqualification.

A. Project Manual Revisions:

B. Drawing Revisions:

This addendum consists of _____ page(s)/sheet(s).

Approved by OWNER

Approved by ENGINEER/ARCHITECT (as applicable per license requirements)

END



Austin Water

FACILITY SECURITY PROCEDURE FOR CONTRACTORS

SP-1070

Water and Wastewater Treatment Plants, Water Pump Stations and Reservoirs, Lift Stations, Service Centers, and Administration Buildings

**NOTICE: ACCESS TO AUSTIN WATER SITES
WILL NOT BE GRANTED UNTIL THE ENCLOSED
APPLICATION IS SUBMITTED AND APPROVED.**

Facility Security Procedure for Contractors

SP-1070

Approval Record

Prepared by Austin Water Security Management Division:

Rick Verardi

05/12/2021

Rick Verardi, Security Manager

Date

Approved by Austin Water Security Steering Committee:

Shay Ralls Roalson

5/12/2021

Shay Ralls Roalson, P.E., Assistant Director, Engineering
Committee Chair

Date

Anna Bryan - Borja

5/12/2021

Anna Bryan-Borja, CIA, CFE, Assistant Director, Business Services

Date

Rick Coronado

5/12/2021

Rick Coronado, P.E., Assistant Director, Operations

Date

Steven W. Hutton

5/12/2021

Steve Hutton, Acting Chief Information Officer

Date

Facility Security Procedure for Contractors

SP-1070

Revision Record

Version	Date	Description- Affected Pages	Approved By
1	16 Sept 2014	Updated, included all facilities All pages	Rick Verardi Security Mgr.
2	16 Sept 2018	Updated decal issuing/valid dates	Rick Verardi Security Mgr.
3	24 Oct 2019	Updated Escorted access, removed decal, added ID Badges	Rick Verardi Security Mgr.
4	12 May 2021	Updated Escorted access, application updated, additional notices/updates	Rick Verardi Security Mgr.

FACILITY SECURITY PROCEDURE FOR CONTRACTORS

SP-1070

Table of Contents

1 SECURITY POLICY 5

2 SECURITY PROCEDURE 5

 2.1 PURPOSE 5

 2.2 SECURITY PROCEDURE MAINTENANCE 5

 2.3 RESTRICTED AREA ACCESS POLICY 5

 2.3.1 Unescorted Access 5

 2.3.2 Escorted Access 5

 2.4 CONTRACTOR’S BASIC SECURITY RESPONSIBILITIES 6

 2.4.1 Read-and-Follow Requirement 6

 2.4.2 Basic Security Functions 6

 2.5 APPLICATIONS FOR AUTHORITY TO ENTER FACILITIES, BACKGROUND SECURITY CHECKS AND IDENTIFICATION BADGES 7

 2.5.1 Applications for Authority to Enter Facilities 7

 2.5.2 Background Security Checks 7

 2.5.3 Security Identification Badges 7

 2.5.4 Identification Badge Control and Handling 8

 2.5.5 Revoking Access Authorization 8

 2.6 FACILITY SECURITY AND ACCESS CONTROL 9

 2.6.1 Access to Facilities 9

 2.6.2 Site Security Requirements 9

 2.6.3 Combinations and Key Controls 10

 2.6.4 Operation of Access-Controlled Doors at Remote Facilities 10

 2.6.5 Tailgating 11

APPENDIX A: 12

APPENDIX B: 13

APPENDIX C: 14

1 SECURITY POLICY

Paramount to Austin Water (AW) is:

- The production and delivery of adequate supply of safe drinking water to all customers
- Uninterrupted collection of wastewater, without spills, and
- Adequate processing of wastewater to be safely returned to the environment.

AW shall provide high quality physical security at all its facilities and shall initiate, implement, enforce, and update as needed, specific rules and procedures to protect property, personnel, equipment, and material against unauthorized entry, trespass, damage, sabotage, or other acts that might threaten the security of essential facilities, the quality of the drinking water, or the quality of treated wastewater.

2 SECURITY PROCEDURE

2.1 PURPOSE

The purpose of this Procedure is to provide Contractors and Subcontractors with standard operating methods, directives and instructions in accordance with AW's mission to protect its assets.

2.2 SECURITY PROCEDURE MAINTENANCE

The maintenance and updating of this Facility Security Procedure is the responsibility of the Security Manager with input from the Treatment Program Division Managers and Facilities Management.

This Facility Security Procedure will be reviewed and updated at least yearly. A record of all revisions will be maintained at the front of all copies.

2.3 RESTRICTED AREA ACCESS POLICY

2.3.1 Unescorted Access

Unescorted access is granted to contractors that have completed the "Application for Authorization to Enter Secured Austin Water Facilities" (Appendix B) and clear the background security check. An Austin Water technology badge or identification badge will be issued.

2.3.2 Escorted Access

Escorted access is not granted to contractors performing regularly scheduled contract work for Austin Water. Escorted access may be granted in situations that necessitate the need for Austin Water staff to be present for the contractors visit. Escorted access, when approved, is allowed provided an Austin Water and/or City of Austin employee physically escorts the visitor and is present with the visitor at all times.

Exceptions to the Escorted access policy are reviewed and approved by Security Management on a case by case basis. Contractors requesting escorted access must submit their request in writing to Security Management and the site Supervisor a minimum of 12 hours before they intend to be on site except in emergency situations. Contractors must have written confirmation of an exception to the escort policy from Security Management before being granted site access. Security management can be reached at AWFacilitySecurity@austintexas.gov.

Any exceptions granted to contractors regarding the Escorted Access policy are valid for one (1) day. Contractors scheduled for contract work for longer than one (1) day are required to apply for unescorted access.

In the event of an unplanned facility emergency that requires an immediate response from a contractor, that contractor may be granted temporary access to the facility. The contractor must be met at the facility entry point by an Austin Water or approved City of Austin employee escort, must sign the visitor guest log (which will include the name of AW/CoA employee escorting the contractor), and must remain in the presence of the escorting AW/CoA employee for the duration of the visit. Security Management must approve all City of Austin employees assigned to escort on Austin Water property.

2.4 CONTRACTOR'S BASIC SECURITY RESPONSIBILITIES

2.4.1 Read-and-Follow Requirement

All Contractors and Subcontractors shall read and follow this Procedure. The Contractor's Project Manager and Site Superintendent, and all Subcontractors' on-site Supervisors will be required to sign the "CONTRACTOR'S ACKNOWLEDGEMENT OF AUSTIN WATER FACILITY SECURITY PROCEDURES FOR CONTRACTORS" (Appendix A) attesting to the fact that they have read and understood this Procedure. The "Contractor's Acknowledgement" signed by the Contractor's Project Manager and Site Superintendent shall be delivered to AW at the Preconstruction Conference, and before any access is permitted to the work site. The "Contractor's

Acknowledgement" signed by the Subcontractors' Project Managers and Site Supervisors will be delivered to AW at least **two (2) weeks** before the Subcontractor requires access to the site.

All Contractor's and Subcontractors' employees are expected to be thoroughly knowledgeable in the contents of this Procedure. Contractors and Subcontractors shall instruct their employees on the provisions and requirements of this procedure and shall emphasize the importance of their compliance. **Any person's failure to follow any of the provisions or requirements of this Procedure may result in that person being removed from the job site and losing access privileges.**

Persons removed from the site for violations of this Procedure may reapply for access to the site if approved by Security Management and the site Superintendent. Security Management reserves the right to refuse access to persons found to have intentionally violated this Procedure.

2.4.2 Basic Security Functions

The basic security functions of Contractors and Subcontractors shall center on the protection of water and wastewater quality, personnel, and AW and Contractors' property. These basic functions will involve securing and monitoring the project site, controlling access, preventing unlawful entry, unlocking and locking buildings, and enforcing AW's rules, policies, procedures and directives.

Contractors and Subcontractors shall provide deterrence against fire, theft, vandalism, and trespass and shall assist in the elimination of safety hazards and security breaches. In some cases, Contractors and Subcontractors will be called upon to assist in the detection and detention of persons guilty of trespassing on or committing offenses on AW property. Uniformed officers from the Austin Police Department and local Sheriffs' Departments shall provide the enforcement support for criminal acts committed on AW property.

Contractors and Subcontractors shall accurately report and record all transgressions and incidents.

2.5 APPLICATIONS FOR AUTHORITY TO ENTER FACILITIES, BACKGROUND SECURITY CHECKS AND IDENTIFICATION BADGES

2.5.1 Applications for Authority to Enter Facilities

The Contractor shall submit an “Application for Authorization to Enter Secured Austin Water Facilities” (Appendix B) for each of their employees and their Subcontractors’ employees before that employee is allowed to enter the project site. All information requested on the application shall be provided, including required signatures. Each application submitted shall be an original document. Copies or facsimiles are not acceptable.

Each application shall be accompanied by a complete background security check. Each employee’s application and background security check shall be submitted at least **five (5) working days** prior to the first day that employee is to work on the secured site to allow for adequate review of the documents. Each background check submitted shall be an original document. Copies or facsimiles are not acceptable.

2.5.2 Background Security Checks

The Contractor shall submit a “Criminal History Records Check Disqualifying Criminal Offenses” (Appendix C) and provide a current **fingerprint based** background security check for each of their employees and their Subcontractors’ employees submitted along with the “Application for Authorization to Enter Secured Austin Water Facilities” (Appendix B). The background check must be performed by either the United States Federal Government (FBI) or the Department of Public Safety from the employee’s home state (the state in which the employee resides and from which they obtained their driver’s license or identification card). The background security check for a non-US citizen shall be performed by their native country’s national law-enforcement agency (e.g. a Canadian citizen shall submit a background check performed by the Royal Canadian Mounted Police). Contractors may employ a background check service. Contractors are responsible for ensuring the service conducts the correct type of background check.

The results of each background check shall be dated and submitted as an original, certified official document from the agency performing the check, and shall bear all appropriate letterheads, seals, and signatures. The background check shall clearly indicate the agency performing the check and include their address and telephone number. Background checks performed less than one year prior to the subject Contract’s Notice-to Proceed will be acceptable.

Due to the current nationwide pandemic Applications and Background Security Checks may be submitted electronically to Security management.

2.5.3 Security Identification Badges

Austin Water utilizes two methods of Security ID Badges

ID Badge: This badge is issued to contractors working at a facility that require access to the facility grounds via the entrance gate. An example would-be long-term contractor. Badges are given an **expiration date** set to expire at a date determined by Security Management. Badges are issued for a maximum of two years.

Technology Badge: This badge is issued to contractors working at a facility that require access to secured buildings on an AW site. Examples are the cleaning crew, security guards, and contractor superintendents supervising multiple job sites. Badges are given an expiration date set to expire at a date determined by Security Management. Badges are issued for a maximum of two years. **Technology Badges are issued at the discretion of Security Management.**

Authorization to enter protected facilities and the issuing of an ID Badge or Technology Badge shall require a review of the background security check and approval from Security Management.

A new background check is required prior to the issuance of another Badge after the previous one expires.

2.5.4 Identification Badge Control and Handling

All personnel on the job site shall maintain the Security Identification Badge on their person at all times. The Badge should be displayed on their outer clothing in a clear manner. Arm band ID holders are acceptable.

Security Identification Badge holders will take reasonable care to protect their badge from unauthorized use.

Badge holders will not allow others to use their badge.

In the event that a Security Badge holder discovers that their badge has been lost, the badge holder shall immediately report the loss to the Contractor's Site Superintendent, who will immediately report the loss to the AW Project Sponsor/Manager, and to the AW Plant Superintendent (at treatment plants) or the AW Operation Manager at the South First Support Center (512-972-0502) (for pump stations and reservoirs).

2.5.5 Revoking Access Authorization

Authorization to enter and/or work on any Austin Water site is at the sole discretion of AW and may be revoked at any time.

Authorization to enter secured AW sites shall be revoked immediately for the following reasons:

- The badge holder ends their employment with the Contractor or Subcontractor
- The badge holder allows another person to use their badge, or the badge holder permits, or allows another person without a badge to enter a secured site.
- The badge holder acts without authorization to defeat any security device at any secured site.
- The badge holder's actions (or inaction) result(s) in damage to AW facilities or threaten(s) the quality of the drinking water.
- The badge holder has been involved in a criminal action on site and has been determined as a threat to any persons or property at this site.

Personnel in the following positions may revoke Access Authorization:

- AW Director and Assistant Directors for Treatment and for Engineering
- AW Division Heads, Plant Superintendents, and Supervisors in the Treatment Program Area
- AW Security Manager
- AW Project Sponsor/Manager and Consultant's Project Manager
- City of Austin Public Works Project Manager
- Contractor's Project Manager and Site Superintendent

If a person in one of the positions listed above believes that another person's Access Authorization should be immediately revoked to eliminate or mitigate a threat to site security or the security of the water, they shall contact the Project Manager/Sponsor or the Contractor's Site Superintendent. The badge shall be taken from the person and they shall be escorted from the work site.

2.6 FACILITY SECURITY AND ACCESS CONTROL

2.6.1 Access to Facilities

Access to AW facilities shall be limited to:

- City of Austin Public Works or Austin Water employees who possess appropriate unescorted access authorization by AW and have a valid Security Identification Badge.
- Contractor's and Subcontractors' employees who possess appropriate access authorization(s) and possess and wear a proper AW-authorized Security Identification Badge. All Contractor's and Subcontractors' employees will follow AW procedures while on the site.
- Contractor's or Subcontractors' supplier delivery personnel. Delivery personnel may be permitted access to complete material deliveries and will not be required to obtain a Security Identification Badge. Delivery personnel shall be closely escorted within the secured site by the Contractor's Site Superintendent and shall be permitted access only for the time required to unload the material being delivered. Under no circumstances will any delivery personnel be allowed to remain on site for longer than one hour. If delivery of any material or equipment is projected to require more than one hour, an "Application for Authorization to Enter Secured Water Treatment Facilities", complete Background Security Check, and Security Identification Badge will be required for all personnel associated with making that delivery.
- Visitors who have been authorized in advance, in writing, by the Plant Superintendent or Division Manager. (Persons who perform work on the site or deliver equipment or materials to the site are not considered to be visitors) Visitors who have been authorized such access must be closely escorted within AW facility by an AW employee who possesses the appropriate access authorization and Security Identification Badge. The Entry gate guard staff shall maintain a Visitor Register to record all visits. The Visitor Register shall record the name of each visitor, their employer, date of the visit, arrival and departure times, the purpose of visit and the name of the escort. This Visitor Register shall be made available at every project progress meeting and shall be delivered to the AW Project Manager at the end of the project. Visitors do not require an ID badge. Contractors are not eligible for access to the facility as a visitor except for pre-bid meetings.

2.6.2 Site Security Requirements

All AW facilities shall be kept secure at all times. The following provisions, at a minimum shall be maintained:

- An eight-foot high perimeter fence shall be maintained without gaps or holes, with gate(s) locked with a tempered chain and padlock. A security guard may also be employed if desired by the Contractor or required by the Contract.
- All perimeter door(s) (if present) shall be locked and alarmed.
- Other installed security devices (if present) such as motion detectors, fence monitors and CCTV cameras shall be operational.
- All classified material (if present) shall be properly stored.

During the Contractor's working hours, the Contractor's Site Superintendent shall maintain an active cellular telephone to enable AW's Plant Superintendent or the Central Security Operator to contact him/her in the event that a security alarm is triggered on the job site. If an alarm is triggered and the Plant Superintendent or the Central Security Operator is unable to contact the Contractor's Site Superintendent to ascertain the reason for the alarm, law enforcement officers will be summoned to the site.

At the beginning of each day that the Contractor or a Subcontractor performs work on a pump station or reservoir site, a Supervisor authorized by the Contractor (and previously identified to the pump station or reservoir Central Security Operator) shall open the security gate to the site as follows:

- Place a telephone call to the Central Security Operator (512-972-0502) before unlocking the gate.
- Identify themselves and advise the Central Security Operator that they are at the site entrance, identify where on the site they intend to work, and advise that they are about to open the gate. The Central Security Operator will disarm any alarms that might be triggered by the gate opening or by employees working in the areas identified. The Central Security Operator will advise the Supervisor placing the call when the alarms are disarmed.
- Unlock the gate, enter the site, and lock the gate or post a guard to assure that only authorized personnel wearing required, proper Security Identification Badges may enter.

At the end of every work day at a pump station or reservoir site, when the last employee has left the job site, the Contractor's Site Superintendent shall place a call to the Central Security Operator to advise that everyone has left the site, that the security gate is locked, and that the alarms should be rearmed.

2.6.3 Combinations and Key Controls

Knowledge of the combination of locks and access to any keys will be limited to designated individuals assigned to work in the associated facilities. All combinations will be changed regularly at times designated by the Division Manager, and whenever it is suspected the combination has been compromised.

Facility keys are cut to fit a number of cylinders. If a key shared with the Contractor is lost, all similar lock cylinders, whether present on the site or off the site, will be re-keyed by AW, at the expense of the Contractor.

2.6.4 Operation of Access-Controlled Doors at Remote Facilities

Entry to all remote facilities will be coordinated with the Central Security Operator. Many facilities include an access-control door. An access-control door may be used by authorized Security Identification Badge holders for entry and exit using the following procedure:

Entry procedure:

1. Contact the Central Security Operator (512-972-0502) and request permission to enter. Hang up the telephone.
2. The CSO will call back the person requesting to enter (on their previously authorized number) and verify the request.
3. The CSO will unlock the door or request that the person's Security Identification Badge be presented to the exterior card reader.
4. Unlock the deadbolt (if present)
5. Enter PIN
6. Open door
7. Enter
8. Close the door

Exit procedure:

1. Press crash bar
2. Open door
3. Exit
4. Close the door

5. Lock the deadbolt (if present)
6. Contact the CSO and request that the door be locked, advise them that the site's alarms need to be re-armed
7. The CSO shall lock the door and re-arm all alarm devices
8. The CSO shall call back and ask the requestor to verify that the door is locked

2.6.5 Tailgating

Tailgating is the entry of multiple individuals through an access-controlled door or gate without closing the door (or gate) between entries. Tailgating is allowed by authorized ID Badge holders provided that each presents their badge to the card reader or person controlling access prior to entry. Tailgating by unauthorized individuals or anyone not possessing an authorized ID Badge is not allowed.

APPENDIX A:
**CONTRACTOR’S ACKNOWLEDGEMENT OF AUSTIN WATER
FACILITY SECURITY PROCEDURES FOR CONTRACTORS**

PROJECT NAME: _____

CIP/PROJECT NUMBER: _____

By signing this document, I acknowledge that I have received a copy of the Austin Water **SP-1070 FACILITY SECURITY PROCEDURE FOR CONTRACTORS** and that I have read it and understand its contents. Furthermore, I agree to follow all the provisions contained therein.

CONTRACTOR: _____

PROJECT MANAGER:

Print

Signature

SITE SUPERINTENDENT:

Print

Signature

SUBCONTRACTOR: _____

PROJECT MANAGER:

Print

Signature

SITE SUPERINTENDENT:

Print

Signature

SUBCONTRACTOR: _____

PROJECT MANAGER:

Print

Signature

SITE SUPERINTENDENT:

Print

Signature

APPENDIX B:

**APPLICATION FOR AUTHORIZATION
TO ENTER SECURED AUSTIN WATER FACILITIES
(CONTRACTOR EMPLOYEE)**

PROJECT: _____ **Date of Application:** ____ - ____ - ____

CONTRACTOR: _____

SUBCONTRACTOR: _____

SITE(S) TO BE ACCESSED: _____

APPLICANT: _____
Last Name First Name Middle Name

Job Title: _____

Home Address: _____ Birth date: ____ - ____ - ____
Street / Apt No.

City State Country Zip Code

SUPERVISOR: _____ **Job Title:** _____

Work Telephone No. _____

AUTHORIZATIONS:

CONTRACTOR'S PROJECT MANAGER: _____
Print Sign

I HAVE READ AND UNDERSTAND THE POLICIES AND PROCEDURES LISTED IN THE SP-1070 DOCUMENT. I UNDERSTAND THAT ANY VIOLATION OF THOSE POLICIES MAY RESULT IN MY ACCESS TO ALL AUSTIN WATER SITES BEING REVOKED.

SIGNATURE: _____

APPENDIX C:

Criminal History Records Check Disqualifying Criminal Offenses

An individual has a disqualifying offense if the individual has been convicted of, or found not guilty of by reason of insanity, any of the disqualifying crimes listed in this paragraph in any jurisdiction during the 10 years before the date of the individual’s application for unescorted access authority, or while the individual has unescorted access authority. The disqualifying criminal offenses are as follows:

1	Felony involving burglary.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	13	Murder.	Yes <input type="checkbox"/>	No <input type="checkbox"/>
2	Felony involving theft.	<input type="checkbox"/>	<input type="checkbox"/>	14	Assault with intent to murder.	<input type="checkbox"/>	<input type="checkbox"/>
3	Felony involving dishonesty, fraud, or misrepresentation.	<input type="checkbox"/>	<input type="checkbox"/>	15	Espionage.	<input type="checkbox"/>	<input type="checkbox"/>
4	Felony involving possession or distribution of stolen property.	<input type="checkbox"/>	<input type="checkbox"/>	16	Rape or aggravated sexual abuse.	<input type="checkbox"/>	<input type="checkbox"/>
5	Aggravated assault.	<input type="checkbox"/>	<input type="checkbox"/>	17	Kidnapping or hostage taking.	<input type="checkbox"/>	<input type="checkbox"/>
6	Felony involving bribery.	<input type="checkbox"/>	<input type="checkbox"/>	18	Treason.	<input type="checkbox"/>	<input type="checkbox"/>
7	Terrorist threat.	<input type="checkbox"/>	<input type="checkbox"/>	19	Class A Criminal Mischief (500 or Above).	<input type="checkbox"/>	<input type="checkbox"/>
8	Armed or felony unarmed robbery.	<input type="checkbox"/>	<input type="checkbox"/>	20	Criminal Trespass at Critical Infrastructure Facility.	<input type="checkbox"/>	<input type="checkbox"/>
9	Felony involving willful destruction of property.	<input type="checkbox"/>	<input type="checkbox"/>	21	Burglary of Vehicle	<input type="checkbox"/>	<input type="checkbox"/>
10	Felony involving importation or manufacture of a controlled substance.	<input type="checkbox"/>	<input type="checkbox"/>	22	Engaging in Organized Criminal Activity	<input type="checkbox"/>	<input type="checkbox"/>
11	Extortion.	<input type="checkbox"/>	<input type="checkbox"/>	23	Conspiracy or attempt to commit any of the criminal acts listed on this page.	<input type="checkbox"/>	<input type="checkbox"/>
12	Felony arson.	<input type="checkbox"/>	<input type="checkbox"/>				

By signing below, I certify that I do not have any of the above listed disqualifying criminal offenses.

Also signing below indicates my understanding that I have a continuing obligation under Title 49, CFR, Parts 1542.209 and 1544.229 to disclose to Austin Water within 24 hours if I plead guilty or nolo contendere (“no contest”) to, have an adjudication withheld, have been convicted or found not guilty by reason of insanity to any of the disqualifying crimes listed on this application or the federal security regulations.

Also signing below indicates the information I have provided on this application is true, complete, and correct to the best of my knowledge and belief and is provided in good faith. I understand that a knowing and willful false statement on this application can be punished by fine or imprisonment or both. (See section 1001 of Title 18 United States Code.)

PRINT NAME

SIGNATURE

DATE

The Work of this Contract includes sustainability requirements as shown in the Division 1 Sections 01352 and/or 01505 and all other applicable specification sections. It is the intent of the Owner to work in partnership with the Contractor in implementing sustainable construction practices to the greatest extent possible.

PART 1 - GENERAL

1.1 Related Documents:

Drawings and general provisions of Contract, including General Conditions, Section 00700, and Supplemental General Conditions, Section 00810, and Division 1 requirements.

1.2 DESCRIPTION OF WORK

1.21 Scope of Work

A. This section describes the Project in general and provides an overview of the extent of the Work to be performed by the CONTRACTOR. Detailed requirements and extent of Work is stated in the applicable Specification Sections and shown on the Drawings. CONTRACTOR shall, except as otherwise specifically stated herein or in any applicable part of these Contract Documents, provide and pay for all labor, materials, equipment, tools, construction equipment, and other facilities and services necessary for proper execution, testing, and completion of the Work.

B. Any part or item of the Work which is reasonably implied or normally required to make the installation satisfactorily operable shall be performed by the CONTRACTOR and the expense thereof shall be included in the applicable unit prices or lump sum prices bid for the Work. It is the intent of these Specifications to provide the OWNER with the complete system. All miscellaneous appurtenances and other items of Work that are incidental to meeting the intent of the Specifications shall be considered as having been included in the applicable unit prices or lump sum prices bid for the Work even though these appurtenances and items may not be specifically called for in the Bid Documents.

C. The Work shall include furnishing all tools, labor, materials, equipment, and miscellaneous items necessary for the complete construction of the following:

- 1.** Remove and replace chlorine scrubber as indicated in the plans - Utilize existing electrical, instrumentation, and duct infrastructure.
- 2.** Improvements at chlorination room – Extend scrubbing duct and replace three (3) doors as indicated in the plans.
- 3.** Ventilation improvements at sulfur dioxide building - Replace air handling/condensing unit, FRP exhaust distribution system, and exhaust fans.
- 4.** Furnish and install a backup blower and electrical control panel for the existing sulfur dioxide scrubber.
- 5.** Furnish and install an electrical control panel for the existing sulfur dioxide scrubber per Plans
- 6.** Ventilation improvements at chlorination building - Replace air handling unit, FRP exhaust distribution system, exhaust fans, and wall louvers.
- 7.** Miscellaneous Improvements at the chlorination building and de-chlorination buildings as indicated in the plans.

- 8.** Electrical & Instrumentation – Provide the necessary wiring and connections to support implementation of the scrubber renewal and ventilation improvements described above
- 9.** Furnish and install temporary sodium hypochlorite storage and pumping system.

1.22 Location of Project

- A. The Project location/route is shown on the Drawings.

1.23 Contractor's Responsibilities

A. Execute all Work, including excavation, installing pipe, backfill, miscellaneous concrete and testing. The Work of this Contract is specified in the City of Austin Standard Specifications, Special Provisions and Special Specifications listed in the Table of Contents.

B. Secure all construction-related permits, other than those provided by OWNER as described in paragraph 6.6 of Section 00810, Supplemental General Conditions, and pay for the same.

C. Arrange for the necessary temporary water and electric service and pay for these services and all water and electricity consumed during the construction Work.

- D. Provide adequate temporary sanitary facilities.

1.24 Easements and Rights-Of-Way

CONTRACTOR shall confine his construction operations within the limits indicated on the Drawings, and shall use due care in placing construction tools, equipment, excavated materials, and pipeline materials and supplies so as to cause the least possible damage to property and interference with traffic. If the CONTRACTOR requires additional easement for his operations, the CONTRACTOR is solely responsible for acquisition and maintenance of the easement. No additional compensation will be provided by the OWNER.

A. Easements - Easements across private property are indicated on the Drawings. CONTRACTOR shall set stakes to mark the boundaries of construction easement across private property. The stakes shall be protected and maintained until completion of construction and cleanup.

B. Rights-of-Way - Permits for Work in rights-of-way shall be obtained by the CONTRACTOR. All Work performed and all operations of CONTRACTOR, his employees, or subcontractors, within the limits of railroad and highway rights-of-way, shall be in conformity with the requirements and be under the control (through OWNER) of the railroad or highway authority owning, or having jurisdiction over and control of, the right-of-way in each case.

1.25 Operation of Existing Facilities

Existing water and wastewater facilities shall be kept in continuous operation throughout the construction period. No interruption will be permitted which adversely affects the degree of service provided. Provided permission is obtained from OWNER in advance, portions of the

existing facilities may be taken out of service for short periods corresponding with periods of minimum service demands.

CONTRACTOR shall provide temporary facilities and make temporary modifications as necessary to keep the existing facilities in operation during the construction period.

1.26 Connections to Existing Facilities

Unless otherwise specified or indicated, CONTRACTOR shall make all necessary connections to existing facilities including structures, drain lines, and utilities. In each case, CONTRACTOR shall receive permission from OWNER or the owning utility prior to undertaking connections. CONTRACTOR shall protect facilities against deleterious substances and damage.

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

1.27 Unfavorable Construction Conditions

No portion of the Work shall be constructed under conditions which adversely affect the quality or efficiency thereof, unless special means or precautions are taken by CONTRACTOR to perform the Work in a proper and satisfactory manner.

END

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Applicable portions of the Project Manual including but not limited to the Drawings and Specifications.

1.2 SUMMARY

This Section includes administrative and procedural requirements governing allowances.

Definition:

Allowances. "Allowance" is defined as "a not-to-be-exceeded amount", either individually or in the aggregate, which is established between the Owner and the CONTRACTOR as part of the bid documents when the precise scope of a particular line item(s) has not been defined to a level which is adequate for the CONTRACTOR to provide a definitive line item pricing for that particular scope of Work.

1.3 COORDINATION

At the earliest practical date after award of the Contract, the Contractor shall advise Owner of the date when final selection and purchase of each product or Work described by an Allowance must be completed to avoid delaying the Work.

Coordinate Allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.4 PROCEDURES

Submit cost proposals for purchase of products or work included in Allowances in the form specified for Change Orders.

Coordinate and process submittals for Allowance items in accordance with Section 01300 as for other portions of the Work.

The use of any Allowances by the CONTRACTOR will be subject to the Owner's sole approval and it is the Owner's intent to minimize the use of Allowances to the fullest extent possible.

For any Allowances which the Owner allows the CONTRACTOR to use, the following rules shall apply: (i) the Allowance shall cover the cost to the CONTRACTOR of the cost of Work, as defined in the Agreement and the CONTRACTOR's portion of overhead and profit associated with the stated Allowance; and (iii) upon completion of the portion of the Work subject to an Allowance, the Contract Amount for that portion of the Work will be adjusted based upon the approved actual Cost of the Work, including the proportionate overhead and profit, provided however that the total amount of payments under the Allowances will not exceed the approved aggregate amount of the Allowances.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.1 SCHEDULE OF ALLOWANCES

Allowance No. 1 – Temporary Hypo Dosing System Operation \$100,000

Contractor shall allocate Allowance No. 1 for any unforeseen conditions related to Temporary Hypo Dosing System operation. This allowance item provides an estimated funding to cover unforeseen requirements that may encountered during ONLY operation of Temporary Hypo Dosing System.

3.2 PAYMENT

Once the cost proposal for the Allowance has been incorporated into the Contract by Change Order, Payment for the Allowance will be based upon either the unit prices or a schedule of values provided with the proposal and incorporated in the Change Order.

END

MEASUREMENT AND PAYMENT LUMP SUM CONTRACTS

Section 01025

For this Project, all measurement and payment sections, including standard technical specifications and special specifications, are modified by this Section.

All work items installed, provided, constructed, etc. with the exception of the unit price items listed in the 300L, shall not be paid for separately but shall be considered subsidiary to the lump sum bid price for the Project. The cost of all work materials, labor, overhead, insurance, equipment, etc. necessary to finish the work complete in place shall be included in the lump sum bid price for the project.

END

REFERENCE STANDARDS AND DEFINITIONS

Section 01095

DEFINITIONS

General: Basic Contract definitions are included in the General Conditions, Section 00700 included herein.

Approved: The term approved, when used in conjunction with the Owner's Representative's action on the CONTRACTOR'S submittals, applications, and requests, is limited to the Owner's Representative's duties and responsibilities as stated in the Conditions of the Contract. A stamp reading "No Exceptions Taken" shall have the same intent as "Approved".

Furnish: The term furnish means supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

Indicated: The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.

Install: The term install describes operations at the Project site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

Installer: An Installer is the CONTRACTOR or another entity engaged by the CONTRACTOR, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in operations they are engaged to perform.

Project Site: The space available to the CONTRACTOR for performing construction activities either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

Provide: The term provide means to furnish and install, complete and ready for the intended use.

Regulations: The term regulations includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

Trades: Using terms such as carpentry is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as carpenter. It also does not imply that requirements specified apply exclusively to trades persons of the corresponding generic name.

INDUSTRY STANDARDS

Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as

Division 1 – General Requirements

if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.

Conflicting Requirements: Where compliance with two or more standards is specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer to the Owner's Representative for a decision before proceeding.

Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

Abbreviations and Names: Trade association names, titles of general standards, and names and titles of government agencies are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturer's Association
AAN	American Association of Nurserymen.
AASHTO	American Association of State Highway and Transportation Officials.
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
ACIL	American Council of Independent Laboratories
ACPA	American Concrete Pipe Association
ADC	Air Diffusion Council
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGC	Associated General Contractors of America
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute
AIA	American Institute of Architects
AIHA	American Industrial Hygiene Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction.
ALCA	Associated Landscape Contractors of America
ALI	Associated Laboratories, Inc.
ALSC	American Lumber Standards Committee
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute.
AOAC	Association of Official Analytical Chemists
AOSA	Association of Official Seed Analysts
APA	American Plywood Association
API	American Petroleum Institute.

Division 1 – General Requirements

AREA	American Railroad Engineers Association
ARI	Air Conditioning and Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASA	Acoustical Society of America
ASA	American Standards Association.
ASC	Adhesive and Sealant Council
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating & Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials.
AWCMA	American Window Covering Manufacturers Association
AWG	American Wire Gage
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America
BIFMA	Business and Institutional Furniture Manufacturers Association
CAGI	Compressed Air and Gas Institute
CAUS	Color Association of the United States
CBM	Certified Ballast Manufacturers
CCC	Carpet Cushion Council
CDA	Copper Development Association
CE	Corps of Engineers
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CISCA	Ceiling and Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CPSC	Consumer Product Safety Commission
CRI	Carpet and Rug Institute
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard of NBS (U.S. Dept. of Commerce)
CTI	Ceramic Tile Institute
DFPA	Douglas Fir Plywood Association
DHI	Door and Hardware Institute
DLPA	Decorative Laminate Products Association
DOC	U.S. Department of Commerce
DOT	Department of Transportation
ECSA	Exchange Carriers Standards Association
EIA	Electronic Industries Association
EIMA	Exterior Insulation Manufacturers Association
EJMA	Expansion Joint Manufacturers Association
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FGMA	Flat Glass Marketing Association
FHA	Federal Housing Administration
FM	Factory Mutual Research Organization
FS	Federal Specifications

Division 1 – General Requirements

FSC	Forest Stewardship Council
FTI	Facing Tile Institute
GA	Gypsum Association
GSA	General Services Administration
HEI	Heat Exchange Institute
HI	Hydronics Institute
H.I.	Hydraulic Institute
HMA	Hardwood Manufacturers Association
HPMA	Hardwood Plywood Manufacturers Association
IBD	Institute of Business Designers
ICEA	Insulated Cable Engineers Association, Inc.
IEEE	Institute of Electrical and Electronic Engineers, Inc.
IESNA	Illuminating Engineering Society of North American
IGCC	Insulating Glass Certification Council
ILI	Indiana Limestone Institute of America
IMSA	International Municipal Signal Association
IRI	Industrial Risk Insurers
ISA	Instrument Society of America
ITE	Institute of Transportation Engineers
LEEDTM	Leadership in Energy and Environmental Design
LIA	Lead Industries Association, Inc.
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturer's Association
MCAA	Mechanical Contractors Association of America
MFMA	Maple Flooring Manufacturers' Association
MIA	Marble Institute of America
ML/SFA	Metal Lath/Steel Framing Association
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry
MUTCD	Texas Department of Transportation Manual on Uniform Traffic Control Devices
NAAMM	National Association of Architectural Metal Manufacturers
NAIMA	North American Insulation Manufacturers Association
NAPA	National Asphalt Pavement Association
NBFU	National Board of Fire Underwriters
NBGQA	National Building Granite Quarries Association
NBS	National Bureau of Standards (U.S. Dept. of Commerce)
NCMA	National Concrete Masonry Association
NCRPM	National Council on Radiation Protection and Measurements
NCSPA	National Corrugated Steel Pipe Association
NEC	National Electrical Code (Published by NFPA)
NECA	National Electrical Contractors Association
NEII	National Elevator Industry, Inc.
NEMA	National Electrical Manufacturers Association
NETA	International Electrical Testing Association
N.F.P.A.	National Forest Products Association
NFPA	National Fire Protection Association
NHLA	National Hardwood Lumber Association
NIST	National Institute of Standards and Technology
NLGA	National Lumber Grades Authority
NOFMA	National Oak Flooring Manufacturers Association
NPA	National Particleboard Association
NPCA	National Paint and Coatings Association

Division 1 – General Requirements

NRCA	National Roofing Contractors Association
NWMA	National Woodwork Manufacturers Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Precast/Prestressed Concrete Institute
PDI	Plumbing and Drainage Institute
PE	Professional Engineer
REA	Rural Electrification Administration
RFCI	Resilient Floor Covering Institute
RMA	Rubber Manufacturing Association
RPLS	Registered Professional Land Surveyor
SDI	Steel Deck Institute
S.D.I.	Steel Door Institute
SFPA	Southern Forest Products Association
SGCC	Safety Glazing Certification Council
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPIB	Southern Pine Inspection Bureau
SPRI	Single Ply Roofing Institute
SSPC	Steel Structures Painting Council
SSPMA	Sump and Sewage Pump Manufacturers Association
SWI	Steel Window Institute
SWPA	Submersible Wastewater Pump Association
TCA	Tile Council of America
TEX TEST	TxDOT Laboratory Test
TIMA	Thermal Insulation Manufacturers Association
TPI	Truss Plate Institute
TxDOT	Texas Department of Transportation
UL	Underwriters Laboratory, Inc.
USDA	U. S. Department of Agriculture
USGBC	U. S. Green Building Council
USPS	U. S. Postal Service
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Wallcovering Manufacturers Association
WIC	Woodwork Institute of California
WLPDIA	Western Lath, Plaster, Drywall Industries Association
WRI	Wire Reinforcement Institute
WSC	Water Systems Council
WSFI	Wood and Synthetic Flooring Institute
WWPA	Western Wood Products Association
W.W.P.A.	Woven Wire Products Association

END

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Documents related to this section will include the construction drawings and general provisions of the Contract, including the General Conditions, Section 00700, Supplemental General Conditions, Section 00810, and other Division 1 requirements.

1.2 SUMMARY

- A. This section describes the preconstruction conference and other Project related meetings which may be held on a routine schedule throughout the duration of the Project.
- B. The CONTRACTOR, or his authorized representative(s), shall attend all Project related meetings as indicated herein. The CONTRACTOR's representatives, as a minimum, shall include his Project Manager and Superintendent. Other CONTRACTOR's representatives may attend Project related meetings; however, there shall be a maximum of four (4) CONTRACTOR's representatives at any one meeting unless the ENGINEER/ARCHITECT approves a larger number.
- C. The CONTRACTOR shall provide all pertinent reports, copies of reports, etc., for each meeting as may be required by this or other sections of the Contract.

1.3 PARTNERING WORKSHOP

- A. To complete this work most beneficially for all parties, the Owner desires to form a Partnering Team among the Owner, Engineer/Architect, Contractor, and Subcontractor(s). This relationship will draw on the strength of all parties to identify and achieve mutual goals. The objectives are effective and efficient contract performance, intended to achieve completion within budget, on schedule, and in accordance with the drawings and specifications.
- B. The Owner will schedule a Partnering Workshop independent of or in conjunction with the Preconstruction Conference, to facilitate the project objectives. The partnering relationship will be multilateral in makeup and participation will be totally voluntary.

1.4 PRECONSTRUCTION CONFERENCE

- A. Attendees

A preconstruction conference shall be held as soon after the award and execution of the Contract as possible and before any Work at the site is started. The conference will be held at a location selected by the Owner's Project Manager. The Owner's Project Manager shall prepare and distribute the meeting agenda, preside over the conference, and may distribute meeting minutes. The conference shall be attended by:

1. CONTRACTOR's Project Manager.
2. CONTRACTOR's Superintendent.
3. Any Subcontractors' and/or Suppliers' representatives whom the CONTRACTOR may desire to invite or whom the ENGINEER/ARCHITECT or OWNER may request to attend.
4. ENGINEER/ARCHITECT's representative.
5. OWNER's Project Manager.

Division 1 General Requirements

6. OWNER's REPRESENTATIVE
7. OWNER's Sponsor Department Representative.
8. Representative from the City of Austin, Transportation Department if a traffic management plan is required.
9. Representative from the City of Austin, Watershed Protection and Development Review Department, Environmental Inspection Division, if site erosion / sedimentation controls are required.
10. Representative from the City of Austin, Transportation Department if utility coordination has occurred through the Austin Utility Location and Coordination Committee.
11. Representative from the City of Austin, Contract Management Department, Contract Administration Division, to discuss wage.
12. Representative from the City of Austin, Small and Minority Business Resources Department to discuss M/WBE compliance.

B. Meeting topics

The topics to be discussed may include, but will not be limited to, the following items:

1. Introduction of persons attending the meeting.
2. General project description, including length of contract and liquidated damages.
3. Key personnel associated with the construction (may include, but is not limited to the following):
 - CONTRACTOR's Project Manager
 - CONTRACTOR's Superintendent
 - OWNER's Project Manager
 - ENGINEER/ARCHITECT's representative
 - OWNER's Sponsor Department Representative.
 - Representatives of the various utilities.
4. Lines of communication and chains of command.
5. Wage and personnel records and reporting requirements.
6. Subcontractors and suppliers.
7. Submittal review and approval procedure. Submittals may include, but are not limited to the following:
 - Letter stating the name and qualifications of the CONTRACTOR's Superintendent
 - Letter(s) from the Subcontractor(s) listing their salaried specialists
 - If applicable, a letter designating the Registered Professional Land Surveyor
 - If applicable, a letter designating the Safety Representative (for general project safety) and the "Competent Person" for excavation safety
 - Excavation Safety Systems Plan
 - Schedule of Values
 - Schedule for submittals
 - Shop drawings
 - Construction schedule (The schedule shall indicate the phases of work in which subcontractors will be participating. Subcontractors shall be indicated by name.)
 - Payroll reports
 - Substitution of subcontractors

Division 1 General Requirements

- Non-use of asbestos materials affidavit
 - Appropriate safety training certificates for workers that will initially be on site
 - Documentation for all workers initially on site who are governed by a prevailing wage classification as described in Section 00830.
 - Construction Equipment Emissions Reduction Plan
8. Job and traffic safety.
 9. Permits.
 10. Utility coordination report.
 11. Notification of property owners and other affected by the project
 12. Job meetings.
 13. Use of the site for construction, storage, staging, etc., and interrelationship with other contracts.
 14. Equal opportunity requirements.
 15. Laboratory testing of material requirements.
 16. Inventory of materials stored on site provisions.
 17. Progress estimate and payment procedure.
 18. Posting of signs.
 19. Project safety.
 20. Prompt payment procedure.
 21. Review of contract - addenda, supplementary general conditions, special provisions, special specifications, and other unique project items.
 22. Other

1.5 JOB MEETINGS

A. General

Job meetings shall be held as deemed necessary by the ENGINEER/ARCHITECT or OWNER or as requested by the CONTRACTOR throughout the duration of the Project. The meetings shall be held at a location selected by or approved by the Owner's Representative. The OWNER's REPRESENTATIVE or CONTRACTOR, as agreed to, shall preside over the meeting and issue meeting minutes.

B. Attendees

Job meetings will be attended by the following:

1. CONTRACTOR's Project Manager, when requested to attend.
2. CONTRACTOR's Construction Superintendent.
3. Any subcontractors' and/or suppliers' representatives whom the CONTRACTOR may desire to invite or whom the ENGINEER/ARCHITECT or OWNER requests to attend.
4. OWNER's REPRESENTATIVE
5. ENGINEER/ARCHITECT's representative(s), if needed or required.
6. OWNER's PROJECT MANAGER, if needed or required
7. OWNER's Sponsor Department representative(s), if needed or required.

C. Meeting topics

The topics will include, but not necessarily be limited to, the following subjects:

Division 1 General Requirements

1. Review of previous meetings' notes and update of pertinent information and Project status.
2. Identification and discussion of new job related construction problems. Such discussion will be toward resolving identified problems.
3. Review work accomplished to date and establish proposed construction activities for the upcoming week(s).
4. Discuss the status of or need for change orders.
5. Check of required bonds and insurance certificates (including Workers' Compensation Insurance verification for CONTRACTOR's, Subcontractor's, and Sub-Subcontractor's employees as stated in Section 00700, General Conditions, 5.2 Workers' Compensation).
6. Status of pay requests.
7. Work in progress.
8. Review and update construction schedule including three week look ahead.
9. Review of submittals schedule and status of submittals.
10. Status of SMBR Compliance Plan.
11. Status of Safety Training certificates for all new workers on project.
12. Other.

1.6 OTHER MEETINGS

Other meetings shall be held from time to time as may be requested by the CONTRACTOR, the ENGINEER/ARCHITECT, or the OWNER. The time and place of the meetings shall be as mutually agreed upon. The attendance at the meetings shall be as requested by the party requesting the meeting.

END

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

The Contractor prepares submittals. Drawings and general provisions of Contract, including Section 00700, "General Conditions"; Section 00810, "Supplemental General Conditions"; Division 1 requirements and City of Austin Technical Specifications and Special Provisions thereto, should be used as the related documents for this requirement.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:
 - 1. Security plan.
 - 2. Contractor's construction schedule.
 - 3. Submittal schedule.
 - 4. Shop drawings.
 - 5. Product data.
 - 6. Samples.
 - 7. Quality assurance and quality control submittals, including calculations, mix designs and substantiating test results.

- B. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:
 - 1. Permits.
 - 2. Applications for Payment.
 - 3. Performance and Payment bonds.
 - 4. Insurance certificates.
 - 5. Monthly Subcontractors expense report.
 - 6. Non-use of asbestos affidavits

- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 00700, "General Conditions"; Section 00810, "Supplemental General Conditions"; and/or Division 1, Section 01025, "Measurement and Payment" specifies requirements for submittal of the Schedule of Values.
 - 2. Division 1, Section 01200, "Project Meetings" specifies requirements for submittal and distribution of meeting and conference minutes.
 - 3. Section 00700, "General Conditions"; Section 00810, "Supplemental General Conditions"; and/or Division 1, Section 01700, "Contract Close-out" specifies requirements for submittal of Project Record Documents and warranties at project close-out.
 - 4. Section 00700, "General Conditions" Article 6.2.4 specifies requirements for Substitutes and "Approved Equal" Items.

- D. Technical Submittals: Technical information required to be submitted by the Standard Specifications, Special Provisions or Special Specifications.

PART 2 - PRODUCTS - not used

PART 3 - EXECUTION

3.1 SUBMITTAL PROCEDURES

Contractor shall be responsible for the following:

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals or resubmittals concurrently.
 - a. The E/A reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
 - 3. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.
 - a. Allow fourteen (14) calendar days for initial review. Allow additional time if the Engineer must delay processing to permit coordination with subsequent submittals.
 - b. If an intermediate submittal is necessary, process the same as the initial submittal.
 - c. Allow fourteen (14) calendar days for processing each resubmittal.
 - d. No extension of Contract Time will be authorized because of failure to transmit submittals to the E/A sufficiently in advance of the Work to permit processing.
- B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
 - 1. Provide a space approximately 4 inches by 5 inches (100 by 125 mm) on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
 - 2. Include the following information on the label for processing and recording action taken.
 - a. Project name.
 - b. Date.
 - c. Name and address of the Contractor's Engineer.
 - d. Name and address of the Contractor.
 - e. Name and address of the subcontractor.
 - f. Name and address of the supplier.
 - g. Name of the manufacturer.
 - h. Number and title of appropriate Specification Section.
 - i. Drawing number and detail references, as appropriate.
- C. Number of Copies:

Division 1 General Requirements

1. Two (2) copies of the proposed Construction schedule and subsequent revision are required.
 2. Two (2) copies of the proposed Submittal schedule and subsequent revision are required.
 3. Nine (9) copies of Shop Drawings, Product, Product Samples, Quality Assurance and Quality Control submittals are required.
- D. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the E/A through the Owner's Representative using a transmittal form (An example Transmittal Form is provided at the end of this section). The E/A will not accept submittals received from sources other than the Contractor.
1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.
 2. Number transmittals in sequence for each Series of the Specifications thus: x-xxx. The number after the dash indicates the Section of the Specifications, and the number before the dash is the sequence number of the transmittal. For example, the first item submitted related to Specification Item No. 506, "Manholes" would be labeled **1-506**, the second item submitted would be labeled **2-506**, etc. If the submittal item relates to a Special Provision or Special Specification, use **SP506** or **SS5061**, for example, to indicate the applicable Specification Section. Identify resubmittals with a letter of the alphabet following the original sequence number, using "A" for the first resubmittal, "B" for the second resubmittal, etc. For example, the first resubmittal of the second item submitted for Specification SP506 would be labeled **2A-SP506**.

3.2 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Construction Schedule: As described in Section 2.4.2 of Section 00700 "General Conditions", prepare a fully developed Contractor's construction schedule ("Baseline Schedule") using Microsoft Project[®] software unless otherwise approved by Owner's Representative. Submit Baseline Schedule prior to or at the preconstruction conference, and submit updated schedules as specified by the E/A, usually at each regularly scheduled Project Meeting and with each pay application.
1. Detail each significant construction activity and use a weekly timeframe for the schedule. Use the same breakdown of units of the Work as indicated in the "Schedule of Values."
 2. With each update, revise task completion percentage and mark completed tasks.
 3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
 4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically the critical path items and the sequences necessary for completion of related portions of the Work.
 5. Indicate the phases of work in which subcontractors will be participating. Subcontractors shall be indicated by name.

Division 1 General Requirements

6. Coordinate the Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other schedules.
 7. Indicate substantial completion in advance of the date established for Final Completion to allow time for the E/A's procedures necessary for certification of Substantial and Final Completion.
- B. Work Stages: Indicate important stages of construction for each major portion of the Work, including submittal review, testing, and installation.
- C. Cost Correlation: Within the Baseline Schedule, provide cost information indicating planned and actual costs. On the appropriate task line(s), show dollar volume of Work performed as of the dates used for preparation of applications for payment. Refer to Section 00700, "General Conditions", Article 14 Payment to Contractor and Completion for cost reporting and payment procedures.
- D. Distribution: Following response to the Baseline Schedule submittal, distribute electronic copies to the E/A, subcontractors, suppliers, and other parties required to comply with scheduled dates. Keep a copy at the Project Site at all times.
 1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- E. Schedule Updating: Revise the schedule after each meeting, event, or activity where revisions have been recognized or made and as requested by the E/A. Issue the updated schedule concurrently with the report of each meeting, or as requested by the E/A.
- F. Contractor shall provide a three week look ahead schedule in a format acceptable to the Project Manager at each Job Meeting as required in 1200 1.5 C.

3.3 SUBMITTAL SCHEDULE

- A. Concurrently with the development of the Contractor's Construction Schedule, prepare a complete schedule of submittals. Submit the initial Submittal Schedule along with the Construction Schedule, at, or prior to, the Pre-construction Conference.
 1. Coordinate Submittal Schedule with the list of subcontractors, Schedule of Values, and the list of products as well as the Contractor's Construction Schedule.
 2. Prepare the schedule in chronological order. Provide the following information:
 - a. Scheduled date for the first submittal.
 - b. Related Section number or Specification number.
 - c. Submittal category (Shop Drawings, Product Data, Calculations, Test Results, or Samples).
 - d. Name of the subcontractor.
 - e. Description of the part of the Work covered.
 - f. Scheduled date for resubmittal.
 - g. Scheduled date for completion of the E/A's review.
- B. Contractor's schedule of submittals will be reviewed to verify that the list of submittals provided is all inclusive and the schedule is reasonable and realistic for delivery of the project. Owner will provide a response to the Contractor based on the assessment of the schedule of submittals.
- C. Distribution: Upon Owner's agreement with the schedule of submittals, print and distribute copies to the Owner's Representative, E/A, Owner, subcontractors, suppliers, and other parties required to comply with submittal dates indicated. Keep copies at the Project Site at all times.

Division 1 General Requirements

1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- D. Schedule Updating: Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting, or as requested by the E/A.

3.4 CONSTRUCTION SEQUENCE PLANS

The Contractor is required to submit construction sequence plans to the City at, or prior to, the pre-construction conference for approval. The Project shall be divided into phases according to the sequence of construction given in the Drawings and traffic control plans. The Contractor shall arrange his/her work schedule to complete all Work on each phase, including street repair, any valve casting or manhole adjustments, and street overlay before moving on to the next work area.

3.5 SHOP DRAWINGS

- A. Submit newly prepared information drawn accurately to scale. Highlight, circle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
- B. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following information:
1. Dimensions;
 2. Identification of products and materials included by sheet and detail number;
 3. Compliance with specified standards;
 4. Notation of coordination requirements; and
 5. Notation of dimensions established by field measurement.
 6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 inches by 11 inches but no larger than 24 inches by 36 inches.
 7. Do not use Shop Drawings without an appropriate stamp indicating action taken.

3.6 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, applicable certifications and performance curves.
1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:
 - a. Manufacturer's printed recommendations;
 - b. Compliance with trade association standards;
 - c. Compliance with recognized testing agency standards;
 - d. Application of testing agency labels and seals;
 - e. Notation of dimensions verified by field measurement; and
 - f. Notation of coordination requirements.
 2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

Division 1 General Requirements

3. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
 - a. Do not proceed with installation until a copy of the final submission of Product Data is in the Installer's possession.
 - b. Do not permit use of unmarked copies of Product Data in connection with construction.
4. Potable Water, Reclaimed Water, and Wastewater Items or Projects: The Contractor shall submit descriptive information and evidence that the materials and equipment the Contractor proposes for incorporation into the Work is of the kind and quality that satisfies the specified functions and quality. **Austin Water Utility Standard Products Lists (SPL)** are a part of the Specifications. Contractors shall use products specified in the Contract Documents, listed on the SPLs, or approved by AWU through the process in Section 2.4.0 of the Utilities Criteria Manual. Products contained in the SPL cannot be substituted for items shown on the Drawings, or called for in the specifications, unless approved by the E/A in conjunction with the Austin Water Utility Standards Committee. **Unless otherwise specified**, products current at the time of solicitation shall be installed except where an updated List has been issued to remove a product because of quality or performance issues.

3.7 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished when specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
 1. Mount or display Samples in the manner to facilitate review of qualities indicated. Include the following:
 - a. Specification Section number and reference;
 - b. Generic description of the Sample;
 - c. Sample source;
 - d. Product name or name of the manufacturer;
 - e. Compliance with recognized standards; and
 - f. Availability and delivery time.
 2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
 - a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variations.
 - b. Refer to other Specification Sections for requirements of Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
 - c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.

Division 1 General Requirements

- d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.
3. Maintain sets of Samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.
 - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
 - b. Sample sets may be used by Owner for final acceptance of the construction associated with each set.
- B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.

3.8 QUALITY ASSURANCE AND QUALITY CONTROL SUBMITTALS

- A. Submit quality assurance and quality control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, materials test results, field testing and inspection reports, and other quality-control submittals as required under other Sections of the Specifications.
- B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a certification from the manufacturer or responsible Engineer certifying compliance with specified requirements.
 1. Signature: Certification shall be signed by an officer of the corporation or other individual authorized to sign documents on behalf of the company.
- C. Calculations: When required in the technical specification, calculations shall be prepared and stamped by a Professional Engineer registered in the State of Texas.
- D. Concrete, Controlled Low Strength Material, Asphalt Stabilized Base and Hot Mix Asphaltic Concrete Mix Designs and Substantiating Test Data: Requirements for submittal of mix designs and substantiating test data are specified in the applicable Technical Specification Section. Each separate batch plant supplying ASB, HMA and/or concrete shall submit mix designs to the Owner's Representative for review.

3.9 ENGINEER/ARCHITECT'S ACTION

- A. Except for submittals, for the record, or for information where action and return is not required, the E/A will review each submittal, mark to indicate action taken, and return within the time frame specified in Paragraph 3.1.A.3.
 1. Compliance with specified characteristics is the Contractor's responsibility.
- B. Action Stamp: The E/A will stamp each submittal with a uniform, action stamp. The E/A will mark the stamp appropriately to indicate the action taken, as follows:
 1. "Reviewed": the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.

Division 1 General Requirements

2. "Reviewed with Comments": the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
 3. "Revise and Resubmit" or "Rejected": do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations and resubmit without delay. Repeat if necessary to obtain different action mark.
 - a. Do not use, or allow others to use, submittals marked "Revise and Resubmit" or "Rejected" at the Project Site or elsewhere where Work is in progress.
 4. Other Action: Where a submittal is for information, or for record purposes, or for special processing, or for other activity, the E/A will return the submittal marked "Record Copy", "Action Not Required" or "No Action Taken."
- C. Unsolicited Submittals: The E/A will return unsolicited submittals to the sender without action.

3.10 PREPARATION AND SUBMITTAL OF CONSTRUCTION RECORD DRAWINGS

The Owner's Representative and the Contractor's Superintendent will each maintain a set of bluelines noting any changes in ink during construction of the Project. The Owner's Representative and the Contractor's Superintendent will compare bluelines at least weekly (at a time mutually acceptable to both) to exchange information and compare notes to ensure all items installed and changes are documented. The following is a recommended minimum of items to be noted:

GENERAL

1. Notes should be sufficiently clear to allow a draftsman to easily make the necessary changes without the need for field checks and interpretation.
2. One complete set of Construction Record bluelines will be submitted prior to the final pay request and forwarded to the Owner.

STREET RECONSTRUCTION AND OVERLAY PROJECTS

1. Location, type, and quantity of all work added or deleted from the Project including repair areas, milled areas, sidewalk, ramps, curb and gutter, etc.
2. Deviations in street, sidewalk, curb and gutter location and grades from Drawings.

WATER/WASTEWATER PROJECTS

1. Type, name and model numbers of all valves (with # of turns to open/close), air release valves, drain and fire hydrants noted at locations installed.
2. Installed locations of all assignments, appurtenances and elevations which differ from those indicated on the Drawings.
3. Pipe manufacturer type and classification noted in sufficient detail to determine location and extent of each type or classification installed.
4. Modification to any standard or special details noted.
5. Location and description of pipe closures.
6. Thrust blocking locations and restrained pipe lengths, approximate dimensions and quantities noted.
7. Location, type and quantity of all addition and deletions.
8. Changes in grade.

The above list is not intended to be complete. Any information noted which could be used for future maintenance, location and construction projects is encouraged to be noted on the bluelines.

3.11 CONSTRUCTION DIARIES

The Contractor shall prepare a daily construction diary recording as a minimum the following information concerning events at the site and submit duplicate copies to the Owner's Representative

Division 1 General Requirements

at weekly intervals. The copies are to be signed by the project Superintendent as defined in Section 00700, Article 6.1.2.

1. Work performed;
2. Approximate count of Contractor's personnel, by classification, on the site;
3. List by classification, of all Subcontractors, personnel and any professionals on the site that day;
4. List of all equipment on the site by make and model;
5. High and low temperatures together with general weather conditions;
6. Start time and finish time of day's work;
7. Accidents and / or unusual events;
8. Meetings and significant decisions made;
9. Stoppages, delays, shortages and / or losses;
10. Meter readings and / or similar recordings;
11. Emergencies procedures that may have been needed;
12. Orders and requests of governing authorities;
13. Change Orders received and implemented;
14. Services connected and / or disconnected;
15. Installed equipment and / or system tests and / or startups and results;
16. Partial completions and / or occupancies; and
17. Date of substantial completion certified.

Shop Drawing Transmittal

Month XX, 2008

Transmittal No. _____
 Previous Transmittal No. _____
 Previous Submittal Date _____

City of Austin
 Construction Inspection Division
 Public Works Department
 P.O. Box 1088
 Austin, Texas 78767

Project Name: Austin Lakeside Drive

Attention: Owner's Representative

Enclosed are nine (9) copies of the following items for your review:

<u>Item No.</u>	<u>Description</u>	<u>Submittal Type</u>	<u>Specification Section</u>	<u>Subcontractor/Supplier</u>
1.	6" DI Pipe	Produce Data	510	ABC Company
2.	8" Resilient Seat Gate Valve	Product Data	511	DEF Company

E
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e

NOTE: Item 1 above contains a deviation from the Specifications as indicated on the item

Submitted by: _____
 XYZ Company
 101 Ranch Road 2974
 Austin, Texas 78759

END

PART 1 GENERAL

1.01 SUMMARY

- A. Preliminary Progress Schedule: Submit no later than Pre-Construction Conference.
- B. Submit the initial Submittal Schedule along with the Progress Schedule, at, or prior to, the Pre-Construction Conference.
- C. Progress Schedule: Submit adjusted Progress Schedule or confirm validity of current schedule with each monthly Application for Payment in accordance with the General Conditions, and at such other times as necessary to reflect:
 - 1. Progress of Work to within 5 working days prior to submission;
 - 2. Changes in Work scope and activities modified since submission;
 - 3. Delays in Submittals or resubmittals, deliveries, or Work;
 - 4. Adjusted or modified sequences of Work;
 - 5. Other identifiable changes; and
 - 6. Revised projections of progress and completion.
- D. Narrative Progress Report: Submit with each monthly submission of progress schedule.
- E. Precedent to final payment, provide four copies of any Critical Path Method (CPM) type schedule utilized with certification that said schedule represents correctly the way the Work was performed.
- F. Distribution: Following response to the initial schedule submittal, print and distribute copies to the ENGINEER, subcontractors, suppliers, and other parties required to comply with scheduled dates. Keep a copy at the Project Site at all times.
 - 1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

1.02 SUBMITTAL SCHEDULE

- A. Concurrently with the development of the Contractor's Construction Schedule, prepare a complete schedule of submittals. Submit the initial Submittal Schedule along with the Construction Schedule, at, or prior to, the Pre-construction Conference.
 - 1. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Progress Schedule.
 - 2. Prepare the schedule in chronological order. Provide the following information:
 - a. Scheduled date for the first submittal.
 - b. Related Section number or Specification number.
 - c. Submittal category (Shop Drawings, Product Data, Calculations, Test Results, or Samples).
 - d. Name of the subcontractor.
 - e. Description of the part of the Work covered.
 - f. Scheduled date for resubmittal.
 - g. Scheduled date for completion of the E/A's review.
- B. Distribution: Following OWNER's response to the initial submittal, print and distribute copies to the Owner's Representative, E/A, OWNER, subcontractors, suppliers, and other parties required to comply with submittal dates indicated. Keep copies at the Project Site at all times.

1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

1.03 PROGRESS SCHEDULE

A. General

1. Schedule(s) shall reflect Work logic sequences, restraints, delivery windows, review times, Contract Times, and Milestones set forth in the Agreement, and shall begin with the date of Notice to Proceed and conclude with the date of Final Completion.
2. The schedule requirement herein is the minimum required. CONTRACTOR may prepare a more sophisticated schedule if such will aid CONTRACTOR in execution and timely completion of Work.
3. Base schedule on standard 5-day work week.
4. Coordinate the Progress Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other schedules.
5. Indicate important stages of construction for each major portion of the Work, including submittal review, testing, and installation.
6. When the OWNER requests a specific sequence of work, that sequence of work is to be identified as a separate time line with its own critical path and schedule constraints.
7. Shop drawing submittals, including float for review time, are to be shown as specific activities on critical path items.
8. O&M Manual submissions are to be clearly shown as a separate task item on the schedule.
9. Indicate substantial completion in advance of the date established for Final Completion to allow time for the ENGINEER's procedures necessary for certification of Substantial and Final Completion.
10. Cost Correlation: At the head of the schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of Work performed as of the dates used for preparation of applications for payment. Refer to Section 00700, "General Conditions", Article 14 Payment to Contractor and Completion for cost reporting and payment procedures.
11. Use Microsoft Project latest version or a compatible and approved software.

B. Format

1. Critical Path Method (CPM) Schedule, on maximum 24-inch by 36-inch sheet size to include at least:
 - a. Schedule to have critical path clearly shown on a calendar and the relationship between each task and calendar day indicated. The earliest time at which an activity may be started, the latest time at which an activity may be started, the earliest time which an activity may be finished, and the latest time at which an activity may be finished are to be clearly shown on the schedule. Format the schedule such that there is a one to one correspondence between schedule items and the Schedule of Values items. In addition submit an arrow diagram or precedence diagram for the initial schedule and each revision.
 - b. Schedule to include those activities reasonably required to complete Work, including, but not limited to, subcontract Work, major equipment design, fabrication, factory testing, and delivery dates including required lead times for OWNER-furnished products, move-in and other preliminary activities, equipment and equipment system test and startup activities, Project closeout and cleanup, and specified Work sequences, constraints, and Milestones, including Substantial Completion date(s). Listings to be identified by Specification Section number.
 - c. Identify: (i) horizontal time frame by year, month and week; (ii) duration, early-start, and completion for each activity and sub-activity; and (iii) critical activities and Project float.

- d. Sub-schedules to further define critical portions of the Work.
 - e. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".
 - f. Within each time bar, indicate estimated completion percentage in 10 percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.
 - g. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically the critical path items and the sequences necessary for completion of related portions of the Work.
 - h. Indicate the phases of work in which subcontractors will be participating. Indicate Subcontractors by name.
2. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, with data for the entire construction period. Schedule is to be submitted as both a "hard" copy and a PC-compatible electronic copy on a CD-ROM.
- C. If CONTRACTOR provides an accepted schedule with an early completion date, OWNER reserves the right to reduce Contract Times to match the early completion date by issuing a deductive Change Order at no change in Contract Price.
- D. No partial payment requests will be processed unless the progress schedule has been submitted and/or updated and approved by the OWNER. No partial payments will be made unless the schedule has been approved by the OWNER.
- E. Updating Progress Schedule: Adjust or confirm the Progress Schedule on a monthly basis. Revise the Progress Schedule after each meeting, event, or activity where revisions have been recognized or made. Issue the updated Progress Schedule at maximum intervals of 90 days, to reflect as nearly as possible the actual construction operations, show overall percent complete, projected and actual, and completion progress by listed activity and sub-activity.

1.04 NARRATIVE PROGRESS REPORT

- A. Include, as a minimum:
- 1. Summary of Work completed during the past period between Narrative Progress Reports.
 - 2. Work planned during the next period.
 - 3. Explanation of differences between summary of Work completed and Work planned in previously submitted Narrative Progress Report.
 - 4. Current and anticipated delaying factors and their estimated impact on other activities and completion Milestones.
 - 5. Corrective action taken or proposed.

1.05 PROGRESS OF THE WORK

- A. If CONTRACTOR fails to complete activity by its latest scheduled completion date and this failure may extend Contract Times (or Milestones), CONTRACTOR shall, within 7 days of such failure, submit a written statement as to how CONTRACTOR intends to correct nonperformance and return to the acceptable current progress schedule. Actions by CONTRACTOR to complete Work within Contract Times (or Milestones) will not be justification for adjustment to Contract Price or Contract Times.

1.06 - 1.11 (NOT USED)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

1. GENERAL

1.1. RELATED DOCUMENTS

- A. This Section applies to Drawings and all provisions of Contract.

1.2. SUMMARY – CONSTRUCTION EQUIPMENT EMISSIONS PLAN

- A. The OWNER, as part of the Council Resolution No. 20100211-019, has decided to take steps to reduce emissions associated with construction process including Nitrogen Oxides (NO_x), particulate matter and greenhouse gas. Construction activity is a source of large quantities of particulate matter and ozone forming Nitrogen Oxides that adversely affect the health of our community and the natural environment.
- B. The CONTRACTOR shall employ practices and take actions that reduce emissions from NO_x, particulate matter (black soot) and greenhouse gases resulting from activities associated with new construction and demolition Projects.
- C. The CONTRACTOR shall maximize the use of equipment and vehicles with advanced emission controls in support of the City's goals, utilizing equipment that meets defined EPA emissions standards.

1.3. DEFINITIONS

- A. "Construction Equipment" means equipment powered by an internal combustion engine and used for performing or otherwise advancing the Work on the Project, other than motor vehicles intended for use on public highways and registered pursuant to Section 502.002 of the Texas Transportation Code.
- B. The list of applicable Construction Equipment includes, but is not limited to excavators, backhoes, loaders, bulldozers, graders, rock saws, generators, and other similar equipment.
- C. "EPA" means the United States Environmental Protection Agency.
- D. "Low-Use Equipment" means any piece of construction equipment which is used for less than ten (10) hours per week on site for a single construction contract.
- E. "Greenhouse Gases" are emissions that absorb and emit radiation within the atmosphere. Greenhouse Gases can be one or a combination of, these gases: carbon dioxide, methane, nitrous oxide and three groups of fluorinated gases (sulfur hexafluoride, hydro fluorocarbons, and perfluorocarbons)

1.4. REQUIREMENTS – Not Used

1.5. SUBMITTALS

A. CONSTRUCTION EQUIPMENT EMISSIONS REDUCTION PLAN:

- 1. The CONTRACTOR agrees to prepare a draft Emissions Reduction Plan (referred to as PLAN) prior to start of construction. This PLAN shall include an inventory report containing

identifying data for each piece of equipment to be used on the worksite and shall include the following:

- Vehicle/Equipment: Make & Model Year
 - Vehicle/Equipment: Engine Make & Model Year
 - Vehicle/Equipment: Fuel Type
 - Vehicle/Equipment: Expected gallons or hours used for project duration
- a) The OWNER will provide Emissions Reduction Toolkit to help the CONTRACTOR in preparation of the PLAN and inventory.
2. The CONTRACTOR shall develop a list of strategies to be used in this Project in order to reduce emissions from NO_x, particulate matter and greenhouse gas (CO₂ equivalent). Once prepared, the agreed upon strategies shall be incorporated into the PLAN. The PLAN will then be signed by the CONTRACTOR and made ready for implementation. Implementation progress will be reviewed once a month in regularly scheduled project progress meetings. The PLAN may be modified during construction if changes are made to the Project, but adjustments shall be approved by the OWNER prior to implementation.
3. This PLAN may be used by the Owner's Representative or Inspector to conduct site inspections and/or verify compliance with specification elements.
4. If additional equipment is brought on-site after construction begins, the Contractor shall provide this same inventory information to the Owner's Representative for the new equipment on or before the day it begins work on-site. All additional equipment shall conform to the PLAN.
5. Reports shall be provided for all equipment used on-site.

B. EQUIPMENT EMISSIONS CLOSEOUT DOCUMENTATION:

1. Submit the following prior to final payment:
- a) Record of changes made to the original PLAN and reasons.
 - b) Provide a summary and documentation of strategies used and estimated reductions in fuel & emissions.
 - c) Provide documentation of amount and % of alternative fuel used.

2. PRODUCTS

Not used

3. EXECUTION

3.1. GENERAL

- A. Implement the submitted PLAN. Provide personnel, documentation, equipment, signage, transportation, and other items as required to implement the PLAN during the entire duration of the Contract.

3.2. EQUIPMENT EMISSIONS PLAN IMPLEMENTATION

- A. Plan Coordinator (Could be same as superintendent): Designate an on-site person responsible for instructing workers on the Owner's intent to reduce emissions, overseeing implementation and documenting results of the PLAN for the Project.

- B. Plan Review: Review the PLAN in monthly progress meeting and include comments in the meeting notes.
- C. Instruction: Provide on-site instructions to all subcontractors of emissions reduction methods to be used by all parties for the appropriate activities of the Project.
- D. Discuss Owner's goals and requirements at the following meetings:
 - 1. Pre-bid conference.
 - 2. Pre-construction conference.
 - 3. Progress meetings (monthly).

3.3 EQUIPMENT EMISSIONS REDUCTION TOOLKIT

- A. Equipment Emissions Reduction Toolkit available at:
 - 1. Website: (<http://austintexas.gov/department/capital-improvement-program>)
 - 2. City of Austin Public Works Department, Project Management Division, One Texas Center, Suite 900
 - 3. Construction Job Site Office (after contract award)
- B. Equipment Emissions Reduction Toolkit consists of:
 - 1. A list of Construction Equipment Emissions Reduction Strategies
 - 2. EPA fuel savings calculator by idling reductions
 - 3. Posting of Anti-idling signs
 - 4. Memorandum of Agreement by Local Area Governments
 - 5. Equipment Inventory Form

3.4 A LIST OF EQUIPMENT EMISSIONS REDUCTION STRATEGIES

The following are suggested emissions reduction strategies and references. As per the specification section 01353, 1.5 Submittals, the CONTRACTOR shall develop a list of strategies to be used in this Project at the start of construction.

C-1 Anti-Idling Strategies:

- 1. Implement and enforce anti-idling practices for all equipment and vehicles on and adjacent to the site and associated with the project. City will provide a construction site sign and stickers for vehicles and equipment. Add Hyperlink to COA Idling flyer location TBD

Also refer to:

<https://www.nctcog.org/trans/quality/air/for-everyone/engine-off-north-texas>

Another potential resource for the COA website on emission specifications:

<https://www.tceq.texas.gov/airquality/mobilesource/vehicleidling.html>

2. Limit all idling of project associated vehicles and equipment operations to five (5) minutes unless the idling is applicable to one or more of the following exceptions:
 - a) Idling is being used for emergency response purposes;
 - b) Idling is necessary for component of mechanical operation, maintenance, or diagnostic purposes; or
 - c) Idling is for the health or safety of the equipment operator.
3. Provide education to all staff, vendors and subcontractors about emissions hazards and anti-idling practices and encourage use of EPA calculator for fuel savings.
4. To the extent possible, do not stop or idle haulage trucks directly under tree limbs and foliage overhanging the street along the haul route. Further avoid such damage from truck exhaust by means of exhaust diversion devices to redirect or diffuse exhaust from being directed in a concentrated manner to tree limbs and foliage.
5. Avoid vehicle loitering or queuing outside or inside the gates of the work area to minimize degradation of localized air quality.

(<http://austintexas.gov/airquality/>)

C-2 Alternative Fuels:

6. Utilize **alternative fuels** including, Texas LED Compliant B20 (or higher) biodiesel, Compressed Natural Gas (CNG), propane and electric. (Refer to EPA Energy Policy Act for full list).
7. Avoid unnecessary fuel use by providing on-site fuelling for alternate fuels.

(<http://www.tceq.texas.gov/airquality/mobilesource/txled/cleandiesel.html>)

(<http://www.eere.energy.gov/cleancities>)

(<http://lonestarcfa.org>)
8. **C-3 Vehicle/Equipment Improvements:** It is recommended that CONTRACTOR takes advantage of the **Texas Emission Reduction Plan (TERP)** grant incentives to upgrade (replace or repower) vehicles with retrofitted emission reduction technologies. (<http://www.tceq.texas.gov/airquality/terp/index.html>) or (www.terpgrants.com)
9. Utilize **battery powered and/or solar powered equipment** where available. This strategy can be combined with anti-idling strategies by using this technology for sign boards. (evtransportal.org/dieselengineidlerreduction.pdf)
10. Consider using voluntary and mandatory sections of the City of Chicago Clean Diesel Program related to <https://www.chicago.gov/city/en/progs/env/clean-diesel.html>file:///C:/Users/user/Documents/Downloads/O2011-1418.pdf
11. Consider an air quality training section administered by a governmental entity to help comply with an updated

COA Construction Equipment Emission Reduction Plan by using the California Air Resources Board (CARB) training section in the link below:

<https://ww2.arb.ca.gov/our-work/topics/construction-earthmoving-equipment>

C-4 Maintenance Program:

1. Establish a preventative **maintenance program** addressing issues including but not limited to, fuel use, air emissions, tire pressure, smoke from exhaust and noise.
2. Make all efforts to **prevent oil/fuel spillage** on to site surfaces.

C-5 Resource Management:

3. Utilize equipment companies that are located closest to the construction site.
4. Store equipment on site during construction use or arrange for closest overnight storage including **temporary use of the Right of Way** if possible.
5. To the extent possible, CONTRACTOR shall maximize use of **local and regional materials** to reduce transportation emissions.
6. CONTRACTOR shall maximize **salvage and reuse** of appropriate on-site materials. (<http://www.usgbc.org/ShowFile.aspx?DocumentID=1095>)
7. To the greatest extent possible, stage equipment and vehicles away from, and minimize operation near, sensitive receptors including, but not limited to, operable windows, fresh air intakes, hospitals, schools, licensed day care facilities, residences and areas where people congregate.

END

CONSTRUCTION PHOTOGRAPHY & VIDEOS

Section 01380

1. GENERAL

CONTRACTOR shall be responsible for the production of pre-construction, construction progress and post-construction photographs as provided herein. Owner's Representative may also designate additional subjects for photographs in addition to the general guidelines identified below.

2. QUALITY

All photographs must be produced by a competent photographer and shall be digital (6 Mega-Pixel) date-stamped color photography of commercial quality. All CONTRACTOR-generated photographs must be stored in a .jpeg file format. Each photograph shall be submitted in duplicate as two 3x5 prints with no more than 3 photos per page of professional quality enclosed in clear plastic sleeve within 3 tab folders. The prints shall be accompanied by digital date-stamped photographs in CD format or other format acceptable to the City. Each print shall be marked with the name and CIP ID number for the Contract, name of CONTRACTOR, description and location of view and identity of photographer.

Each photograph submittal must include a Photo Log that includes the name and CIP ID number of Contract, name of CONTRACTOR, the name of the photographer and company, photograph number, the date of the photograph and the filename that the camera assigns to the photo (e.g. MVC-001.jpg). In addition, appropriate descriptive information to properly identify the location of view must be entered into the Photo Log that includes a project drawing or sketch to assist in maintaining a concise project record (e.g. location of MH 5 - Line A or Sta. 2+00 - Line A or location of Sedimentation Basin 5, sludge pump A).

3. VIEWS AND QUANTITIES

3.1. PRE-CONSTRUCTION VIDEO

STREET, RIGHTS-OF-WAY OR WATER/WASTEWATER/STORMWATER PROJECTS

CONTRACTOR shall document by video, within the limits of construction, all pre-existing site conditions/elements as listed for the Pre-construction Photographs below. The video documentation shall provide a clear and continuous view of the project alignment showing all visible utilities and features within the limits of construction. The pre-construction video shall be in a format acceptable to the City and shall be shot prior to the occurrence of any site disturbance after Notice to Proceed. The pre-construction video shall be submitted within ten (10) calendar days of the Notice to Proceed.

3.2. PRE-CONSTRUCTION PHOTOGRAPHS

STREET, RIGHTS-OF-WAY OR WATER/WASTEWATER/STORMWATER PROJECTS

All pre-construction photographs must be submitted within ten (10) calendar days of the Notice to Proceed. Pre-construction photographs must be taken at sufficient intervals to be able to carefully document the pre-construction conditions of the Work, but in no case less than 100 foot intervals along the street, right-of-way, drainage easement or water/wastewater line route before commencement of Work. Each photograph location shall be taken from a minimum of two (2) views (one forward station view and one backward station view along the street, drainage, easement or pipeline route) within the limits of construction. Particular attention must be devoted to pre-existing damage to structures; landscape features, streets, curbs, sidewalks, driveways, signs, mailboxes, retaining walls, MSE walls, etc. shall be documented. An identifier such as houses or businesses address/ signs, property numbers, mail boxes, landscaping, etc. shall be included in each view for ease of later identification. At a minimum, Pre-construction photographs must be taken of the following views:

- The entire street ROW
- The entire easement width and length (both permanent and temporary)
- All curb lines (both sides of street) – all pre-existing curb damage not called for replacement within the Work and shall include major cracks
- All driveways, steps, and curbs and curb ramps (both sides of street)
- Fence and gate conditions
- Trees, ornamental shrubs, plantings/planter boxes and evidence of irrigation features
- Other privately or publically owned features or facilities that might be disturbed by the construction
- Prominent utility features, such as: guy wires, poles, signs, valves, fire hydrants, meters, pull boxes, etc.
- Streams and stream banks within the limits of construction
- Other significant or prominent features in order to protect the OWNER and CONTRACTOR following construction (e.g. close up photographs of pre-existing broken curbs, cracked/failed pavement, damaged adjacent retaining walls, etc.)
- Views of structures, both inside and adjacent to the ROW/easement in areas where CONTRACTOR will be working within five (5) feet of said structure
- Other views as requested by the OWNER

3.2 PRE-CONSTRUCTION PHOTOGRAPHS

INFRASTRUCTURE FACILITIES (i.e. TREATMENT PLANTS, PUMP STATIONS, LIFT STATIONS, RESERVOIRS, ETC) OR BUILDING PROJECTS

All pre-construction photographs must be submitted prior to the CONTRACTOR or Subcontractor beginning any Work that may cause site disturbance and shall be submitted with the initial CONTRACTOR'S Pay Application. As a minimum, Pre-construction photographs must be taken of the following views:

- The entire construction site area (full width and length)
- All curb lines showing all pre-existing curb damage not called for replacement within the Work and shall include major cracks
- All driveways, steps, and curbs and curb ramps (both sides of street adjoining the project site)
- Fence and gate conditions
- Trees, ornamental shrubs, plantings/planter boxes and evidence of irrigation features

Division 1 – General Requirements

- Views of structures, both inside and adjacent to the project site and easements in areas where CONTRACTOR will be working within five (5) feet of said structure
- Other views as requested by the OWNER

3.3 CONSTRUCTION PROGRESS PHOTOGRAPHS

STREET, RIGHTS-OF-WAY OR WATER/WASTEWATER/STORMWATER PROJECTS

Construction Progress photos must be taken at least monthly showing the progress of the work for the month. Construction photographs of the same views taken during pre-construction photography must be taken during the progress of the Work and shall be submitted monthly with the Contractor's monthly progress payment application.

3.3. CONSTRUCTION PROGRESS PHOTOGRAPHS.

INFRASTRUCTURE FACILITIES (i.e. TREATMENT PLANTS, PUMP STATIONS, LIFT STATIONS, RESERVOIRS, ETC) OR BUILDING PROJECTS

Construction Progress photos must be taken at least once per month.

One set of Construction progress photographs, as the work progresses, of the same views taken during pre-construction photography must be taken during the progress of the Work.

One set of the progress photos must be taken to depict the work accomplished during the month that includes:

- Work not yet covered up
- The beginning of installation of major items of equipment
- After installation of major items of equipment
- Other significant construction activities.

Both sets of photos shall be submitted monthly with the CONTRACTOR'S monthly progress payment application.

3.4 POST CONSTRUCTION PHOTOGRAPHS

Post-construction photographs must be taken of the same views taken during pre-construction photography to fully document the completed project. Post-construction photographs must be taken after cleanup and site restoration, and must be submitted with the final payment.

END

PART 1 - GENERAL

1.1 Related Documents:

Drawings and general provisions of Contract, including General Conditions, Section 00700, and Supplemental General Conditions, Section 00810, and Division 1 requirements.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 Office at the Work Site (Job Shack)

During the performance of this Contract, CONTRACTOR shall maintain a suitable office at or near the site of the Work which shall be the headquarters of their superintendent. Any communication given to the superintendent or delivered to CONTRACTOR's office at the site of the Work in their absence shall be deemed to have been delivered to CONTRACTOR.

In addition, CONTRACTOR shall provide a suitable field office with at least 200 square feet of floor space, either adjacent to, or partitioned off from, their office at the site for use by Owner's Representative. The office shall be provided with outside entrance door with a substantial lock, glazed windows suitable for light and ventilation, and adequate heating, air conditioning, and lighting facilities. CONTRACTOR shall pay all electricity and heating bills and shall provide telephone services with a telephone as specified hereinafter. The office shall be furnished with a desk, two four-drawer filing cabinets, a table, two chairs, a plan rack, and a locker for storage of surveying instruments. The doors on the locker shall be equipped for padlocking. The general arrangement of the office and facilities provided shall be acceptable to Owner's Representative.

3.2 Water for Construction

All water required for and in connection with the Work to be performed shall be furnished by and at the expense of the CONTRACTOR through meters installed on hydrants, except for water used in the "disinfection of potable water lines" process per Specification 510.3(29). All water used in the disinfection process shall not be metered, but rather shall be measured by calculation. Such water use does not require a meter, but a double-check valve assembly is required when connecting to a fire hydrant or a City main. CONTRACTOR shall submit a written plan for the disinfection process for review and approval by OWNER prior to commencing Work. The written plan shall include the CONTRACTOR's plan for final flushing and discharge of chlorinated water, and shall specify the quantities of potable water that will be required for the procedure and dosage plan proposed by the CONTRACTOR. Water used in the disinfection process shall be supplied by the OWNER through hydrants or connection through a City main at no charge to the CONTRACTOR for the initial disinfection procedure up to the quantities agreed to in the written plan for the disinfection process. Should the initial disinfection procedure fail to produce acceptable bacteriological sample test results, the cost of water at standard rates used for subsequent disinfection procedures shall be the responsibility of the CONTRACTOR with quantities determined through calculations.

For all water required for and in connection with the Work to be performed other than for the disinfection process, water and meters will be available from OWNER at standard rates. All costs for obtaining a water meter shall be the responsibility of the CONTRACTOR. The CONTRACTOR shall contact the Austin Water Utility and arrange to pick up the meter. CONTRACTOR shall install a double-check valve assembly on the fire hydrant between the hydrant and the meter, to prevent backflow in the event of pressure failure. CONTRACTOR shall supply all necessary tools, hose and pipe, and shall make necessary arrangements for

securing and transporting such water and shall take water in such a manner, and at such times, that will not produce a harmful drain or decrease of pressure in the OWNER's water system. It shall be the CONTRACTOR's responsibility to make arrangements with the Austin Water Utility for the metering and reporting of the amount of water used. Water shall not be used in a wasteful manner. Standard hydrant wrenches shall be used for opening and closing of fire hydrants. In no case shall pipe wrenches be used for this purpose. Temporary lines shall be removed when no longer required.

"If applicable, after the installation of the City of Austin's water meter(s) for the Project, the CONTRACTOR has the option to utilize the water available from this service at the CONTRACTOR's expense. An adjustment to the Contract amount will be made by Change Order at the end of the Project for the costs incurred by the City of Austin for the water."

3.3 Telephone Service

CONTRACTOR shall make all necessary arrangements and pay all installation charges for telephone lines in their offices at the site and shall provide all telephone instruments. The telephone service shall be available to the Owner's Representative for toll free calls.

3.4 Sanitary Facilities

CONTRACTOR shall furnish temporary sanitary facilities at the site, as provided herein, for the needs of all construction workers and others performing Work or furnishing services on the Project.

Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one toilet shall be furnished for each 20 employees. CONTRACTOR shall enforce the use of such sanitary facilities by all personnel at the site.

3.5 Protection of Public and Private Property

CONTRACTOR shall protect, shore, brace, support and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by the CONTRACTOR's operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all sod and shrubs in yards, parkways, and medians, shall be restored to their original condition, whether within or outside the easement/right-of-way. All replacements shall be made with new materials.

CONTRACTOR shall be responsible for all damage to streets, roads, curbs, sidewalks, highways, shoulders, ditches, embankments, culverts, bridges, or other public or private property, which may be caused by transporting equipment, materials, or men to or from the Work, whether by him or their Subcontractors. CONTRACTOR shall make satisfactory and acceptable arrangements with the owner of, or the agency having jurisdiction over, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage.

All fire hydrants and water control valves shall be kept free from obstruction and available for use at all times.

3.6 Tree and Plant Protection

All trees and other vegetation which must be removed to perform the Work shall be removed and disposed of by the CONTRACTOR; however, no trees or cultured plants shall be unnecessarily removed unless their removal is indicated on the Drawings. All trees and plants not removed shall be protected against injury from construction operations.

No tree shall be removed outside of permanent easement(s), except where authorized by the E/A. Whenever practicable, CONTRACTOR shall tunnel beneath trees in yards and

parking lots when on or near the line of trenching operations. Hand excavations shall be employed as necessary to prevent injury to trees. Care shall be taken with exposed roots, unearthed during construction, so that roots do not dehydrate causing tree damage.

Trees considered by the E/A to have any significant effect on construction operations are indicated on the Drawings and those which are to be preserved are so indicated.

CONTRACTOR shall take extra measures to protect trees designated to be preserved, using methods shown on the Drawings and as specified in Standard Specification Item No. 610S "Preservation of Trees and other Vegetation".

3.7 Security

CONTRACTOR shall be responsible for protection of the site, and all Work, materials, equipment, and existing facilities hereon, against vandals and other unauthorized persons.

No claim shall be made against OWNER by reason of any act of an employee or trespasser, and CONTRACTOR shall make good all damage to the OWNER's property resulting from CONTRACTOR's failure to provide security measures as specified.

Security measures shall be at least equal to those usually provided by OWNER to protect existing facilities during normal operations, and shall also include such additional security fencing, barricades, lighting, and other measures as required to protect the site. When required, the CONTRACTOR shall provide a security plan to the OWNER for review as to appropriateness of the security measures proposed.

3.8 Access Roads

CONTRACTOR shall establish and maintain temporary access roads to various parts of the site as required to complete the Project. Such roads shall be available for the use of all others performing Work or furnishing services in connection with the Project.

3.9 Parking

CONTRACTOR shall provide and maintain suitable parking areas for the use of all construction workers and others performing Work or furnishing services in connection with the Project, as required, to avoid any need for parking personal vehicles where they may interfere with public traffic, the OWNER's operations, or construction activities.

3.10 Dust Control

Dust Control during construction of this Project shall conform to Standard Specifications Item No. 220S, "Sprinkling for Dust Control". No direct payment will be made for dust control. Dust Control shall be considered subsidiary work relating to various Bid items of the Contract.

3.11 Temporary Drainage Provisions

CONTRACTOR shall be responsible for providing for the drainage of stormwater and such water as may be applied or discharged on the site in performance of the Work. CONTRACTOR shall obtain E/A approval for temporary drainage facilities which will handle, carry through, or divert around their Work all drainage flow, including storm flow and flows created by construction activity, to prevent silting of waterways or flooding damage to the property and adjacent property.

3.12 Erosion Control

CONTRACTOR shall prevent erosion of soil on the site and adjacent property resulting from their construction activities. Effective measures shall be initiated prior to the commencement of clearing, grading, excavation, or other operations which will disturb the natural protection.

CONTRACTOR shall use controls found in "Environmental Criteria Manual" or developed from successful techniques elsewhere as approved by E/A.

3.13 Pollution Control

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

CONTRACTOR shall observe the rules and regulations of the State of Texas and agencies of the U.S. Government prohibiting the pollution of any lake, stream, river, or wetland by the dumping of any refuse, rubbish, dredge material, or debris therein.

CONTRACTOR is specifically cautioned that disposal of materials into any water of the State must conform to the requirements of the Texas Commission on Environmental Quality (TCEQ), and any applicable permit from the U.S. Army Corps of Engineers.

3.14 Noise Control

CONTRACTOR shall comply with the City of Austin's Noise Ordinance. CONTRACTOR shall take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound level in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound-muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work.

3.15 CIP Sign

CONTRACTOR shall erect install and maintain CIP signs as specified. Signs shall be constructed in accordance with City Standard Specification Item No. 802S "Project Signs," as indicated on the Drawings.

3.16 Fences

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

Upon completion of the Work across any tract of land, CONTRACTOR shall restore all fences to preconstruction, or to a better, condition and to their preconstruction location.

3.17 Mail Boxes

CONTRACTOR shall remove, reset temporarily, and relocate permanently all mail boxes that are within construction site limits conforming to requirements of United States Postal Service. Mailboxes shall not be laid on the ground, but shall be temporarily reset the same day as removed. Payment for removing and resetting of mail boxes will not be paid for directly, but will be considered subsidiary to the various Bid items. Any damage to mail boxes or posts shall be the responsibility of the CONTRACTOR.

3.18 Emergency Facilities

Free access shall be maintained at all times to fire lanes and emergency and utility control facilities such as fire hydrants, fire alarm boxes, police call boxes, and utility valves, manholes, junction boxes, etc. In the event that it is necessary to make one of these facilities temporarily inaccessible, CONTRACTOR shall obtain approval of such action and schedule of Work from the OWNER. CONTRACTOR shall also provide at least 24 hours prior notice to the Fire Department, Police Department, and City Department governing the affected utility. The same Department(s) shall be promptly notified by the CONTRACTOR when such facilities are placed back in unobstructed service.

3.19 Notification of Owners

Unless otherwise indicated, the OWNER will notify property owners abutting the right-of-way of impending construction. The CONTRACTOR shall exercise diplomacy and tact with individual property owners.

3.20 Maintenance of Traffic

CONTRACTOR shall conduct their Work to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct, or close roads, driveways, and walks whether public or private, the CONTRACTOR shall provide and maintain suitable safe bridges, detours or other temporary measures to accommodate public and private travel, and shall provide reasonable notice to owners of private drives before interfering with them. Such maintenance of traffic will not be required when CONTRACTOR has obtained written permission from the owner and the tenant of the private property, or from the authority having jurisdiction over public property involved, to obstruct traffic at the designated point. A copy of the initial written permission shall be provided to the Owner's Representative.

Safety and conveyance of traffic shall be regarded as prime importance. Unless otherwise directed, all portions of streets associated with this Project shall be kept open and provided a dust free, smooth and comfortable ride to traffic. It shall be the responsibility of the CONTRACTOR to ensure that two-way traffic may safely bypass the construction site and that access is provided to abutting private property. In making open cut street crossings, the CONTRACTOR shall not block more than one-half of the street at one time without approval of the OWNER. Whenever possible, CONTRACTOR shall widen the shoulder on the opposite side to facilitate traffic control. Temporary surfacing shall be provided as necessary on shoulders.

Prior to beginning Work, CONTRACTOR shall designate, in writing, a competent person who will be responsible and available on the Project site, or in the immediate area, to ensure compliance with the traffic control plan. CONTRACTOR shall provide documentation to demonstrate the sufficient training in Traffic Control for their competent person. Owner will designate a qualified person to observe implementation and who will have authority to assure compliance with the traffic control plan.

The CONTRACTOR shall perform the necessary cleanup and finishing immediately after all or a portion of the Work is completed. When the Work includes paving operations, the entire site shall be kept clean to facilitate placement of required traffic control devices. Temporary and permanent striping lay-out shall be approved by the Transportation Department prior to placement, when included in the Work.

1. Detours

Where indicated on the traffic control plan CONTRACTOR shall erect and maintain detours around construction activities. Should CONTRACTOR desire to propose a detour, not already included in the traffic control plan, it shall be their responsibility to prepare a revised traffic control plan showing the detour, and obtain approval of the revised traffic control plan from the Transportation Department, prior to implementation of the detour. The Transportation Department has final authority as to the acceptability of any proposed revisions to the traffic control plan. The CONTRACTOR shall bear all costs for revising the traffic control plan and for maintaining the proposed detour.

2. Barricades and lights

CONTRACTOR shall place and maintain in good condition, standard barricades at each end of the Project and at other locations where traffic is rerouted or blocked from using regular traffic lanes. Barricades and warning signs shall be in accordance with the Texas Manual on Uniform Traffic Control Devices (MUTCD) and City of Austin Standard Specification Item No. 803S, "Barricades, Signs and Traffic Handling". Signs, barricades, and warning devices informing the public of construction features will be placed and maintained by the

CONTRACTOR, who shall be solely responsible for their maintenance. The decision to use a particular device at a particular location as indicated in the traffic control plan or as determined by the CONTRACTOR, shall be the sole responsibility of the CONTRACTOR.

All open trenches and other excavations shall have suitable barricades, signs, and lights to provide adequate protection to the public. Obstructions, such as material piles and equipment shall be provided with similar warning signs and lights.

All barricades and obstructions shall be illuminated with warning lights from sunset to sunrise. Material storage and conduct of the Work on, or along side, public streets and highways shall cause a minimum obstruction and inconvenience of the traveling public.

3.21 Required Job Site Postings and Notices

CONTRACTOR shall post the following postings and notices in English and Spanish at one or more conspicuous locations on the job site. In the case of Projects with multiple sites, the notices and postings must be displayed at each site. In the case of Projects that do not have a job shack or other temporary facility on the site, CONTRACTOR shall post all notices on a temporary bulletin board. Other special conditions are noted below.

Required for all Projects	
<i>Poster</i>	Available at:
Baseline Schedule for Project identifying when all subcontractors will be used	N/A (as required under Section 00700, paragraph 2.4.2.1.)
Wage Rates as required under Section 00830.	Section 00830BC and/or Section 008300HH
City of Austin Wage Contact posters	Provided at Pre-Construction meeting (English and Spanish)
City of Austin Equal Employment Opportunity posters	http://austintexas.gov/department/wage-compliance (English and Spanish)
Texas Commission on Environmental Quality "Construction Site Notice" form, if applicable, as required or the required TPDES information	http://www.tceq.state.tx.us/assets/public/permitting/waterquality/attachments/stormwater/txr152d2.pdf (Option 1 - as required under Section 00810, 6.7.4.2) N/A (Option 2 - as required under Section 00810, 2.6.7.4.3)
OSHA poster "Job Safety and Health: It's the Law"	http://www.osha.gov/Publications/osh3165.pdf (English) http://www.osha.gov/Publications/osh3167.pdf (Spanish)
City of Austin Rest Break Ordinance Signs	http://austintexas.gov/department/wage-compliance (English and Spanish) As required to be posted in English and Spanish under Ordinance No. 20100729-047
Texas Payday Law Poster	http://www.twc.state.tx.us/ui/lablaw/ll10.pdf (English) http://www.twc.state.tx.us/ui/lablaw/ll10s.pdf (Spanish)
Texas Workers Compensation notice that the employer does or does not carry Workers Compensation insurance	Does <u>not</u> carry Workers Compensation Insurance: http://www.tdi.state.tx.us/forms/dwc/notice5.pdf (English) http://www.tdi.state.tx.us/forms/dwc/notice5s.pdf (Spanish) Does carry Workers Compensation Insurance: http://www.tdi.state.tx.us/forms/dwc/notice6.pdf (English) http://www.tdi.state.tx.us/forms/dwc/notice6s.pdf (Spanish)

TWC Employer's Notification of the Ombudsman Program to Employees	http://www.oiec.state.tx.us/documents/Employer_Notice_of_O.pdf (both versions)
DOL – The Uniformed Services Employment and Reemployment Rights Act (USERRA)	http://www.dol.gov/vets/programs/userra/USERRA_Private.pdf
EEOC Equal Employment Act and the Americans with Disabilities Act (ADA)	http://www.dol.gov/ofccp/regs/compliance/posters/pdf/eeopost.pdf (English) http://www.dol.gov/ofccp/regs/compliance/posters/pdf/eeosp.pdf (Spanish)
Fair Labor Standards Act (FLSA) Minimum Wage Poster	http://www.dol.gov/whd/regs/compliance/posters/flsa.htm (English) http://www.dol.gov/whd/regs/compliance/posters/flspan.htm (Spanish)
If applicable: Employee Rights for Workers with Disabilities/Special Minimum Wage Poster – Employment Standards	http://www.dol.gov/whd/regs/compliance/posters/disabc.pdf http://www.dol.gov/whd/regs/compliance/posters/disabspanc3p.pdf
"Your Rights Under the Family and Medical Leave Act (FLMA)"	http://www.dol.gov/whd/regs/compliance/posters/fmlaen.pdf (English) http://www.dol.gov/whd/regs/compliance/posters/fmlasp.pdf (Spanish)
Title VI Rights Poster	http://austintexas.gov/department/wage-compliance
Additional Postings Required for Federally Funded Projects	
"Employee Rights Under the Davis-Bacon Act"	http://www.dol.gov/whd/regs/compliance/posters/fedprojc.pdf (English) http://www.dol.gov/whd/regs/compliance/posters/davispan.pdf (Spanish)
Applies to USDOT/FHWA funded projects: "Notice of False Statements Concerning Highway Projects"	http://www.mdt.mt.gov/publications/docs/forms/dbe/eeo_board/false_statements.pdf (as required in Section 00810A Standard Federal-Aid Assurances)
Applies to USDOT/FHWA funded projects; "Contractors EEO Policy"	N/A (as required in Section 00810A Standard Federal-Aid Assurances)

END

Division 1 General Requirements
CONSTRUCTION AND DEMOLITION WASTE
MANAGEMENT

Section 01505

SECTION 01505.1

Building Projects

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

1. Division 01 Section 01200 "Project Meetings"
2. Division 01 Section 01500 "Temporary Facilities"
3. Division 00 Section "Hazardous Waste Management"
4. Division 01 Section 01700 "Contract Closeout"
5. Division 02 Section "Demolition" & "Clearing and Grubbing".
6. Division 01 Section 01352 "Sustainable Construction Requirements".

1.2 SUMMARY

- A.** The Owner has established that the Project shall minimize the creation of construction and demolition waste on the Project site and shall recycle and/or salvage non-hazardous construction, demolition, and land clearing debris to divert waste from Landfills.
1. Contractor shall minimize factors that contribute to waste such as over packaging, improper storage, ordering error, poor planning, breakage, mishandling, and contamination.
 2. Contractor shall reuse, salvage, or recycle as many of the non-hazardous waste materials as economically feasible.
 3. As an incentive to encourage resourcefulness, all profits resulting from salvaging and recycling shall go to the Contractor.
 4. In cases where there is little to no cost difference between recycling/salvaging and land-filling of items not required to be recycled or salvaged, the Contractor is directed to recycle/salvage.
 5. Contractor shall minimize waste disposal in landfills.
- B.** Hazardous materials are an exception to this Section. Comply with applicable requirements of Local, State and Federal regulations.
- C.** This Section includes administrative and procedural requirements for the following:
1. Salvaging non-hazardous demolition and construction waste
 2. Recycling non-hazardous demolition and construction waste
 3. Disposing of non-hazardous demolition and construction waste.

1.3 REFERENCES

- A.** The standards listed below form a part of this Section to the extent referenced. Standards are referred to in the text by basic reference only.

1. LEED-NC Reference Guide MR credit 2 (Reference only, Certification is not required)
2. Sustainable Building Sourcebook – Austin Energy Green Building:
www.austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/constructionWasteManagement.htm
3. Resource Exchange Network for Eliminating Waste (RENEW), TCEQ (MC-112), Biannual catalog lists materials available and wanted; serves Texas and surrounding states; lists are posted on the Internet:
<http://www.tceq.state.tx.us/assistance/P2Recycle/renew/renew.html>
4. Recycle Texas Online, A service of the Texas Commission on Environmental Quality. Contains information on about 1000 businesses and local governments handling materials from Texas. Organizations' information is self-reported and listings are free of charge. <http://www.tceq.state.tx.us/assistance/P2Recycle/rtol/rtol.htm>
5. The "Construction Materials Management Guidelines", a publication of AIA/Austin for the Governor's Energy Office provides construction waste recycling economics worksheets, recycling market information and other related information that may be useful in estimating the construction waste quantities and recycling costs for this project. Available from AIA/Austin (512) 452-4332.
6. "WasteSpec", Triangle J Council of Governments, Research Triangle Park, NC 27709, (919) 549-9390.

1.4 DEFINITIONS

- A. Chemical Waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
- B. Clean: Untreated and unpainted, not contaminated with oils, solvents, caulk, or the like.
- C. Co-mingled: Keeping mixed recyclable materials in one container on site. The container is then taken to a material recovery facility where materials are separated for recycling.
- D. Deconstruction: Process of carefully dismantling a building in order to salvage components for reuse and recycling. Also known as "construction in reverse".
- E. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- F. Demolition: Process of removing structures as quickly as possible by using heavy machinery and generating large amounts of waste.
- G. Disposal: Acceptance of solid wastes at legally permitted and operating facility for the purposes of land-filling.
- H. Diversion: Avoidance of demolition and construction waste sent to landfill or incineration. Diversion does not include using materials for landfill, alternate daily cover on landfills, or materials used as fuel in waste-to-energy processes.
- I. Hazardous Waste: Byproducts of society that can pose a substantial or potential hazard to human health or the environment when improperly managed, and possessing at least 1 of 4 of the following characteristics, or appearing on a special Environmental Protection Agency (EPA) list.
 1. Ignitability.
 2. Corrosivity.

3. Reactivity.

4. Toxicity.

- J. Non-Hazardous Waste:** Solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair, and demolition operations, possessing none of the 4 characteristics of hazardous substances, i.e., ignitability, corrosivity, reactivity, or toxicity.
- K. Landfill:** Authorized land waste disposal site that is located to minimize waste pollution from runoff and leaching. Waste is spread in thin layers, compacted and covered with a fresh layer of soil each day to minimize pest, aesthetic, disease and air and water pollution problems.
- L. Municipal Solid Waste Landfill:** A permitted facility that accepts solid, non-hazardous waste such as household, commercial, and industrial waste, including construction and demolition waste.
- M. Non-hazardous:** Exhibiting none of the characteristics of hazardous substance, i.e. ignitability, corrosiveness, toxicity or reactivity.
- N. Non- toxic:** Neither immediately poisonous nor poisonous after a long period of exposure.
- O. Recyclable:** The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- P. Recycle:** To remove a waste material from the Project site to another site for remanufacture into a new product for reuse by others.
- Q. Recycling:** The process of sorting, cleansing, treating, and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- R. Return:** To give back reusable items or unused products to vendors for credit.
- S. Reuse:** A strategy to return materials to active use in the same or a related capacity.
- T. Salvage:** To remove a waste material from the Project site to another site for resale or reuse by others.
- U. Source Separation:** The act of keeping different types of waste materials separate beginning from the first time they become a waste.
- V. Toxic:** Poisonous to living beings either immediately or after a long period of exposure.
- W. Trash:** Any product or material unable to be reused, returned, recycled, or salvaged.
- X. Waste:** Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

All materials removed from the Project site to be land-filled, recycled, or salvaged for reuse. Pallets, containers, packaging and packing materials in which construction products are delivered to the Project site are considered waste materials. New, leftover materials that are returned to the material suppliers are not considered waste.
- Y. Waste Management Plan:** A Project-related plan for the collection, transportation, and disposal of the waste generated at the construction site. The purpose of the plan is to ultimately reduce the amount of material being land-filled.

1.5 WASTE MANAGEMENT GOALS

- A. The Owner has established that at least 75% of the “waste” materials produced as a result of the Work, shall be employed, salvaged, reused, or recycled in order to minimize the impact of construction and demolition waste on landfills, and to minimize the expenditure of energy and cost in fabricating new materials. Of the waste that is generated, as many of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills or incinerators shall be minimized, thereby reducing disposal costs. As a minimum, 75% of material that would otherwise go to the landfill shall be diverted.
- B. Contractor shall employ and encourage practices that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Revenues, savings, rebates, tax credits and other incentives received for recycling waste materials shall accrue to the Contractor.
- D. Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, State and local laws and regulations, pertaining to legal disposal of all construction waste materials.
- E. Recycle material including diverting materials for secondary uses whenever economically feasible.
- F. Dispose of materials with no practical use or economic benefit at landfill.
- G. Acceptable methods of diversion include:
 - Donation to nonprofit organizations
 - Removal from jobsite by staff or subcontractors for use (not disposal)
 - Return to supplier
 - Sale to organizations or individuals
 - Recycling
- H. The Contractor shall develop a Construction Demolition Waste Management Plan that results in end-of-Project rates for recycle and/or salvage at least 75% of non-hazardous construction and demolition debris. Develop and implement the plan that, at a minimum, identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or co-mingled. Calculations can be done by weight or volume, but must be consistent throughout.

1.6 SUBMITTALS

- A. **Draft Waste Management Plan:** Within 14 calendar days after date of the Notice to Proceed, or prior to any waste removal, whichever occurs first, submit a draft Waste Management Plan outlining how demolished items and waste material will be removed from the Project Site.

An example template is included as “Appendix A” to this section.

- 1. The Waste Management Plan shall include the following:
 - a. Identify each type of demolished and waste material produced as a result of the Work on the Project Site.
 - b. Identify each type of demolished and waste material intended to be recycled or reused.
 - c. Identify estimated quantities for each type of demolished and waste material that can be recycled or reused.
 - d. Identify material separation requirements.

- e. Identify location of temporary on-Site storage for recycled and reused materials.
- f. Identify final destination for each recycled and reused material.
- g. Identify means of transportation for each recycled and reused material to their final destination.
- h. Identify the name/phone number of the Coordinator of the Waste Management Plan. The Coordinator is Contractor-designated on-site party responsible for workers and overseeing and documenting results of Waste Management Plan.
- i. Indicate permit or license and the location of the municipal solid waste landfills and other disposal area(s) to be used.
- j. List of materials that cannot be recycled or reused.

B. Final Construction Waste Management Plan: Once the Owner has determined which of the recycling options addressed in the draft Construction Waste Management Plan are acceptable, revise and resubmit, within 14 calendar days, a final Construction Waste Management Plan. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

C. Waste Management Reports: Prepare and maintain through Project duration a record of waste management. An Example template of a waste management record form is attached as "Appendix B" of this Section. With each application for progress payment, Contractor shall submit a summary of solid waste generated by the construction and demolition operations. Submit an electronic version of the updated form (showing new and cumulative information), indicating solid waste generated by the construction and means of disposal or diversion. Failure to submit updated reports with each Application for Progress Payment may delay payment. Include as a minimum the following information on the form: manifests, weight tickets, receipts and invoices, specifically identifying the Project and waste material for:

1. Municipal solid waste landfills.
2. Recycling centers.
3. Non-Profit organizations.
4. Landfill or Incinerator Disposal: Updates to the form and other updates required as part of the Waste Management Report shall include:
 - a. Land-fill Materials Description. Include date removed from jobsite.
 - b. Land-fill Hauler and Location of disposal or incineration.
 - c. Quantity of Land-filled (or incinerated) Waste
 - d. Submit electronic copy of manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - e. The amount (in tons or cubic yards) of material land-filled from the Project, the identity of the landfill, the total amount of tipping fees paid at the landfill, and the total disposal cost.
 - f. For each material recycled, reused, or salvaged from the Project, include the amount (in tons or cubic yards, pounds, feet, square yards, gallons, etc.), the date removed from the Project site, the receiving party, the transportation cost, the amount of any money paid or received for the recycled or salvaged

material, and the net total cost or savings of salvaging or recycling each material.

5. Recycled and Salvaged Materials: Updates to the form shall include the following information:
 - a. Diverted / Recycled Materials Description, including those retrieved by installer for use on other projects, those taken by the Contractor's staff or subcontractors for use on their projects, and those donated to charitable organizations. Include date item was removed from jobsite.
 - b. Diversion / Recycling Hauler and Location, indicating name of person or company removing the material for future use and the location to which the item was removed.
 - c. Quantity of Diverted / Recycled Waste
 - d. Submit electronic copy of manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - e. The City of Austin Project manager may request further information regarding how the diverted material was used or is intended to be used.

D. CWM Closeout Documentation: Submit the following upon the completion of The Work and prior to final payment:

- a. The completed Project Waste Management Record Form with Contract closeout documents, "signed" by the Contractor's representative and including calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 100% of all non-hazardous construction wastes were recycled, salvaged or disposed of properly.
- b. Copy of all receipts, manifests, weight tickets, and other documentation of materials recycled, salvaged, land-filled or incinerated, that have not already been documented.
- c. Electronic copy of a final summa

2 PART 2 - PRODUCTS

Not used

3 PART 3 – EXECUTION

3.1 GENERAL

- A. Implement the waste management plan as approved by the City of Austin Project Manager. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Satisfy the requirements outlined in Subsection 1.5, Waste Management Goals.

3.2 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Plan Coordinator: Designate an on-site party (or parties) responsible for instructing workers, overseeing implementation and documenting results of the Waste Management Plan for the Project.
- B. Plan Distribution: Provide copies of the Waste Management Plan to the Contractor's superintendent, each Subcontractor, the Owner, and the E/A.

- C.** Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the Project. Contractor is responsible for requiring participation of subcontractors.
- D.** Meetings: Conduct construction waste management meetings. Include subcontractors affected by the Waste Management Plan. At a minimum, discuss and develop a mutual understanding for achieving all of the Owner's waste management goals at the following meetings:
 - 1.** Pre-bid conference.
 - 2.** Pre-construction conference.
 - 3.** Progress meetings.
- E.** Careful Ordering.
- F.** Materials Handling Procedures: Protect materials to be recycled from contamination. Handle, store and transport in a manner that meets the requirements set by the designated facilities for acceptance. All materials shall be covered during transportation to prevent contamination and littering.
- G.** Separation Facilities: The Contractor shall lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, and return. Recycling and waste bin areas shall be kept neat and clean and clearly marked in order to avoid contamination of materials.
- H.** Handling:
 - 1.** Clean materials which are contaminated prior to placing in collection containers. Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.
 - 2.** Arrange for collection by, or delivery to, the appropriate recycling or reuse facility.
- I.** Hazardous Wastes: shall be separated, stored, and disposed of according to local prevailing regulations, and in accordance with the appropriate section of this specification.

3.3 RECYCLING REQUIREMENTS

- A.** Materials: Refer to individual specification sections for detailed Waste Management requirements. In general, the following types of construction waste materials generated during the course of this project that are not salvaged shall be recycled:
 - 1.** Asphalt concrete pavement.
 - 2.** Concrete.
 - 3.** Concrete block.
 - 4.** Metals, including the following.
 - a. Banding straps.
 - b. Reinforcing steel.
 - c. Iron.
 - d. Brass and bronze.
 - e. Lead.
 - f. Extruded aluminum.
 - g. Aluminum sheet.
 - h. Stainless steel sheet.
 - i. Steel studs.
 - j. Copper pipe.

- k. Steel pipe.
 - l. Galvanized steel pipe.
 - m. Metal ductwork.
5. Clean dimensional lumber.
 6. Broken wood crates and pallets.
 7. Glass and glass containers.
 8. Plastics.
 9. Plaster.
 10. Gypsum board.
 11. Acoustic ceiling tile.
 12. Carpet and pad.
 13. Paint and paint containers.
 14. Metal toilet partitions.
 15. Food service equipment.
 16. HVAC heating and cooling coils.
 17. HVAC equipment.
 18. Plumbing fixtures.
 19. Electrical conduit.
 20. Electrical wiring.
 21. Light fixtures.
 22. Cardboard, paper, and packaging.
 23. Beverage containers.
- B. Methods: The following recycling methods may be used.
1. On-site separation: Each material to be recycled shall be separated at the Project site and delivered to the recycling markets or directly from the Project site.
 - a. If on-site separation method is used, designate a specific area or areas to facilitate separation of materials for potential reuse, salvage, recycling, and return.
 - b. Maintain recycling and waste bin areas neat and clean and clearly marked, both in Spanish and in English, in order to avoid commingling of materials.
 - c. Protect bins during non-working hours from off site contamination.
 2. Off-site separation: Materials to be recycled are delivered unsorted from the Project site to a materials recovery facility or transfer station where recyclable materials are separated from other waste.
 - a. If this method is selected, Contractor shall verify that the entity responsible for the off-site separation has a market for all of the materials that are required to be recycled that it receives from the Project site.
 - b. The same Submittals procedures shall apply.
 - c. Protect bins during non-working hours from off site contamination.

3. A combination of each of the above methods.
- C. Area Recyclers: A reference for waste recycling markets and resources for the Austin, Texas area is included at the end of this Section.

3.4 REUSE

- A. Contractor is encouraged to reuse as many demolished and waste materials as possible.
- B. Reuse of demolished and waste materials includes the following:
 - a. Salvaging existing materials scheduled for resale.
 - b. Off-Site storage of demolished materials for future reuse by Contractor on other projects.
 - c. Returning reusable materials, such as packaging and pallets, to vendor.
 - d. Returning unused new materials to vendor.
 - e. Assemble designated reuse items in a single location safe from damage, for review and approval by the Owner's Representative.
- C. Submit a list of reused materials as part of the Waste Management Record
- D. Contractor shall investigate the possibility of off-Site reuse of demolished and removed materials in the Austin, Texas metropolitan area.

3.5 SALVAGE

- A. Salvage materials as identified on the Architectural and Engineering Demolition Plans.
- B. Salvage Guidelines:
 1. The contractor shall salvage as many items as deemed economically possible, considering that each item salvaged saves on land filling fees and may be of use to others.
 2. Assemble potentially salvageable items in one area for review by the City of Austin Project Manager. No items may be donated or sold to the public without prior approval by the City of Austin Project Manager.
 3. The Contractor, with assistance requested from the City of Austin Waste Reduction Assistance contact and Engineer, shall consider several possible markets for salvaged items. Examples of potential markets are:
 - a. Habitat for Humanity Restore.
 - b. Project site display for public purchase/donation
 - c. Demolition Contractor's sales yard/area
 4. Salvage items shall be stored in a manner that prevents damage.
 5. All proceeds from the sale of salvaged items shall go to the contractor.
 6. The contractor shall submit a list of items salvaged as part of the Waste Management Records.

3.6 SCHEDULE OF MATERIAL DISPOSAL & RECYCLING SERVICES

- A. The following list is provided for informational purposes only. Additional opportunities may be available. All information contained in this list is from the Austin Energy Green Building

Program. Shortcut to:

<http://www.austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/constructionWasteManagement.htm>

Contractor shall re-verify any crucial information prior to making arrangements that involve any of the firms listed.

Appendix A. Sample Construction Waste Management Plan

Construction Waste Management Plan

Project:
Contractor:
Date:
Contact:
Phone:
Prepared by:

*Diversion Goal: Salvage and recycle at least **<50% or 75%>** (by weight or volume) of land-clearing and construction waste*

Complete all sections below that are required by or pertinent to this project as outlined in the Construction Documents.

I. Coordination and Training

- a. Name of Contractor's representative responsible for CWM implementation & coordination:
- b. How will Contractor's staff and subcontractors be instructed and updated regarding demolition and construction phase **salvaging** activities?
- c. How will Contractor's staff and subcontractors be instructed and updated regarding proper **recycling and separation** procedures, and how will contamination of separated waste materials will be prevented?
- d. Describe and/or show on an attached site map where the temporary waste material storage area(s) will be located.
- e. Recycling and trash containers and areas shall be clearly marked in English and Spanish in order to avoid contamination. Architect's review and approval of the storage area(s) and signage will be required as part of the approval of this Construction Waste Management Plan.

II. Waste Minimization

- a. What waste minimization techniques will be employed during the construction phase? (See "Waste Minimization" subsection in specifications Section 01505, Construction Waste Management) _____

- b. Which employees and / or subcontractors will be involved with each technique?

III. Construction Waste Analysis (including site / land-clearing materials, as applicable)

- a. Diverted Materials:** For each of the materials anticipated to be reused or recycled (and thereby diverted from the landfill) to meet the minimum 75%_diversion goal, provide information to complete the table below. (Note: Whenever possible, please make efforts to use or donate usable construction waste materials rather than recycling.)

Material or Item	Storage Method (roll-off, bin, area, on pallet, etc.)	Quantity estimate (no., linear ft., square ft., etc.)	Proposed Recipient

Add rows (or paper pages) as required

- b. Landfill:** For construction phase trash and materials / items that will not be diverted, complete the following table:

Quantity estimate (weight or volume)	Number and size of roll offs anticipated	Proposed landfill site

Appendix B. Summary of Solid Waste Disposal and Diversion

Project name _____ Project Number _____
 Contractor Name _____ License Number _____
 Contractor Address _____

Solid Waste Material	Date Material Disposed/ diverted	Amount Disposed/ Diverted (Ton or cubic yd.)	Municipal Solid Waste Facility (Name, address, Phone)	Recycling/Reuse Facility Name Address Phone	Comment (If disposed state why not diverted)
Land Clearing Debris					
Asphalt					
Concrete					
Metal					
Wood					
Debris					
Glass					
Clay Brick					
Paper/Cardboard					
Plastic					
Gypsum					
Paint					
Carpet					
Other					
Other					

Signature _____ Date _____

END

CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN

Section 01510

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for construction indoor air quality, including:
 - 1. Construction Indoor Air Quality Management Purpose
 - 2. Construction Indoor Air Quality Procedures
 - 3. Construction Indoor Air Quality Submittals
- B. This section includes references to the following external documents:
 - 1. "IAQ Guidelines for Occupied Buildings Under Construction", Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), www.smacna.org, (703) 803-2980.
 - 2. "ANSI/AHSRAE 52.2-1999: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size", American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), www.ashrae.org, (800) 527-4723.

1.3 PURPOSE

- A. The intent of Construction IAQ (Indoor Air Quality) management is to reduce indoor air quality problems resulting from the construction process in order to help sustain the health and well-being of construction workers and building occupants.

1.4 PROCEDURES

- A. The Contractor shall make every effort to reduce pollutants throughout the construction process in order to achieve compliance with IAQ testing maximum concentrations discussed below. The most significant method for achieving success is through source control, that is:
 - 1. Install products and materials that are low- or zero-VOC, do not contain added formaldehyde, and are free of particulates
 - 2. Request in-factory flush-out from manufacturers wherever possible, to flush out pollutants before products arrive at the site
- B. The Contractor shall adopt an IAQ management plan to protect the HVAC system during construction, control pollutant sources, and interrupt contamination pathways.
- C. Contractor shall sequence the installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile, and gypsum wallboard.

Division 1 – General Requirements

- D.** Temporary HVAC units (independent of permanent ductwork and distribution systems) are recommended as the optimal method for achieving the Construction IAQ requirements. This allows permanent HVAC equipment to be fully protected. If contractor is utilizing permanent HVAC equipment for fresh air, heating, or cooling during construction, all air intakes shall be protected from incoming construction debris. Contractor shall use filtration media in all permanent air handling equipment during construction, and replace this media immediately before occupancy.
1. Regularly occupied spaces: Filtration media during and after construction shall have a Minimum Efficiency Reporting Value (MERV) of 13 as determined by ANSI/ASHRAE 52.2-1999. Obtain a diagram from MEP Engineer indicating location of all regularly occupied spaces.
 2. All other spaces: Filtration media during and after construction shall have a Minimum Efficiency Reporting Value (MERV) of 8 as determined by ANSI/ASHRAE 52.2- 1999.
- E.** The Contractor shall employ Green Housekeeping methods wherever practicable.
1. Use non-toxic cleaners per Green Seal: <http://www.greenseal.org/>
 2. Conserve energy by shutting off lights and HVAC in all areas except those currently being cleaned.

1.5 SUBMITTALS

- A.** With first Application for Payment, the General Contractor is to submit a draft Construction IAQ Management Plan. Architect will return plan with revisions or approval, to be resubmitted as many times as necessary for Architect's final approval. The plan shall be divided into 6 parts, addressing each of the following topics per "IAQ Guidelines for Occupied Buildings Under Construction", Sheet Metal and Air Conditioning Contractors' National Association (SMACNA); <http://www.smacna.org/> ; (703) 803-2980. The plan shall also include requirements described in "Procedures" above.
1. HVAC protection
 2. Source Control
 3. Pathway Interruption
 4. Housekeeping
 5. Filter Maintenance Schedule
 6. Scheduling
- B.** With subsequent Applications for Payment, the General Contractor is to submit documentation of IAQ procedures as follows:
1. Provide cut sheets of filtration media used during construction with MERV values highlighted (per ANSI/ASHRAE 52.2-1999). Fresh clean filters must be installed immediately prior to occupancy.

END

PART 1 - GENERAL

1.1 Related Documents:

Drawings and general provisions of Contract, including General Conditions, Section 00700, and Supplemental General Conditions, Section 00810, and Division 1 requirements.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 General

CONTRACTOR shall maintain reasonable local vehicular and pedestrian dust free traffic, including use of driveways, to proceed safely with minimum inconvenience, except during actual construction operations. CONTRACTOR provided flaggers shall assist traffic when a street is operating under a single lane. Two-way traffic shall be maintained at all other times unless otherwise authorized by Owner.

CONTRACTOR shall provide, at the work zone location during temporary traffic control installation, a designated Competent Traffic Control Person to ensure compliance with the traffic control plans and the provisions of the Contract. Training Certificates for the designated Competent Person shall be provided with submittals at the Precon. Training certificates for competent persons shall be good for four (4) years from the date of training. After such time the competent person must show that additional training or re-certification has been completed to maintain competent person status.

CONTRACTOR shall maintain a smooth and safe ride for traffic by placing steel plates with Asphaltic concrete berms, temporary fill or bridging and temporary surfacing with cold or hot-mix Asphaltic concrete paving in accordance with applicable City Standards.

Sidewalks shall not be obstructed, except by special permission of Owner or E/A. Access to private dwelling and to commercial establishments shall be provided at all times.

CONTRACTOR shall plan and execute his operations in a manner that will cause a minimum interference with traffic. The CONTRACTOR shall place and maintain in good condition, standard barricades at each end of the Project and at other locations where traffic is rerouted or blocked from using regular traffic lanes. Barricades and warning signs shall be in accordance with Texas Manual on Uniform Traffic Control Devices (MUTCD) and the City of Austin Transportation Criteria Manual.

Signs, barricades and warning devices informing public of construction features shall be placed and maintained by the CONTRACTOR who shall be solely responsible for their maintenance.

Unless otherwise specified elsewhere in Division 1, neither explosives nor blasting shall be permitted on this Project.

3.2 Traffic Control

3.2.1 It shall be the sole responsibility of the CONTRACTOR to furnish, install, maintain and remove barricades, detour signs, warning signs, lights and all regulatory traffic control devices of the size and type specified, at locations indicated, or as directed or approved by the OWNER in accordance with the

Division 1 – General Requirements

Texas Manual on Uniform Traffic Control Devices, (MUTCD), Part VI, Traffic Control for Street and Highway Construction and Maintenance Operations and the City of Austin Transportation Criteria Manual. Upon phase completion, the Contractor shall immediately revise the temporary traffic devices to reflect the next phase or if the project is complete remove them from the public right of way.

- 3.2.2 Throughout the life of the Contract, all existing roads and Traffic Control devices included in the Work shall be maintained by the CONTRACTOR to a condition, in the opinion of the OWNER, which is equal to or better than that which existed when Work commenced. Maintenance of existing roads and devices shall take priority over all other Work items and shall be subject to a seven-day-a-week, 24-hours-per-day time frame. The CONTRACTOR shall provide a smooth and safe riding surface for all vehicles along the route of this Project. This could include, but not be limited to, small cars, motorcycles, mopeds and bicycles. If the condition of the street surface deteriorates, for any reason, CONTRACTOR shall take necessary steps to insure immediate restoration.
- 3.2.3 During construction of streets, drainage, and utility projects, if conditions of existing street surface require maintenance to upgrade from their state when the Work began, a separate pay item may be included in Bid. Otherwise, maintenance work will not be paid for directly but will be considered subsidiary to various Bid items of this Contract.
- 3.2.4 In the event that CONTRACTOR fails, in opinion of OWNER, to maintain a smooth surface for public comfort, fails to provide ingress and egress to private property, and/or does not provide and maintain proper traffic control devices, OWNER may provide these services and deduct any cost thereof, including overtime and administrative expenses, from all estimates thereafter due the CONTRACTOR. Such action by the OWNER shall not relieve the CONTRACTOR of his liability to protect the public at construction site. Owner may also assess an investigation fee, as established by separate Fee Ordinance, for violations resulting in more than one deficiency report issued to Contractor.
- 3.2.5 A permit must be obtained from Texas Department of Transportation (TxDOT), prior to Work being performed on state highway routes passing through the City.
- 3.2.6 CONTRACTOR shall notify the Owner's Representative, Police Department, Fire Department, EMS, and Right of Way Management Division at least seven Calendar Days in advance of beginning proposed Work, with intention to close or partially block any street or any part thereof, or of any construction affecting free flow of traffic. The CONTRACTOR shall plan and adequately provide barricades and warning devices. The same parties shall be notified when normal traffic flow is restored.
- 3.2.7 Should the CONTRACTOR, in his operations, reduce an existing two-way roadway to less than 20 feet in width, CONTRACTOR shall provide a route through or around the narrowed area as approved by Owner or E/A.
- 3.2.8 The CONTRACTOR's Flaggers shall be required any time it is necessary for the CONTRACTOR's equipment to move into or across an open traffic lane, or at other such times as directed by the Owner's Representative. A flagger shall be utilized to aid exit of hauling equipment from open traffic lanes to the Work area, and entry of hauling equipment from Work area to open traffic

Division 1 – General Requirements

lanes. Flaggers shall be dressed and conduct operations in accordance with Texas Manual on Uniform Traffic Control Devices and the Transportation Criteria Manual. Flagging operations shall be the sole responsibility of the CONTRACTOR.

3.2.9 The CONTRACTOR and Subcontractors shall confine their activities to the immediate area of the construction site and provide the following:

- a. Appropriate temporary fences, barricades, and/or Metal Beam Guard Fence if required, for site work involving excavation, utility extensions, remote construction work or other circumstances involving safety of public or protection of the work in progress.
- b. Warning lights at open trenches, excavations, etc., during hours from dusk to dawn each day. Protection of structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations, from damages caused by settlement, lateral movement, undermining, washout and other hazards.

3.3 Spoil Disposal

CONTRACTOR may make other arrangements for spoil disposal subject to E/A evaluation of the CONTRACTOR-supplied proof that the Owner(s) of the proposed site(s) has a valid fill permit issued by the appropriate governmental agency. Finally, the CONTRACTOR shall submit a haul route plan including a map of the proposed route(s) for the E/A and Owner's approval.

3.4 Restoration

WATER AND WASTEWATER CONSTRUCTION REQUIREMENTS

3.4.1 In order to minimize environmental and potential flood impacts, the sum of the amount of trench opened in advance of the completed line and the amount of trench left unfilled at any time shall be restricted to one (1) full block or 300 linear feet, whichever is less.

3.4.2 Restoration shall be an on-going process during construction operations and shall immediately precede completion of construction of each successive section of the line, which shall not exceed 1,200 linear feet without approval of the E/A.

3.5 Street Markers and Traffic Control Signs

It shall be responsibility of the CONTRACTOR to remove, preserve and reset, as required, Street Marker and Traffic Control Signs that are within construction limits to the line and heights as described in Texas Manual on Uniform Traffic Control Devices before any sidewalks or street excavation is begun. Signs shall not be laid on the ground. No payment will be made for this work but shall be considered subsidiary to the various Bid items. Traffic Sign Activity Section of the Transportation Department (457-4850) shall be notified a minimum of five Working Days prior to completion of the Project so that signs may be checked for damage. Any damage to signs or posts shall be paid for by the CONTRACTOR.

3.6 Burning Permit

Open burning within City limits will not be allowed. Trench burning shall require a permit from the Fire Marshal. Burning permits outside City limits shall be obtained from the appropriate authority.

The CONTRACTOR shall secure and pay for all burning permits.

3.7 Driveways

Unless otherwise indicated, the approach grade of existing driveways shall be modified as indicated and as directed by the Owner's Representative. The OWNER will contact property owners whose driveways require grade modification beyond street right-of-way and the OWNER will obtain their concurrence for approach grade modification. Within the right-of-way, all driveways shall be replaced with concrete driveways. Outside the right-of-way, when approach grade modifications are required, flexible base shall be placed by the CONTRACTOR to resurface existing dirt or gravel driveways; asphalt and concrete drives shall be replaced in kind by the CONTRACTOR. Excavation, Flexible Base, Portland Cement Concrete and Asphaltic Concrete, used for driveways as prescribed above shall not be measured for payment but shall be considered subsidiary to various Bid items in the Contract unless payment is included as a separate Contract pay item.

3.8 Removal or Relocation of Fences and Sprinkler Systems

Removal or relocation of privately owned fences and sprinkler systems not specified in Bid, and within public right-of-way is the primary responsibility of the property owner. OWNER will cause property owners to be aware of any known conflicts and encourage them to make desired adjustments in advance of construction. In the event the property owner does not, or will not, make adjustments necessary for construction of improvements to be made under this Contract, CONTRACTOR, after receiving written approval from the OWNER, shall remove those portions that interfere with the Work, as follows:

3.8.1 Fences shall be disassembled, by hand, into hand manageable sizes and placed on the private property.

3.8.2 For sprinkler systems, the CONTRACTOR, after assuring that electrical and/or mechanical controls are disconnected, shall remove sprinkler heads, valves, controls, and any other miscellaneous items, including distribution pipe, or wire, saw cut from the system. The CONTRACTOR shall present these materials to the property owner. Where piping is cut, the pipe shall be permanently capped or plugged, unless otherwise directed by the OWNER.

Work for removal or relocation of fences and sprinkler systems shall not be paid for directly but shall be subsidiary to the various Bid items.

END

PART 1 -- GENERAL

1.1 SUMMARY

- A. General requirements for delivery storage, handling, and installation of products. All equipment furnished and installed under this contract to conform to the general stipulations set forth in this section except as otherwise specified in other sections of the specifications.

1.2 RELATED REQUIREMENTS

- A. Painting and Protective Coatings as called for on PLANS or specified elsewhere in this or other TECHNICAL SPECIFICATIONS Sections.
- B. Format: Other related work as called for on PLANS or specified elsewhere in this or other TECHNICAL SPECIFICATIONS Sections.

1.3 SUBMITTALS

- A. Submittal in compliance with Specifications Section 01300, "Submittals".
 - 1. Furnish a complete list of lubricants tabulated by equipment items.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Experience: No equipment to be supplied from any manufacturer not regularly engaged in the production of equipment of the size and character herein specified. Generally, vendor must have installed and had in satisfactory operation inside the continental United States, for a period of not less than three years, at least one unit of the size and design comparable to the units specified. Particular equipment may require more manufacturing experience. When so, the experience requirement is specified with the equipment.
- B. Coordination: Coordinate all details of the equipment with other related parts of the Work, including verification that all structures, piping, wiring, and equipment components are all compatible. Perform all structural and other alterations in the work required to accommodate equipment differing in dimensions or other characteristics from that contemplated in the Contract Drawings or Specifications. No extra compensation will be allowed because of difference between actual dimensions and measurements indicated on the working drawings.
- C. Provide the services of a technical representative for furnished equipment, for a sufficient period to assist in start-up and initial adjustment of all equipment, and to train, advise, and consult with OWNER'S operating personnel.
- D. All items of equipment required under this contract to include literature explaining "Operations and Maintenance" of that item of equipment. If a manufacturer does not print such a standard O&M manual, contractor to provide OWNER with a manual, approved in writing by the manufacturer.
- E. Workmanship and Materials; Guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship, or materials, and leakage, backstage or other failure. Materials to be suitable for service conditions.

Division 1 – General Requirements

F. All equipment to be designed fabricated, and assembled in accordance with the best modern engineering and shop practice. Individual parts to be manufactured to standard sizes and gages so that repair parts, furnished at any time, can be installed on the field. Like parts of duplicate units to be interchangeable. Equipment is not to have been in service at any time prior to delivery, except as required by tests.

G. Except where otherwise specified, structural and miscellaneous fabricated steel used in equipment to conform to AISC standards. All structural members to be design for shock and vibratory loads. Unless otherwise specific, all steel which will be submerged, all or in part, during normal operation of the equipment to be at least ¼-inch thick.

H. Maintenance and Repair Facility: Equipment and manufacturers to have maintenance and repair facilities established and in operation in the continental United States for a period of not less than three years. Such facilities to be fully equipped and staffed with qualified personnel for making repairs of equipment provided under this contract. The facilities to carry a full time of normal maintenance spare parts.

1.5 PREPERATION FOR SHIPMENT

- A. When practical, factory assemble products. Matchmark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with a strippable protective coating.
- B. Equipment to be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. Mark or tag outside of each package or create to indicate its purchase order number, bill of lading number, contents by name, name of project and CONTRACTOR, equipment number, and approximate weight. Include complete packing lists and bills of materials and bills of materials with each shipment.
- C. Protect from exposure to the elements and keep thoroughly dry and dust free at all times. Painted surfaces to be protected against impact, abrasion, discoloration, and other damage. Apply grease and lubricating oil to all bearings and similar items.
- D. Tag or mark each item of equipment as identified in the delivery schedule or on the Shop Drawings.
- E. Spare Parts, Special tools, Test equipment, Expendables, and Maintenance Materials:
 - 1. Furnished as required by the Specifications prior to:
 - a. Starting functional testing; or
 - b. Operation at the equipment by the OWNER; or
 - c. At 75% percent of Project Completion, whichever comes first.
 - 2. Properly packaged to avoid damage, in original cartons insofar as possible. Replace parts damaged or otherwise inoperable.
 - 3. Firmly affix to, and prominently display on, each package.
 - a. Minimum 3-inch by 6-inch manila shipping tag with the following information printed clearly:
 - 1) Manufacturer's part description and number.
 - 2) Applicable equipment description.
 - 3) Quantity of parts in package.
 - 4) Equipment manufacturer

Division 1 – General Requirements

- 5) Applicable Specification Section.
 - 6) Name of Contractor.
 - 7) Project Name.
4. Delivery materials to site.
 5. Notify ENGINEER/OWNER upon arrival.

- F.** Bare steel: Where steel components of equipment are specified to be shipped bare for field painting, such exposed steel to be sandblasted and primed, in accordance with the specifications.

1.6 DELIVERY AND INSPECTION

- A.** Deliver products in accordance with the accepted current progress schedule and coordinate to avoid conflict with Work and conditions at the site. Deliver anchor bolts and templates sufficiently early to permit setting prior to placement or structural concrete.
- B.** Deliver products in undamaged condition, in manufacturer's original container or packaging, with identifying labels intact and legible. Include on label date or manufacture and shelf life, where applicable. Include UL labels on products so specified.
- C.** Coordinate with the OWNER the delivery of the material at the site for storage, CONTRACTOR is responsible for acceptance of delivery of materials and supplies by his own personnel. OWNER will not accept delivery of materials for the CONTRACTOR. Make arrangements with suppliers and shipping agencies for delivery to the proper locations.
- D.** Unload products in accordance with manufacturer's instructions for unloading, or as specified. Record the receipt of products at the site. Inspect for completeness and evidence of damage during shipment.
- E.** Examine all materials furnished at the time and place of delivery and reject all noncompliant (with specifications), and/or defective or damaged material.
- F.** Remove noncompliant and/or damaged products from the site and expedite delivery of identical new undamaged products and remedy incomplete or lost products to provide that specified, so as not to delay the progress of the work.

1.7 HANDLING, STORAGE AND PROTECTION

- A.** Handle products in accordance with the manufacturer's written instructions, and in a manner to prevent damage. Store products, upon delivery, in accordance with manufacturer's instructions, with labels intact and legible, in approved storage yards or sheds. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by OWNER.
- B.** Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specific conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered but not installed in the Work.
- C.** Store electrical, instrumentation, control products, and equipment with bearings in weather-tight structures maintained above 60 degrees F. Protect electrical, instrumentation, and control products, and insulation against moisture, water, and

Division 1 – General Requirements

- dust damage. Connect and operate continuously **all** space heaters furnished in electrical equipment.
- D. Store fabricated products aboveground, on blocking or skids, and prevent soiling or staining. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter. Cover products that are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
 - E. Store finished products that are ready for installation in dry and well-ventilated areas. Do not subject to extreme changes in temperature or humidity. Protect shafts and couplings of motors with rust-protective compound and store under cover.
 - F. Hazardous Materials: Prevent contamination of personnel, the storage building, and the site. Meet the requirements of the product specifications, codes, and manufacturer's instructions.
 - G. Care in Handling; Handle all equipment with care at all times to prevent damage. Use proper hoisting equipment, slings, and temporary supports.

1.8-1.11 (NOT USED)

PART 2 PRODUCTS

2.1 MANUFACTURER(S) (NOT USED)

2.2 MATERIALS AND/OR EQUIPMENT

A. General

1. Materials and equipment as specified under separate sections of TECHNICAL SPECIFICATIONS or as shown on PLANS.
2. Furnish new and unsaved materials and equipment. Like items of products furnished and installed in the Work to be end products one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, and manufacturer's services.
3. All materials of construction to be as regularly furnished by the equipment manufacturer for the subject item, unless otherwise specified in the Specifications Sections.
4. Where product specifications include a named manufacturer, with or without model number, and also include performance requirements, named manufacturer's products must meet the performance specifications.
5. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
6. Provide interchangeable components of the same manufacture, for similar components, unless otherwise stated.
7. Equipment components, systems, subsystems,; Design and manufacture with due regard for health and safety of operation, maintenance, and accessibility, durability of parts, and comply with applicable OSHA, state, and local health and safety regulations.

Division 1 – General Requirements

8. Provide materials and equipment listed by UL wherever standards have been established by that agency.
 9. Lubricant: Furnish three months' supply of lubricants in 5-gallon, or smaller, containers, Lubricant to be "name" brand available from local sources, and subject to approval of owner.
- B. Drive Units; The nominal input horsepower rating of each gear or speed reducer to be at least equal to the nameplate horsepower to the drive motor. Drive units to be designed for 24-hour continuous service.
1. Gearmotors: Gearmotors to be rated AGMA Class II and to bear an AGMA nameplate.
 2. Gear Reducers: Each gear reducer to be totally enclosed, oil lubricated, with antifriction bearings throughout. Worm gear reducers to have a service factor of at least 1.20. Shaft mounted gear reducers to be rated AGMA Class II. Other helical, spiral bevel, and combination bevel-helical gear reducers to have a service factor of at least 1.50. Each gear reducer to bear an AGMA nameplate.
 3. Variable Speed Drives: Each variable speed drive to have a service factor of at least 1.75 at maximum speed. Provide a spare belt with each variable speed drive unit employing a belt for speed change. Unless specifically, permitted by the detail equipment specifications, bracket type mounting is not acceptable for variable speed drives.
 4. V-belt Drives: Each V-belt drive to include a sliding base of other suitable tension adjustment. V-belt drives to have a service factor of at least 1.6 at maximum speed.
- C. Safety Guards: All belt or chain drives, fan blades, couplings, and other moving or rotating parts to be covered on all sides by a safety guard. Unless otherwise noted in individual Specifications Sections, safety guards to be fabricated from 16 USS gage or heavier galvanized or aluminum-clad sheet steel or galvanized expanded metal. Design guards for easy installation and removal. All necessary supports and accessories to be provided for each guard. Supports and accessories, including bolts, to be galvanized. Safety guards in outdoor locations to be designed to prevent the entrance of rain and dripping water.
- D. Anchor Bolts
1. Equipment Suppliers to furnish suitable anchor bolts for each item of equipment. Anchor bolts, together with templates or setting drawings, to be delivered sufficiently early to permit setting the anchor bolts when the structural concrete is placed. Unless otherwise specified, anchor bolts to have a minimum diameter of $\frac{3}{4}$ -inch.
 2. Unless otherwise indicated or specified, anchor bolts for items of equipment mounted on baseplates to be long enough to permit 1-1/2 inch of grout beneath the baseplate and to provide adequate anchorage into structural concrete.
- E. Equipment Bases: Unless otherwise indicated or specified, all equipment to be installed on concrete bases at least 6 inches high. Cast iron or welded steel baseplates to be provided for pumps, compressors, and other equipment. Each unit and its drive assembly to be supported on a single baseplate of neat design. Baseplates to have pads for anchoring all components and adequate grout holes. Baseplates for pumps to have a means for collecting leakage and a threaded drain connection. Baseplates to be anchored to the concrete base with suitable anchor bolts and the space beneath filled with grout.

Division 1 – General Requirements

- F. Special Tools and Accessories: Equipment requiring periodic repair and adjustment to be furnished complete with all special tools, instruments, and accessories required for proper maintenance. Equipment requiring special devices for lifting or handling to be furnished complete with those devices.
- G. Shop Painting
1. General: All steel and iron surfaces to be protected by suitable paint or coatings applied in the shop. Surfaces, which will be inaccessible after assembly to be protected for the life of the equipment. Exposed surfaces to be finished smooth, thoroughly cleaned, and filled as necessary to provide a smooth uniform base for painting. Electric motors, speed reducers, and other self contained or enclosed components to be shop primed or finished with a high-grade oil-resistant enamel suitable for coating in the field with an alkyd enamel. Coatings to be suitable for the environment where the equipment is installed.
 2. Equipment Finish:
 - a. Provide manufacturer's standard finish and color, except where specific finish or color is indicated.
 - b. If manufacturer has no standard color, provide equipment with ANSI No. 61, light gray color.

2.3 FABRICATION

A. General

1. Manufacturer parts to USA standard sizes and gauges.
2. Two or more items of the same type to be identical, by the same manufacturer, or interchangeable.
3. Design structural members for anticipated shock and vibratory loads.
4. Modify standard products as necessary to meet performance Specifications.

B. Lubrication System

1. Require no more than weekly attention during continuous operation.
2. Convenient and accessible. Oil drains with bronze or stainless steel valves and fill plugs easily accessible from the normal operating area or platform. Locate drains to allow convenient collection of oil during oil changes without removing equipment from its installed position.
3. Provide constant-level oilers or oil level indicators for oil lubrication systems.
4. For grease type bearings, which are not easily accessible, provide and install stainless steel bearings, which are not easily accessible, provide and install stainless steel tubing; Provide one grease line per fitting. One line for multiple fittings is not acceptable.
5. Install oil fill tubes and drain plugs where such are not provided on equipment.

2.4 SOURCE QUALITY CONTROL

- A.** Where Specifications call for factory testing to be witnessed by ENGINEER not less than 14 days prior to scheduled test date unless otherwise specified.
- B.** Calibration Instruments: Bear the seal of a reputable laboratory certifying that instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institution of standards and Technology.

PART 3 EXECUTION

3.1 GENERAL (NOT USED)

3.2 PREPERATION

- A.** Preparation of Concrete for Equipment; Set anchor bolts to certified and approved shop drawings only, unless otherwise directed. Where necessary, provide wood or steel templates. Survey **all** concrete layouts before pouring and make certain that all required or necessary sleeves, inserts, and conduit are in place and secured.
- B.** Lubrication: Completely lubricate all equipment prior to operation. Use only manufacturer's recommended lubricant for each application. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by OWNER.

3.3 ERECTION/INSTALLATION/APPLICATION AND/OR CONSTRUCTION

- A.** Equipment Drawings show general locations of equipment devices, and raceway, unless specifically dimensioned.
- B.** Equipment is not to be installed or operated except by, or with the guidance of, qualified personnel having the knowledge and experience necessary for proper installation and/or operation. When employees of CONTRACTOR or his Subconsultants are not qualified, such personnel to be field representatives of the manufacturer to the equipment or materials being installed.
- C.** Installation: Install each type of equipment in strict accordance with good practice and in compliance with approved printed instructions of manufacturer. CONTRACTOR to provide, and have available at all times, copies of such printed documents.
- D.** Grouting Equipment: Materials and general procedures for grouting equipment are found in applicable concrete sections. Follow approved manufacturer's recommendation for equipment requiring special procedure.
- E.** Repaint painted surfaces that are damaged prior to equipment acceptance.

Division 1 – General Requirements

- F.** Handle, install, connect, clean, condition, and adjust records in accordance with manufacturer's instructions may be specified. Retain a copy of manufacturers' instruction at site, available for review at all times.
- G.** For Material and Equipment specifically indicated or specified to be reused in the Work:
 - 1.** Use special care in removal, handling, storage, and reinstallation to assure proper function in the completed work.
 - 2.** Arrange all transportation, storage, and handling of products that require offsite storage, restoration, or renovation. Include costs for such work in the contract price.

3.4 EQUIPMENT CHECK-OUT

As soon as equipment is erected and lubricated, perform initial check-out and adjustments to ensure that everything is in working order. Protect all parts as necessary to prevent corrosion or deterioration until final painting.

3.5 FIELD QUALITY CONTROL

- A.** Qualified manufacturer's field representatives to be provided by the equipment manufacturer to perform all manufacturers' field service- called for in the specifications. At a minimum, manufacturers' field representative to perform the following:
 - 1. Observe the installation
 - 2. Instruct, guide, and direct CONTRACTOR's erection or installation procedures:
 - 3. Perform an installation check and prepare "Equipment Installation Report", and
 - 4. Instruct the OWNER's personnel in the proper operation and maintenance procedures for the equipment.

Field representatives to revisit the site as often as necessary to complete installation and services satisfactory to OWNER/ENGINEER.

- B.** Each manufacturer's representative to furnish written report certifying that the equipment has been properly installed and lubricated; is inaccurate alignment; is free from an undue stress imposed by connecting piping or anchor bolts; and has been operated under full load conditions and that it is operated satisfactorily.
- C.** Performance Testing: When the specifications require the presence of ENGINEER. Initial tests to be observed or witnessed by ENGINEER, OWNER to be reimbursed by CONTRACTOR for all costs of subsequent visits by ENGINEER to witness or observe incomplete tests, retesting, or subsequent tests.

3.6 ADJUSTMENT AND CLEANING

Perform required adjustments, tests, operation checks, and other startup activities.

3.7 FIELD FINISHING

Division 1 – General Requirements

In accordance with individual Specification Section.

3.8 TESTING AND PLACING IN SERVICE

- A. All equipment installed under this contract to be placed into successful operation according to the written instructions of the manufacturer or the instructions of the manufacturers' field representative. All required adjustments, tests, operation checks, and other startup activity to be provided.

- B. Testing and Adjustments: Complete all preliminary check-out and testing operations. Make necessary adjustments.

- C. Initial Operation: Perform initial operation of process equipment with water. Make final adjustments.

3.9-3.10 (NOT USED)

3.11 MEASUREMENT AND PAYMENT

No separate measurement or payment for work performed under this section. Include cost of same in contract price bid for work of which this is a component part.

END OF SECTION

PART 1 -- GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. General

1. When required by individual Specification Sections, submit Operation and Maintenance (O&M) data, which is specifically applicable to the scope of work and is a complete and concise depiction of the provided equipment or product. Data containing extraneous information that has to be sorted through to find applicable instructions will not be accepted. Present information in sufficient detail to clearly explain user O&M requirements at the system, equipment, and component level. Include an index preceding each submittal.
2. Package Content: For each product, system, or piece of equipment requiring submission of O&M data, submit the package required in the individual Specification Section. Package content to be as required in Paragraph 1.03, "Schedule of Operations and Maintenance Data Packages" of this Section.
3. Furnish four (4) draft Operations and Maintenance Manuals explaining the proper installation, operation, and maintenance for each piece of equipment supplied. Draft O&M Manuals will be reviewed by the ENGINEER for compliance with this Section. One (1) draft O&M Manual will be returned to CONTRACTOR noted as either "Revise & Resubmit" or "No Exception Taken".
4. CONTRACTOR to check and approve O&M Manuals for compliance with requirements of Contract and will so certify by placing CONTRACTOR stamp of approval on each manual prior to submitting to ENGINEER. Any manual submitted without CONTRACTOR's stamp will not be reviewed and will be promptly returned for proper submission. OWNER may assess CONTRACTOR a charge for reviews of same items in excess of three (3) times.
5. After all O&M Manuals are in acceptable form, CONTRACTOR to furnish to the ENGINEER eight (8) bound, complete sets of Operation and Maintenance Manuals consisting of printed material previously accepted by the ENGINEER for this purpose. Manuals are to be bound in a heavy duty, fabric reinforced fiberboard, three post, expandable binder with a maximum binding width of 5". Three-ring vinyl reinforced binders will not be acceptable. Manual to have information listed in Paragraph 1.01 B.1 printed on the front cover as well as the binder spine. Each binder to have an index outlining all information in the set of volumes.
6. Final retainage will not be released until the Operation and Maintenance Manuals have been submitted and recommended by the ENGINEER.
7. Provide one (1) thumb driver and one (1) CD with O&M manual in searchable PDF format.

B. Format

1. Provide each manual with a project name, volume number, number of volumes in the set, project number, and date.
2. Furnish each volume with a complete index for all volumes in the set. The index is to indicate the volume and section for each piece of equipment.
3. Manuals to be limited to page sizes of 8½" × 11" or drawings folded into such size.

Division 1 – General Requirements

- 4.** Materials in manuals to be suitable for photographic reproduction. Where copies of identical material are included, clarity and quality of copies to be equal to the original, square to the page. Faxed copies will not be accepted.
- 5.** Manuals to be customized to describe the equipment actually furnished. Manufacturer's pre-printed literature may be accepted provided it has been modified by underlining the specific model used.
- 6.** Divide manuals into sections paralleling the equipment specifications.
- 7.** The front of each section to have a cover sheet indicating the CONTRACTOR performing the installation, local suppliers name, address and phone number of each piece of equipment in the section.
- 8.** In addition to drawings supplied in the equipment sections, provide an additional, legible copy of all vendor supplied drawings for each piece of equipment in a separate binder and include as a drawing volume in the O&M manual set.
- 9.** Binders: All draft O&M Manuals are to be bound in a folder or 3-ring binder. Unbound, stapled, or clipped submittals will not be accepted for review. Maximum width of any single draft equipment O&M Manual is 4-inches.

1.2 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

A. Maintenance Summary Form

- 1.** General: All Operations and Maintenance Manuals are to include a Maintenance Summary Form in the format and style of the example form attached to this Section as Attachment A. Manuals will not be accepted for review without this form. The Maintenance Summary Form is to be a typed document prepared by the equipment manufacturer specifically for the equipment furnished. Title and subheadings are to be as shown on Attachment A – they are not to be modified. If a subheading is not applicable to the specific piece of equipment, it is to be noted by the words "Not Applicable" after the heading. Additional notes and comments may be added to the end of the form at the manufacturer's discretion.
- 2.** Format:
 - a.** Size: 8½" × 11" (portrait orientation only).
 - b.** Margins: Top - 1", Left - 0.75", Right - 0.75", Bottom - 0.75".
 - c.** Font:
 - 1)** Title: Arial - 16 point - bold.
 - 2)** Subheadings: Arial - 12 point - bold.
 - 3)** Text: Arial - 12 point - regular.
 - 4)** Tables: As shown in Attachment A - minimum text size Arial - 10 point - regular.
- 3.** Specific Instructions:
 - a.** Equipment Item: Include generic name for equipment along with service and specification reference.
 - b.** Manufacturer: List manufacturer's physical address for shipping and receiving and mailing address (if different from physical address). Include telephone number and facsimile telephone number.

Division 1 – General Requirements

- c.** Equipment Identification Number(s): Provide list of equipment serial numbers cross-referenced to equipment tag numbers in tabular form. When multiple items are provided, list each item separately.
 - d.** Total Weight: Note the assembled weight of the equipment.
 - e.** Nameplate Data: Reproduce the nameplate data exactly as it appears on the equipment. For driven equipment, include the driver nameplate data.
 - f.** Manufacturer’s Local Representative: Provide the name, address, and phone numbers of the local representative.
 - g.** Maintenance Requirements:
 - 1)** Maintenance Operation: List briefly each maintenance operation required to maintain warranty in effect and refer to specific information in manufacturer’s standard maintenance manual.
 - 2)** List required frequency of each maintenance operation.
 - 3)** Refer by symbol to lubricant list.
 - h.** Lubricant List: List each recommended lubricant by symbol, noting generic type of lubricant, and a minimum of two manufacturers. The Owner has a standing supply contract with Exxon/Mobil. The recommended lubrication products shall include a specific cross reference to an equivalent Exxon (Mobil) product.
 - i.** Spare Parts: Include recommendations regarding what spare parts, if any, should be maintained on site for routine maintenance.
 - j.** CONTRACTOR’s Job Order: Identify CONTRACTOR’s purchase order number.
 - k.** Closest Service Technician: Identify the closest, factory trained, and authorized, service technician by name, address and telephone number. Include pager number if applicable.
 - l.** Closest Parts and Service Center: List closest factory authorized parts and service center, the physical address for shipping and receiving and mailing address (if different from physical address). Include telephone number and facsimile telephone number.
- B.** Warranty Data Collection Sheet: Provide completed warranty data collection sheet included as Attachment B. Sheet to be provided any time that a warranty period is initiated per CONTRACT DOCUMENTS. Provide data for all tagged equipment and components.
- C.** Operating Instructions: Include specific instructions, procedures, and illustrations for the following phases of operation.
- D.** Safety Precautions: List personnel hazards and equipment or product safety precautions for all operating conditions.
- E.** Normal Operations: Include control diagrams with data to explain operation and control of equipment.
- F.** Service Requirements: Include instructions for services to be performed such as adjustments and inspection.
- G.** Environmental Conditions: Include a list of environmental conditions (temperature, humidity, and other relevant data) for each product or piece of equipment under which it is best suited to operate.

Division 1 – General Requirements

- H.** Preventative Maintenance: Preventative Maintenance Plan and Schedule to include manufacturer's schedule for routine preventative maintenance and inspections required to ensure proper and economical operation and to minimize corrective maintenance and repair. Provide manufacturer's projection of preventative maintenance man-hours on an annual basis.
- I.** Corrective Maintenance:
- 1.** Troubleshooting Guides and Diagnostic Techniques: Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or requires replacement.
 - 2.** Wiring Diagrams and Control Diagrams: Wiring diagrams and control diagrams to be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and the terminals for each type, identically to actual installation numbering. Furnish control schematics reproduced from control schematics shown on PLANS with modifications as required, but not redrawn or redesigned in another format.
 - 3.** Maintenance and Repair Procedures: Include instructions and list tools required to restore product or equipment to proper condition or operating standards.
 - 4.** Removal and Replacement Instructions: Include step-by-step procedures and list required tools and supplies for removal and replacement of components, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions to include a combination of text and illustrations.
 - 5.** Spare Parts and Supply Lists: Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays.
 - 6.** Corrective Maintenance Man-Hours: Include manufacturer's projection of corrective maintenance man-hours. Corrective maintenance that requires participation of the equipment manufacturer to be identified and tabulated separately.
 - 7.** List of all protective relays, breaker types, cable and fuse sizes and settings (where applicable).
 - a.** Protective Relays: Provide information on the relay type used and time current curves.
 - b.** Breakers: Provide catalog numbers and breaker trip curves.
 - c.** Cables: Provide cable size, cable type and length of each cable installed.
 - d.** Power Fuses: Provide fuse catalogue number, rating and fuse curve.
 - 8.** Documentation of field functional tests and performance test described in the specifications. Include the test results and calibration reports of all equipment.
 - 9.** Renewal Parts Bulletin: Include parts lists pertinent to the components used in the installation.
 - 10.** Calibration data sheet including set points: Include all calibration data sheets.

Division 1 – General Requirements

J. Appendices: Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

- 1.** Parts Identification: Provide identification and coverage for all parts of each component and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without any further identification required. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations and separate listing to show the index, reference, or key number which will cross-reference the illustrated part to be the listed part. Parts shown in the listings to be grouped by components.
 - a.** Manufacturer’s Standard Commercial Practice (MSCP): The parts data may cover more than one model or series of equipment, components, attachments, or accessories, such as a master parts catalog, in accordance with the manufacturer’s standard commercial practice.
 - b.** Other than Manufacturer’s Standard Commercial Practice (MSCP): Final assembly manufacturer may add a cross-reference to implement components’ assemblies and parts requirements when implementation in manual form varies significantly from the style, format, and method of manufacturer’s standard commercial practice. Use the format in the following example:

Final Assembly Manufacturer’s Alphanumeric Sequence	Actual Manufacturer’s Name and MSCP	Actual Manufacturer Part No.
100001	John Doe & Co. 00000	2000002

- 2.** Warranty Information: List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or Contract documents to keep warranties in force.
- 3.** Testing Equipment and Special Tool Information: Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

1.3 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

A. Furnish the O&M data packages specified in individual technical sections. The required information for each O&M data package is as follows:

- 1.** Maintenance Summary Form;
- 2.** Safety precautions;
- 3.** Normal operations;
- 4.** Environmental conditions;
- 5.** Preventive maintenance plan and schedule;
- 6.** Troubleshooting guides and diagnostic techniques;
- 7.** Maintenance and repair procedures;
- 8.** Removal and replacement instructions;

Division 1 – General Requirements

9. Wiring diagrams and control diagrams;
10. Spare parts and supply list;
11. Parts identification;
12. Warranty information;
13. Testing equipment and special tool information; and
14. Approved and corrected shop drawings showing “as-built” conditions.

1.4 SPECIAL SUBMITTAL REQUIREMENTS

- A. All drawings, cross-sectional view drawings, wiring diagram drawings, connection detail drawings, physical layout and detail drawings, elevations, etc., shall be developed electronically using AutoCAD® Release 14 software (or latest AutoCAD® Release).
- B. All Bill of Material sheets and/or tables indicating product data, quantities, physical location and reference, catalog number, reference, wiring diagram drawing number reference, cost, and any other field entered in the bill of materials sheet and/or any other spreadsheets and/or any other table and/or listings of references, etc., shall all be electronically developed and submitted in a database format, using the latest version of Microsoft® Excel software. This applies to all summary sheets, material listings, etc., to be submitted for this Project. Submittals shall include hard-copies and an electronic version developed in Microsoft® Excel. Electronic version shall be submitted on CD-ROM.
- C. AutoCAD® drawings shall be developed in full adherence to the formats and drawing standards defined in the Water Treatment Plant No. 4 CADD Manual. A copy of the manual may be obtained from the City of Austin Water & Wastewater Utility or from Carollo Engineers, Inc. Any drawing that is developed or customized for this project by CONTRACTOR, Subcontractor, Supplier or Manufacturer shall be developed in or converted to AutoCAD format and shall be submitted in both electronic AutoCAD format and hard copy with the O&M Manual.
- D. All Operation and Maintenance - Maintenance Instruction Manuals, catalog sheets, product and component data sheets, and factory and on-site (field) test reports/data shall be submitted in bound hard-copies and electronic copies. Electronic copies shall be in the source software, where possible, including MS Word, Excel, or AutoCAD. Other documents not prepared using these software packages shall be submitted in Adobe Acrobat® (*.pdf files) latest edition, and shall be submitted on CD-ROM.
- E. Binders and File Organization of the Electronic Copies: Clearly label each CD-ROM copy of the electronic version of the O&M Manuals. The CD-ROM volume numbers, organization of the electronic files contained within, and labeling formats shall match and be identical to those of the hard-copies. Additionally, in each electronic volume (a CD-ROM), a navigation tool shall be installed that shall guide and navigate the user to open and/or close a desired section and/or subsection (within each volume) simply by clicking on the section/subsection name and number. Install a hard copy of the table of contents in the case (enclosure) of each CD-ROM and CD-ROM copies. All labels and tables of contents shall be neatly typed and labeled. Handwritten labels and/or tables of contents will not be accepted. Organize each set (a complete series) of O&M electronic copies in a CD-ROM hard-plastic case with locking and hinged cover. Install a neatly typed label on each case that shall provide all the information required to be listed on the cover of the O&M Manuals by these Specifications.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- PART 3 EXECUTION

3.1 O&M DATA PACKAGES

Furnish a draft O&M data package for equipment a minimum of four (4) weeks prior to conducting operator training on the equipment. Draft O&M data packages to include, at a minimum, the information defined in Paragraphs 1.03 A.1 through 1.03 A.8.

3.2 - 3.10 (NOT USED)

3.11 MEASUREMENT AND PAYMENT

No separate measurement or payment for work performed under this Section. Include cost of same in Contract price bid for work of which this is a component part.

ATTACHMENT A

MAINTENANCE SUMMARY FORM

1. **EQUIPMENT ITEM:**
2. **MANUFACTURER INFORMATION:**
3. **EQUIPMENT IDENTIFICATION NUMBER(S):**

<i>Equipment Tag Number</i>	<i>Equipment Serial Number</i>	<i>Driver Serial Number</i>

4. **TOTAL WEIGHT:**
5. **NAMEPLATE DATA (HP, Voltage, Speed, etc.):**
6. **MANUFACTURER’S LOCAL REPRESENTATIVE:**

7. **MAINTENANCE REQUIREMENTS:**

<i>Maintenance Operation</i>	<i>Frequency</i>	<i>Lubricant (if applicable)</i>	<i>Comments</i>

8. **LUBRICANT LIST:**

9. **SPARE PARTS:**

<i>Part Description</i>	<i>Quantity</i>	<i>Part Number</i>

10. **CONTRACTOR’S JOB ORDER:**
11. **CLOSEST SERVICE TECHNICIAN:**
12. **CLOSEST PARTS AND SERVICE CENTER:**

Division 1 – General Requirements

Warranty Data Collection Sheet

<i>Facility</i>		<i>Tagging</i>	<i>Project Number</i>			<i>MRC</i>					
<i>Equipment Description</i>	<i>Manufacturer</i>	<i>Equipment Tag</i>	<i>Model</i>	<i>Serial Number</i>	<i>Ship Date</i>	<i>Install Date</i>	<i>Start Date</i>	<i>Expiration Date</i>	<i>Start Reading</i>	<i>Expiration Reading</i>	<i>Service Contract Available?</i>
											<input type="checkbox"/> Check
											<input type="checkbox"/> Check
											<input type="checkbox"/> Check
											<input type="checkbox"/> Check
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END

PROHIBITION OF ASBESTOS-CONTAINING MATERIALS

Section 01900

ARTICLE 1 - GENERAL

1.1 RELATED DOCUMENTS

The following documents are a part of this section:

All documents in Bidding Requirements, Contract Forms and Conditions of the Contract.

Other sections of Division 1 - General Requirements apply to this section.

1.2 DESCRIPTION AND INTENT OF THE WORK

No asbestos containing material (ACM) shall be brought onto the Project site, and/or incorporated into the Project construction without the written consent of the OWNER. Any asbestos containing material found at any time including after contract completion, to have been brought onto the site or incorporated into the Project construction by the CONTRACTOR, or any Subcontractors, Sub-Subcontractors or Suppliers, shall be removed and disposed of in accordance with the then current governmental regulatory standards.

All costs associated with the inspection, sampling, testing, removal and disposal of ACM as described above shall be paid by the CONTRACTOR.

1.3 DEFINITIONS

ASBESTOS: The asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite) cummingtonite-grunerite (amosite), anthophyllite, actinolite and tremolite.

ASBESTOS CONTAINING MATERIAL (ACM): Any material containing more than one percent (1%) by weight of asbestos of any type or mixture of types.

ASBESTOS CONTAINING BUILDING MATERIAL (ACBM): Any material used in the construction of, or incorporated into the construction of, any building that contains more than one percent (1%) by weight of asbestos of any type or mixture of types.

MSDS: A material safety data sheet (MSDS) is a form containing data regarding the properties of component substances that comprise a manufactured product. They are a basic hazard communication tool that gives details on chemical and physical dangers, safety procedures, and emergency responses for chemicals.

1.4 QUALITY ASSURANCE

PROHIBITION OF ASBESTOS CONTAINING MATERIALS

The E/A has been instructed to not permit any asbestos containing materials to be specified, requested or approved for use in conjunction with this Project.

Division 1 – General Requirements

The E/A has signed the following:

- A. 01900A Statement of Non-Inclusion of Asbestos Containing Material (E/A, Prior to Design): stating that the Engineer/Architect shall not specify, request or approve any ACM in this Project without prior written approval of OWNER.
- B. 01900B Statement of Non-Inclusion of Asbestos Containing Material (E/A, After Design): stating that the Engineer/Architect has not specified, requested or approved any ACM in this Project without the prior written approval of the OWNER, and that any ACM allowed in this Project is identified in the Statements.

These Statements are included in the Construction Documents.

ASBESTOS CONTAINING MATERIALS PROHIBITED FROM SITE

No asbestos containing materials will be permitted as part of the Project construction. The following list is intended to be used as a general guide to show which types of materials are suspected to contain asbestos:

- Cement Pipes
- Cement Wallboard
- Cement Siding
- Asphalt Floor Tile
- Vinyl Floor Tile
- Vinyl Sheet Flooring/vinyl wall coverings
- Flooring Backing
- Construction Mastics (floor tile, carpet, ceiling tile, etc.)
- Acoustical Plaster
- Decorative Plaster / stucco
- Textured Paintings/Coatings
- Ceiling Tiles and Lay-in Panels
- Spray-Applied Insulation
- Blown-in Insulation
- Fireproofing Materials
- Taping Compounds (thermal)
- Packing Materials (for wall/floor penetrations)
- High Temperature Gaskets
- Laboratory Gloves
- Fire Blankets
- Fire Curtains
- Elevator Equipment Panels
- CMU block fill materials
- Laboratory hoods/tabletops
- Elevator Brake Shoes
- HVAC Duct Insulation
- Boiler Insulation
- Breeching Insulation
- Ductwork Flexible Fabric Connections
- Cooling Towers
- Pipe Insulation (corrugated air-cell, block, etc.)
- Heating and Electrical Ducts
- Electrical Panel Partitions
- Electric Cloth
- Electric Wiring Insulation
- Chalkboards
- Roofing Shingles / tiles / membranes
- Roofing Felt
- Roof Coatings
- Base Flashing
- Thermal Paper Products
- Fire Doors
- Caulking/Putties
- Adhesives / mastics
- Wallboard
- Joint Compounds
- Spackling Compounds

If any of these suspect materials are specified for use on the Project, and if they do not have specific labelling identifying them as asbestos free, then the CONTRACTOR shall notify the OWNER immediately. Laboratory analysis of the material by an OWNER-approved laboratory shall be performed at CONTRACTOR's expense in order to warrant that the material does not contain asbestos. A copy of the package labelling or results of laboratory testing must be provided to the OWNER prior to inclusion of the specified material during construction. Contractor's construction

Division 1 – General Requirements

submittals must include MSDSs for all new materials used in construction of buildings, facilities and infrastructure.

1.5 SUBMITTALS

NON-USE OF ASBESTOS AFFIDAVITS

At the time that the CONTRACTOR signs the Agreement, they shall sign a Non-Use of Asbestos Affidavit (Contractor Prior to Construction), Contract Document 00680. This Affidavit certifies that the CONTRACTOR agrees that they will not allow any asbestos containing materials to be incorporated into the construction of the Project or allow any asbestos containing building materials on the site for which the OWNER has not given prior written approval.

Prior to final payment, the CONTRACTOR will provide to the OWNER a Non-Use of Asbestos Affidavit (Contractor After Construction), Contract Document 00681. This Affidavit certifies that the CONTRACTOR did not allow asbestos containing materials to be incorporated into the construction or allowed any asbestos containing building materials on the site for which the OWNER of the Project did not give prior written approval.

ASBESTOS CONTAINING MATERIALS: When any asbestos containing materials are used on the Project, provide the following information:

A detailed description of the material containing the asbestos.

The type and percent of asbestos contained in the material.

The quantity of the materials used, including the square footage, or in the case of pipe insulation, the size and linear footage.

A drawing showing the exact location of any asbestos containing materials.

Final payment shall be withheld until the above described Affidavits, submittals and/or information are received and approved.

END

STATEMENT OF NON-INCLUSION OF ASBESTOS CONTAINING MATERIAL

STATE OF TEXAS
COUNTY OF TRAVIS

ENGINEER/ARCHITECT
PRIOR TO DESIGN

"My name is Ashok Perera, P.E., hereinafter known as Authorized Representative.

"I am over the age of 18 years and I have never been convicted of a crime. I am the Senior Project Manager of Atkins North America, Inc. hereinafter known as ENGINEER/ARCHITECT.

"I am fully competent to make this statement. I have personal knowledge of the facts set forth below and they are all true and correct.

"WHEREAS ENGINEER/ARCHITECT has been selected to provide designs, to prepare the bid and construction documents, and to assist the City of Austin, Texas, hereinafter known as OWNER, during the construction of Walnut Creek Chlorine Emergency Gas Scrubber Project, located at 7113 FM 969, Austin, Texas 78724, Austin, Texas, hereinafter known as Project, and

"WHEREAS asbestos in a dust form is a recognized health hazard, and

"WHEREAS the OWNER desires not to have any asbestos containing materials used or incorporated into the construction of the Project;

"THEREFORE the ENGINEER/ARCHITECT affirms that to the best of its knowledge and belief:

- 1. The ENGINEER/ARCHITECT, any person, firm or organization representing or represented by the ENGINEER/ARCHITECT, shall not knowingly specify, request, or approve for use in conjunction with the Project, any asbestos containing materials or any other materials defined as containing asbestos by any laws, rules or regulations promulgated by the United States Government, the State of Texas or any governmental organization or agency operating under the authority of either of those entities.
2. Realizing that there might be materials required in which a satisfactory non-asbestos containing material cannot be obtained, the ENGINEER/ARCHITECT will do the following before specifying any asbestos containing material:
A. Inform the OWNER's Project Manager for this Project, in writing, of any intent to specify asbestos containing materials.
B. Receive written approval from the City of Austin Project Manager for the specifying of any asbestos containing materials.
C. At the completion of the design phase, and before the OWNER receives any bids for this Project, provide to the Project Manager, in writing, the proposed location of any asbestos containing materials, the type of asbestos they contain, and the percent of asbestos by types.
3. The ENGINEER/ARCHITECT states its understanding that if any asbestos containing materials not approved by the OWNER for inclusion into the Project, are determined, as a result of any inspection and sample analysis performed by an individual(s) and/or firm(s) certified and/or licensed to perform such inspection by the United States Government and/or the State of Texas, to have been knowingly specified, requested and/or approved by the ENGINEER/ARCHITECT for inclusion in the Project, the OWNER shall look to the ENGINEER/ARCHITECT for reimbursement of any and all costs incurred in the removal and/or other abatement of said asbestos containing materials.
4. ENGINEER/ARCHITECT further understands that OWNER shall also look to the ENGINEER/ARCHITECT for any and all damages to OWNER which result from the inability of the OWNER to use any portion or all of the Project due to the incorporation of asbestos containing materials that have been knowingly specified, requested and/or approved by the ENGINEER/ARCHITECT.
5. ENGINEER/ARCHITECT further understands that OWNER will pursue reimbursement of any said cost and compensation for any said damages from the ENGINEER/ARCHITECT by any and every means within OWNER's right and power.

Signature of Authorized Representative: [Signature]

STATE OF TEXAS
COUNTY OF TRAVIS

ON June 24, 2019, personally appeared Ashok Perera

and been duly sworn by me, subscribed to the foregoing statement and has stated that the facts stated therein are true and correct.



Notary Public, State of Texas [Signature]

Printed Name of Notary Cindy Lou Scott

My Commission Expires: 02-04-2022

01605A.00/110392

CITY OF AUSTIN
STATEMENT OF NON-INCLUSION OF ASBESTOS CONTAINING MATERIAL

STATE OF TEXAS
COUNTY OF TRAVIS

ENGINEER/ARCHITECT
AFTER DESIGN

"My name is Ashok Perera, P.E., hereinafter known as Authorized Representative.

"I am over the age of 18 years and I have never been convicted of a crime. I am the Senior Project Manager of Atkins North America, Inc., hereinafter known as ENGINEER/ARCHITECT.

"I am fully competent to make this statement. I have personal knowledge of the facts set forth below and they are all true and correct.

"WHEREAS ENGINEER/ARCHITECT has been selected to provide designs, to prepare the bid and construction documents, and to assist the City of Austin, Texas, hereinafter known as OWNER, during the construction of Walnut Creek Chlorine Emergency Gas Scrubber Project, located at 7113 FM 969, Austin, Texas 78724 Austin, Texas, hereinafter known as Project, and

"WHEREAS asbestos in a dust form is a recognized health hazard, and
"WHEREAS the OWNER desires not to have any asbestos containing materials used or incorporated into the construction of the Project;
"THEREFORE the ENGINEER/ARCHITECT affirms that to the best of its knowledge and belief:

1. The ENGINEER/ARCHITECT, any person, firm or organization representing or represented by the ENGINEER/ARCHITECT, shall not knowingly specify, request, or approve for use in conjunction with the Project, any asbestos containing materials or any other materials defined as containing asbestos by any laws, rules or regulations promulgated by the United States Government, the State of Texas or any governmental organization or agency operating under the authority of either of those entities.
2. The only exceptions to the above statement are the following materials that are required because a satisfactory non-asbestos containing material cannot be obtained. The inclusion of these materials has been approved by the OWNER's Project Manager for this Project.

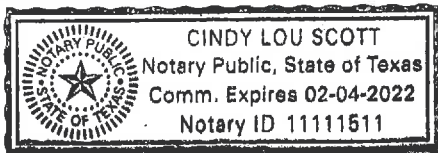
3. The ENGINEER/ARCHITECT states its understanding that if any asbestos containing materials not approved by the OWNER for inclusion into the Project, are determined, as a result of any inspection and sample analysis performed by an individual(s) and/or firm(s) certified and/or licensed to perform such inspection by the United States Government and/or the State of Texas, to have been knowingly specified, requested and/or approved by the ENGINEER/ARCHITECT for inclusion in the Project, the OWNER shall look to the ENGINEER/ARCHITECT for reimbursement of any and all costs incurred in the removal and/or other abatement of said asbestos containing materials.
4. ENGINEER/ARCHITECT further understands that OWNER shall also look to the ENGINEER/ARCHITECT for any and all damages to OWNER which result from the inability of the OWNER to use any portion or all of the Project due to the incorporation of asbestos containing materials that have been knowingly specified, requested and/or approved by the ENGINEER/ARCHITECT.
5. ENGINEER/ARCHITECT further understands that OWNER will pursue reimbursement of any said cost and compensation for any said damages from the ENGINEER/ARCHITECT by any and every means within OWNER's right and power.

Signature of Authorized Representative: [Signature]

STATE OF TEXAS
COUNTY OF TRAVIS

ON June 24, 2019 personally appeared Ashok Perera

and been duly sworn by me, subscribed to the foregoing statement and has stated that the facts stated therein are true and correct.



Notary Public, State of Texas Cindy Lou Scott
Printed Name of Notary Cindy Lou Scott
My Commission Expires: 02-04-2022

01605B/110392

PART 1 -- GENERAL

1.1 Description

- A.** This item shall govern quality, storage, handling, proportioning and mixing of materials for hydraulic cement concrete construction of buildings, bridges, culverts, slabs, prestressed concrete and incidental appurtenances.
- B.** This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

1.2 Submittals

The submittal requirements of this specification item may include:

- A.** Mix design option(s) of the class of concrete required on the project,
- B.** The supplier of the concrete mix design(s) and type of mixing equipment, and
- C.** Type of admixtures to be used with the concrete mixes.

1.3 Materials

Concrete shall be composed of hydraulic cement or hydraulic cement and supplementary cementing materials, water, aggregates (fine and coarse), and admixtures proportioned and mixed as hereinafter provided to achieve specified results.

A. Cementitious Materials

- 1.** Hydraulic cement shall conform to ASTM C 150, Type I (General Purpose), Type II (General Purpose with Moderate Sulfate Resistance) and Type III (High Early Strength). Type I shall be used when none is specified or indicated on the drawings. Type I and Type III cements shall not be used when a Type II cement is specified or indicated on the drawings. Type III cement may be used in lieu of a Type I cement, when the anticipated air temperature for the succeeding 12 hours will not exceed 60°F (15.6°C). A Type III cement shall only be used in precast concrete or when otherwise specified or allowed. All cement shall be of the same type and from the same source for a monolithic placement.
- 2.** Unless otherwise specified the cementitious material content shall be limited to no more than 700 lbs. per cubic yard (417 kg per cubic meter). When supplementary cementing materials are used, cement is defined as "cement plus supplementary cementing material." Supplementary cementing materials include fly ash (DMS 4610), ultra-fine fly ash (DMS-4610), ground granulated blast furnace slag grade 100 or 120 (DMS-4620), silica fume (DMS-4630) and metakaolin (DMS-4635).
- 3.** Supplementary cementing materials shall not be used when white hydraulic cement is specified.
- 4.** Class C flyash shall not be used in sulfate-resistant concrete.
- 5.** Hydraulic cement manufactured in a cement kiln fueled by hazardous waste shall be considered as an approved product if the production facility is authorized to operate under regulation of the Texas Commission on Environmental Quality (TCEQ) and the U.S. Environmental Protection Agency (EPA). Supplier shall provide current TNRCC and EPA authorizations to operate the facility.

6. When sulfate-resistant concrete is required for a project, mix design options 1, 2, 3 or 4 presented in Section 403S.8, "Mix Design Options" shall be used to develop appropriate mix design utilizing Type I/II, II, V, IP or IS cement.

B. Mixing Water

1. Water for use in concrete and for curing shall be potable water free of oils, acids, organic matter or other deleterious substances and shall not contain more than 1,000 parts per million of chlorides as Cl or sulfates as SO₄.
2. Water from the City of Austin will not require testing. Contractor may request approval of water from other sources. Contractor shall arrange for samples to be taken from the source and tested at the Contractor's expense. When water from other sources is proposed, test reports shall be provided that indicates compliance with Table 1 before use.

Table 1: Chemical Limits for Mix Water		
Contaminant	Test Method	Maximum Concentration (ppm)
Chloride (CL) Prestressed concrete Bridge decks & superstructure All other concrete	ASTM D-512	500 500 1,000
Sulfate (SO ₄)	ASTM D-516	1,000
Alkalies (NA ₂ O + 0.658 K ₂ O)	ASTM D-4191 & D-4192	600
Total Solids	AASHTO T-26	50,000

3. Water that has an adverse effect on the air-entraining agent or any other chemical admixture or on strength or time of set of the concrete shall not be used. Water used in white Portland cement concrete shall be free from iron and other impurities, which may cause staining, or discoloration.

C. Coarse Aggregate

1. Coarse aggregate shall consist of durable particles of crushed or uncrushed gravel, crushed blast furnace slag, crushed stone or combinations thereof; free from frozen material or injurious amounts of salt, alkali, vegetable matter or other objectionable material either free or as an adherent coating. When white hydraulic cement is specified, the coarse aggregates used in the concrete shall be light colored. Quality shall be reasonably uniform throughout.
2. The coarse aggregate from each source shall not contain more than 0.25 percent by weight of clay lumps, nor more than 1.0 percent by weight of shale nor more than 5 percent by weight of laminated and/or friable particles when tested in accordance with TXDOT Test Method TEX-413-A. The coarse aggregate from each source shall have a wear of not more than 40 percent when tested in accordance with TXDOT Test Method TEX-410-A.
3. Unless otherwise indicated on the drawings, the coarse aggregate from each source shall be subjected to 5 cycles of the soundness test conforming to TXDOT Test Method TEX-411-A. The loss shall not be greater than 12 percent when sodium sulfate is used or 18 percent when magnesium sulfate is used.

4. Coarse aggregate shall be washed. The Loss by Decantation (TXDOT Test Method TEX-406-A), plus allowable weight of clay lumps, shall not exceed 1 percent or the value indicated on the drawings or in the project manual, whichever is less. If material finer than the # 200 (75 micrometer) sieve is definitely established to be dust of fracture of aggregates made primarily from crushing of stone, essentially free from clay or shale as established by Part III of TXDOT Test Method TEX-406-A, the percent may be increased to 1.5. When crushed limestone coarse aggregate is used in concrete pavements, the decant may exceed 1% but not more than 3% if the material finer than the #200 (75 micrometer) sieve is determined to be at least 67% calcium carbonate in accordance with TxDoT Test Method Tex-406-A, Part III.
5. The coarse aggregate factor may not be more than 0.82; however, when voids in the coarse aggregate exceed 48 percent of the total rodded volume, the coarse aggregate factor shall not exceed 0.85. The coarse aggregate factor may not be less than 0.68 except for a Class I machine extruded mix that shall not have a coarse aggregate factor lower than 0.61.
6. When exposed aggregate surfaces are required, the coarse aggregate shall consist of particles with at least 40 percent crushed faces. Uncrushed gravel, polished aggregates and clear resilient coatings are not acceptable for exposed aggregate finishes.
7. When tested by approved methods, the coarse aggregate including combinations of aggregates when used, shall conform to the grading requirements shown in Table 2.

Table 2: Coarse Aggregate Gradation Chart (Percent Passing)

Grade	Nom. Size	2 1/2" (62.5mm)	2" (50mm)	1 1/2" (37.5mm)	1" (25mm)	3/4" (19mm)	1/2" (12.5mm)	3/8" (9.5mm)	No. 4 (4.75mm)	No. 8 (2.36mm)
1	2" (50 mm)	100	80–100	50–85		20–40			0–5	
2 (467)*	1 1/2" (37.5 mm)		100	95–100		35–70		10–30	0–5	
3	1" (50 mm)		100	95–100		60–90	25–60		0–5	
4 (57)*	1" (50 mm)			100	95–100		25–60		0–10	0–5
5 (67)*	3/4" (19 mm)				100	90–100		20–55	0–10	0–5
6 (7)*	1/2" (12.5 mm)					100	90–100	40–70	0–15	0–5
7	3/8" (9.5 mm)						100	70–95	0–25	
8	3/8" (9.5 mm)						100	95–100	20–65	0–10

Notes:

1. Recycled crushed concrete fine aggregate shall be limited to a maximum of 20% of the fine aggregate.
2. The use of recycled crushed hydraulic cement concrete as a coarse aggregate shall be limited to Concrete Classes A, B and D (see Table 5).

D. Fine Aggregate

1. Fine aggregate shall be washed and consist of clean, hard, durable and uncoated particles of natural or manufactured sand or a combination thereof, with or without a mineral filler. When white hydraulic cement is specified, the fine aggregates used in the concrete shall be light colored. Quality shall be reasonably uniform throughout. It shall be free from frozen material or injurious amounts of salt, alkali, vegetable matter or other objectionable material and it shall not contain more than 0.5 percent by weight of clay lumps in accordance with TEX-413-A. When subjected to color test for organic impurities per TXDOT Test Method TEX-408-A, it shall not show a color darker than standard.
2. Unless indicated otherwise on the drawings the acid insoluble residue of fine aggregate used in slab concrete subject to direct traffic shall not be less than 60 percent by weight (mass) when tested conforming to TXDOT Test Method TEX-612-J.
3. Unless indicated otherwise on the Drawings, fine aggregate shall be blended, when necessary, to meet the acid insoluble residue requirement.
4. When blending the following equation shall be used:

$$\text{Acid Insoluble (\%)} = \{(A1)(P1)+(A2)(P2)\}/100$$
 Where:
 A1 = acid insoluble (%) of aggregate 1,
 A2 = acid insoluble (%) of aggregate 2,
 P1 = % by weight of A1 of the fine aggregate blend, and
 P2 = % by weight of A2 of the fine aggregate blend.
5. When tested in accordance with TxDoT Test Method Tex-401-A, the fine aggregate, including mineral filler and combinations of aggregates, when used, shall conform to the grading requirements shown in Table 3.

Table 3: Fine Aggregate Gradation Chart ¹ (Grade 1 - Percent Passing)							
3/8 (9.5 mm)	No. 4 (4.75 mm)	No. 8 (2.36 mm)	No. 16 (1.18mm)	No. 30 (600 μm)	No. 50 (300 μm)	No. 100 (150 μm)	No. 200 (75 μm)
100	95–100	80–100	50–85	25–65	10–351	0–10	0–32

Notes:

1. Recycled crushed concrete fine aggregate shall be limited to a maximum of 20% of the fine aggregate.
 2. The use of recycled crushed hydraulic cement concrete as a fine aggregate shall be limited to Concrete Classes A, B and D (see Table 5).
 3. 6 to 35 when sand equivalent value is greater than 85.
 4. 0 to 6 for manufactured sand.
6. Sand equivalent per TXDOT Test Method TEX-203-F shall not be less than 80 nor less than otherwise indicated on the drawings, whichever is greater.
 7. The fineness modulus will be determined by adding the percentages by weight retained on sieve Nos. 4, 8, 16, 30, 50 and 100 (4.75 mm, 2.36 mm, 1.18mm, 600 μm, 300 μm, and 150 μm) and dividing the sum of the six sieves by 100. For all classes of concrete except K (see Table 5), the fineness modulus shall be between 2.30 and 3.10. For Class K concrete, the fineness modulus shall be between 2.40 and 2.90, unless indicated otherwise on the Drawings.

E. Mineral Filler

1. Mineral filler shall consist of stone dust, clean crushed sand or other approved inert material. When tested in accordance with TxDOT Test Method Tex-401-A, it shall conform to the following gradation:

Passing the No. 30 (600 µm) Sieve	100 percent
Passing the No. 200 (75 µm) Sieve	65 to 100 percent

F. Mortar and Grout

1. Unless otherwise specified, indicated on the drawings or approved by the Engineer or designated representative mortar and grout shall consist of 1 part cement, 2 parts finely graded sand and enough water to make the mixture plastic. When required to prevent color difference, white cement shall be added to produce color required. When required by the Engineer or designated representative, approved latex adhesive may be added to the mortar. Mortar shall be provided with a consistency such that the mortar can be easily handled and spread by trowel. Grout shall be provided of a consistency that will flow into and completely fill all voids.

G. Admixtures

1. All chemical admixtures including water reducing, plasticizers and air entrainment shall conform to TxDOT DMS-4640, "Chemical Admixtures for Concrete". Calcium chloride-based admixtures shall not be approved. Admixtures shall be included in the prequalified concrete admixtures list maintained by TxDOT's Construction Division. High-range water-reducing admixtures (TxDOT Type F or G) and accelerating admixtures (TxDOT Type C or E) shall not be used in bridge deck concrete.

H. Air Entrainment

1. Unless indicated otherwise on the drawings, all concrete classes with the exception of Class B shall be air entrained in accordance with Table 8. If the air content is more than 1½ percentage points below or 3 percentage points above the required air, the load of concrete will be rejected. If the air content is more than 1½ but less than 3 percentage points above the required air, the concrete may be accepted based on strength test results.

1.4 Storage of Materials

A. Cement, Supplementary Cementing Materials and Mineral Filler

1. All cement, supplementary cementing materials and mineral filler shall be stored in separate and well ventilated, weatherproof buildings or approved bins, which will protect the material from dampness or absorption of moisture. Storage facilities shall be easily accessible and each shipment of packaged cement shall be kept separated to provide for identification and inspection. The Engineer or designated representative may permit small quantities of sacked cement to be stored in the open for a maximum of 48 hours on a raised platform and under waterproof covering.

B. Aggregates

1. The method of handling and storing concrete aggregates shall prevent contamination with foreign materials. If the aggregates are stored on the ground, the sites for the stockpiles shall be clear of all vegetation and shall be level.

Aggregates shall be stockpiled in sizes to facilitate blending. If the aggregate is not stockpiled on a hard, non-contaminant base, the bottom 6-inch (150 mm) layer of the stockpile shall not be used without recleaning the aggregate.

2. When conditions require the use of 2 or more grades of coarse aggregates, separate stockpiles shall be maintained to prevent intermixing. Where space is limited, stockpiles shall be separated by walls or other appropriate barriers.
3. Aggregate shall be stockpiled and protected from the weather a minimum of 24 hours prior to use to minimize free moisture content. When stockpiles are too large to protect from the weather, accurate and continuous means acceptable to the Engineer or designated representative shall be provided to monitor aggregate temperature and moisture. Aggregates shall be stockpiled and handled such that segregation and contamination are minimized.
4. The stockpiles shall be sprinkled to control moisture and temperature as necessary. A reasonably uniform moisture content shall be maintained in aggregate stockpiles.

C. Admixtures

1. Admixtures shall be stored in accordance with manufacturer's recommendations and shall be protected against freezing.

D. Hot Weather Concrete Mixes

1. Ice may be used during hot weather concrete placement (Section 13 of Standard Specification Item No. 410S, "Concrete Structures") to lower the concrete temperature; however, the Contractor shall furnish a mix design acceptable to the Engineer or designated representative for class of concrete specified. The addition of ice shall not exceed 50% of the total mix water weight.

1.5 Measurement of Materials

- A. Water shall be accurately metered. Fine and coarse aggregates, mineral filler, bulk cement and fly ash shall be weighed separately. Allowances shall be made in the water volume and aggregate weights during batching for moisture content of aggregates and admixtures. Volumetric and weight measuring devices shall be acceptable to the Engineer or designated representative. Measurement of materials in non-volumetric and volumetric mixers shall conform to Section 421.4.D of TxDot Specification Item 421, "Hydraulic Cement Concrete".
- B. Batch weighing of sacked cement is not required; however, bags, individually and entire shipments, may not vary by more than 3 percent from the specified weight of 94 pounds (42.6 kilograms) per bag. The average bag weight of a shipment shall be determined by weighing 50 bags taken at random.

1.6 Mix Design

- A. The Contractor shall furnish a mix design acceptable to the Engineer or designated representative for the class of concrete required in accordance with Table 5. The mix shall be designed by a qualified commercial laboratory and signed/sealed by a registered Professional Engineer, licensed in the state of Texas to conform with requirements contained herein, to ACI 211.1 or TXDOT Bulletin C-11 (and supplements thereto). The maximum water-to-cementitious material ratio identified in Table 5 for specific classes of concrete shall not be exceeded.
- B. A higher-strength class of concrete with equal or lower water-to-cementitious-material ratio may be substituted for the specified class of concrete.

- C. The mix design shall be over-designed in accordance with Table 5 in order to account for production variability and to ensure minimum compressive strength requirements are met.
- D. Allowable mix design options are presented in Section 403S.8.
- E. The Contractor shall perform, at the Contractor's expense, the work required to substantiate the design, including testing of strength specimens. Complete concrete design data shall be submitted to the Engineer or designated representative for approval. The mix design will be valid for a period of one (1) year provided that there are no changes to the component materials.
- F. When there are changes in aggregates or in type, brand or source of cement, supplementary cementing material or chemical admixtures, the mix shall be evaluated as a new mix design. A change in vendor does not necessarily constitute a change in materials or source. When only the brand or source of cement is changed and there is a prior record of satisfactory performance of the cement with the ingredients, the submittal of new trial batches may be waived by the Engineer or designated representative.
- G. At the end of one (1) year, a previously approved mix may be resubmitted for approval if it can be shown that no substantial change in the component materials has occurred and that test results confirming the adequacy of the mix designs have been acquired during the previous year. The resubmittal analysis must be reviewed, signed and sealed by a registered Professional Engineer, licensed in the state of Texas. This resubmittal shall include a reanalysis of specific gravity, absorption, fineness modulus, sand equivalent, soundness, wear and unit weights of the aggregates. Provided that the fineness modulus did not deviate by more than 0.20 or that the re-proportioned total mixing water, aggregate and cement (or cement plus fly ash) are within 1, 2, and 3 percent, respectively, of pre-approved quantities, a one-year extension on the approval of the mix may be granted by the Engineer or designated representative. Updated cement, fly ash, and admixture certifications shall accompany the resubmittal.
- H. Approved admixtures that are included in the prequalified concrete admixtures list maintained by TxDot's Construction Division may be used with all classes of concrete at the option of the Contractor provided that specific requirements of the governing concrete structure specification are met. Water reducing and retarding agents shall be required for hot weather, large mass, and continuous slab placements. Air entraining agents may be used in all mixes but must be used in the classes indicated on Table 5. Unless approved by the Engineer or designated representative, mix designs shall not exceed air contents for extreme exposure conditions as recommended by ACI 211.1 for the various aggregate grades.

1.7 Consistency and Quality of Concrete

- A. Concrete shall be workable, cohesive, possess satisfactory finishing qualities and of stiffest consistency that can be placed and vibrated into a homogeneous mass within slump requirements specified in Table 4 without the development of segregation or honeycombing. No concrete will be permitted with a slump in excess of the maximums shown unless water-reducing admixtures have been previously approved. Concrete that exceeds the maximum acceptable placement slump at time of delivery will be rejected. Slump values shall be conducted in accordance with TXDOT Test Method TEX-415-A.
- B. Consistency and quality of concrete should allow efficient placement and completion of finishing operations before initial set. Re-tempering (i.e. addition of water and reworking concrete after initial set) shall not be allowed. When field conditions are

such that additional moisture is needed for final concrete surface finishing operation, the required water shall be applied to surface by fog spray only and shall be held to a minimum. Excessive bleeding shall be avoided and in no case will it be permissible to expedite finishing and drying by sprinkling the surface with cement powder.

Table 4: Slump Requirements		
Type of Construction	Slump ¹, inches (mm)	
	Maximum	Minimum
Cased Drilled Shafts	4 (100)	3 (75)
Reinforced Foundation Caissons and Footings	3 (75)	1 (25)
Reinforced Footings and Substructure Walls	3 (75)	1 (25)
Uncased Drilled Shafts	6 (150)	5 (125)
Thin-walled Sections; 9 inches (225 mm) or less	6½ (165)	4 (100)
Prestressed Concrete Members ¹	6½ (165)	4 (100)
Precast Drainage Structures	6 (150)	4 (100)
Wall Sections over 9 inches (225 mm)	5 (125)	3 (75)
Reinforced Building Slabs, Beams, Columns and Walls	4 (100)	1 (25)
Bridge Decks	4 (100)	2 (50)
Pavements, Fixed-form	6½ (165)	4 (100)
Pavements, Slip-form	3 (75)	1½ (37.5)
Sidewalks, Driveways and Slabs on Ground	4 (100)	2 (50)
Curb & Gutter, Hand-vibrated	3 (75)	1 (25)
Curb & Gutter, Hand-tamped or spaded	4 (100)	2 (50)
Curb & Gutter, Slip-form/extrusion machine	2 (50)	½ (12.5)
Heavy Mass Construction	2 (50)	1 (25)
High Strength Concrete	4 (100)	3 (75)
Riprap and Other Miscellaneous Concrete	6 (150)	1 (25)
Under Water or Seal Concrete	8½ (213)	6 (150)

Notes:

1. Slump values when a high range water reducer (HRWR) is not used.
2. When a high range water reducer (HRWR) is used, maximum acceptable placement slump will be 9 in (225 mm).

- C.** During progress of the work, the Engineer or designated representative shall cast test cylinders as a check on compressive strength of concrete actually placed. The Engineer or designated representative may also perform slump tests, entrained air tests and temperature checks to ensure compliance with specifications.
- D.** Proportioning of all material components shall be checked prior to discharging. Excluding mortar material for pre-coating of the mixer drum [see section 403S.8.B] and adjustment for moisture content of admixtures and aggregates, material components shall fall within the range of + 1% for water, + 2% for aggregates, + 3% for cement, +2% for fly ash and within manufacturer recommended dosage rates for

admixtures except that air entrainment shall be within + 1½ percentage points of the mix design requirements.

- E.** Unless otherwise specified or indicated on the drawings, concrete mix temperature shall not exceed 90°F (32°C) except in mixes with high range water reducers where a maximum mix temperature of 100°F (38°C) will be allowed. Cooling an otherwise acceptable mix by addition of water or ice during agitation will not be allowed.
- F.** Test cylinders will be required for small placements such as manholes, inlets, culverts, wing walls, etc. The Engineer or designated representative may vary the number of tests to a minimum of 1 for each 25 cubic yards (1 for each 19 cubic meters) placed over a several day period.
- G.** Test cylinders shall be required for each monolithic placement of bridge decks or superstructures, top slabs of direct traffic culverts, cased drilled shafts, structural beams and as otherwise directed by Engineer or designated representative for design strength confirmation or early form removal. Test cylinders made for early form removal or for consideration of use of structure will be at Contractor's expense, except when required by Engineer or designated representative.
- H.** A strength test shall be defined as the average breaking strength of 2 cylinders. A minimum of four test cylinders shall be prepared; two each to be tested at 7 and 28 days. Specimens will be tested conforming to TXDOT Test Method TEX-418-A. If required strength or consistency of class of concrete being produced cannot be secured with minimum cementitious material specified or without exceeding maximum water/cementitious material ratio, Contractor will be required to furnish different aggregates, use a water reducing agent, an air entraining agent or increase the cement content in order to provide concrete meeting these specifications.
- I.** Slump tests will be performed in accordance with TxDOT Test Method Tex-415-A. Entrained air tests will be performed in accordance with TxDOT Test Method Tex-416-A.
- J.** Test specimens shall be cured using the same methods and under the same conditions as the concrete represented. Design strength cylinders shall be cured conforming to TXDOT Bulletin C-11 (and supplements thereto).
- K.** When control of concrete quality is by 28-day compressive tests, job control testing will be by 7-day compressive strength tests. The minimum strength requirement for seven (7) day test will be 70 percent of the specified minimum 28-day compressive strength. If the required 7-day strength is not secured with the quantity of cement specified in Table 4, changes in the mix design shall be made and resubmitted for approval. For an occasional failure of the seven-day compressive test, the concrete may be tested at 28 days for final evaluation.

Class	Cement Sks Per CY	Minimum Strength, psi (MPa)		Maximum W/C Ratio ¹	Coarse Aggr. Grade ^{2,3,4}	Air Entrain.
		28 Days	7 Days			
A	5.0 (280 kg/m ³)	3000 (20.6)	2100 (14.5)	0.6	1,2,3,4,8	Yes
B	4.0 (225 kg/m ³)	2000 (13.8)	1400 (9.7)	0.6	2,3,4,5,6,7	No
C ⁵	6.0 (335 kg/m ³)	3600(24.8)	2520 (17.4)	0.45	1,2,3,4,5,6	Yes
D	4.5 (252 kg/m ³)	2500 (17.2)	1750 (12.1)	0.6	2,3,4,5,6,7	No
H ⁵	6.0 (335 kg/m ³)	As indicated	As Indicated	0.45	3,4,5,6	Yes
I	5.5 (308 kg/m ³)	3500 (24.1)	2450 (16.9)	0.45	2,3,4,5	Yes
J	2.0 (112 kg/m ³)	800 (5.5)	560 (3.9)	N/A	2,3,4,5	No
S ⁵	6.0 (335 kg/m ³)	4000 (27.6)	2800 (19.3)	0.45	2,3,4,5	Yes

Notes:

1. Maximum water-cement or water-cementitious ratio by weight
2. Unless otherwise allowed, Grade 1 coarse aggregate shall only be used in massive foundations with 4-in (100-mm) minimum clear spacing between reinforcing steel bars.
3. Grade 1 coarse aggregate grading shall not be used in drilled shafts.
4. Unless otherwise allowed, Grade 8 coarse aggregate shall be used in extruded curbs.
5. Structural concrete classes.
6. When Type II cement is used in Class C, S or A concrete, the 7-day compressive strength requirement will be 2310 psi (15.9 MPa) for Class C, 2570 psi (17.7 MPa) for Class S and 1925 psi (13.3 MPa) for Class A minimum.

Number Of Tests ^{2,3}	Standard Deviation, psi (MPa)				
	300 (2.06)	400 (2.75)	500 (3.44)	600 (4.13)	700 (4.82)
15	470 (3.24)	620 (4.27)	850 (5.85)	1,120 (7.71)	1,390 (9.57)
20	430 (2.96)	580 (3.99)	760 (5.23)	1,010 (6.95)	1,260 (8.67)
30 or more	400 (2.75)	530 (3.65)	670 (4.61)	900 (6.20)	1,130 (7.78)

Notes:

1. When designing the mix, add the tabulated amounts to the minimum design strength in Table 5. Maximum water-cement or water-cementitious ratio by weight
2. Number of tests of a concrete mixture used to estimate the standard deviation of a concrete production facility. Test of another mix within 1,000 psi (6.88 MPa) of the specified strength may be used.
3. If less than 15 prior tests are available, the overdesign should be 1,000 psi (6.88 MPa) for specified strength less than 3,000 psi (20.65 MPa), 1,200 psi (8.26 MPa) for specified strengths from 3,000 to 5,000 psi (20.65 to 34.42 MPa) and 1,400 psi (9.64 MPa) for specified strengths greater than 5,000 psi (34.42 MPa).

Table 7: Expected Usage of Concrete Classes	
Class	General Usage
A	Inlets, manholes, curb, gutter, curb & gutter, concrete retards, sidewalks, driveways, backup walls and anchors
B	Riprap, small roadside signs and anchors
C ⁵	Drilled shafts, bridge substructure, bridge railing, culverts except top slab of direct traffic culverts, headwalls, wing walls, approach slabs, and cast-in-place concrete traffic barrier
D	Riprap
H ⁵	Prestressed concrete beams, boxes, piling and precast concrete traffic barrier
J	Utility trench repair
S ⁵	Bridge slabs and top slabs of direct traffic culverts

Table 8: Air Entrainment¹		
Nominal Maximum Aggregate Size In (mm)	% Air Entrainment	
	Moderate Exposure	Severe Exposure
3/8 (9.5)- Grades 7 & 8	6	7½
½ (12.5)- Grades 6	5½	7
¾ (19)- Grades 5	5	6
1 (25)- Grades 4	4½	6
1½ (37.5)- Grades 2 & 3	4½	5½
2 (50)- Grades 2	4	5

Notes:

1. For specified concrete strengths above 5,000 psi (34.42 MPa) a reduction of 1 percentage point is allowed.

1.8 Mix Design Options

- A.** For the structural concretes identified in Table 5 (Classes C, H and S) and any other class of concrete designed using more than 520 lbs. of cementitious material per cubic yard (310 kgs per cubic meter), one of the mix design options presented below shall be used.
- B.** For the non-structural concretes identified in Table 5 (Classes A, B, D and I) and any other class of concrete designed using less than 520 lbs. of cementitious material per cubic yard (310 kgs per cubic meter), one of the mix design options presented below will be used, except that Class C fly ash may be used instead of Class F fly ash for Options 1, 3 and 4 unless a sulfate-resistant concrete is required.
 1. Option 1: Twenty (20) to thirty-five (35) percent of the cement may be replaced with Class F fly ash.
 2. Option 2: Thirty-five (35) to fifty (50) percent of the cement may be replaced with ground granulated blast-furnace slag.
 3. Option 3: Thirty-five (35) to fifty (50) percent of the cement may be replaced with a combination of Class F fly ash, ground granulated blast-furnace slag or silica

fume. The combination may not include more than thirty-five (35) percent fly ash and no more than ten (10) percent silica fume.

4. Option 4: Type IP or Type IS will be used and up to ten (10) percent of the cement may be replaced with Class F fly ash, ground granulated blast-furnace slag or silica fume.
5. Option 5: Thirty-five (35) to fifty (50) percent of the cement may be replaced with a combination of Class C fly ash and at least six (6) percent of silica fume, ultra fine fly ash or metakaolin. The combination may not include more than thirty-five (35) percent fly ash and no more than ten (10) percent silica fume.
6. Option 6: A lithium nitrate admixture will be added at a minimum dosage of 0.55 gal. of thirty (30) percent lithium nitrate solution per pound of alkalis present in the hydraulic cement.
7. Option 7: When hydraulic cement only is used in the design, the total alkali contribution from the cement in the concrete does not exceed 4.0 lbs. per cubic yard, when calculated as follows:
 - a. $\text{alkali (lbs. per CY)} = .01 (\text{lbs cement/CY}) (\% \text{ Na}_2\text{O equivalent in cement})$
where (% Na₂O equivalent in cement) is assumed to be the maximum cement alkali content reported on the cement mill certificate.
8. Option 8: When there are deviations from Options 1 through 7, the following shall be performed:
 - a. Conduct tests on both coarse and fine aggregate separately in accordance with ASTM C-1260, using 440 g of the proposed cementitious in the same proportions of hydraulic cement to supplementary cementing material to be used in the mix.
 - b. Prior to use of the mix, a certified test report signed and sealed by a Professional Engineer, licensed in the state of Texas shall be submitted that demonstrates that ASTM C 1260 test results for each aggregate do not exceed 0.10 percent expansion.

1.9 Mixing and Mixing Equipment

- A. All equipment, tools and machinery used for hauling materials and performing any part of the work shall be maintained in such condition to insure completion of the work without excessive delays for repairs and replacement. Mixing shall be done in a mixer of approved type and size that will produce uniform distribution of material throughout the mass and shall be capable of producing concrete meeting requirements of ASTM C 94, Ready-mixed Concrete and these specifications. Mixing equipment shall be capable of producing sufficient concrete to provide required quantities. Entire contents of the drum shall be discharged before any materials are placed therein for a succeeding batch. Improperly mixed concrete shall not be placed in a structure. For all mixers an adequate water supply and an accurate method of measuring the water shall be provided.
- B. The mixer may be batched by either volumetric or weight sensing equipment and shall be equipped with a suitable timing device that will lock the discharging mechanism and signal when specified time of mixing has elapsed.
 1. Proportioning and Mixing Equipment
 - a. For all miscellaneous concrete placements, a mobile, continuous, volumetric mixer or a volumetric or weight batch mixer of the rotating paddle type may be used.

- b.** When approved by Engineer or designated representative in writing or when specified for use in other items, these mixers may be used for other types of concrete construction, including structural concrete, if the number of mixers furnished will supply the amount of concrete required for the particular operation in question.
 - c.** These mixers shall be designed to receive all the concrete ingredients, including admixtures, required by the mix design in a continuous uniform rate and mix them to the required consistency before discharging.
 - d.** For continuous volumetric mixers, the materials delivered during a revolution of the driving mechanism or in a selected interval, will be considered a batch and the proportion of each ingredient will be calculated in the same manner as for a batch type plant.
 - e.** Mixing time shall conform to recommendations of manufacturer of mixer unless otherwise directed by Engineer or designated representative.
- 2.** Ready-mixed Concrete
 - a.** Use of ready-mixed concrete will be permitted provided the batching plant and mixer trucks meet quality requirements specified herein. When ready-mixed concrete is used, additional mortar (1 sack cement, 3 parts sand and sufficient water) shall be added to each batch to coat the mixer drum. Ready-mixed concrete, batching plant and mixer truck operation shall include the following:
 - 1)** A ticket system will be used that includes a copy for the Inspector. Ticket will have machine stamped time/date of concrete batch, a mix design designation, weight of cement, fly ash, sand and aggregates; exact nomenclature and written quantities of admixtures and water. Any item missing or incomplete on ticket may be cause for rejection of concrete.
 - 2)** Sufficient trucks will be available to support continuous placements. The Contractor will satisfy the Engineer or designated representative that adequate standby trucks are available to support monolithic concrete placement requirements.
 - 3)** A portion of mixing water required by the mix design to produce the specified slump may be withheld and added at the job site, but only with permission of the Engineer or designated representative and under the Inspector's observation. When water is added under these conditions, the concrete batch will be thoroughly mixed before any slump or strength samples are taken. Additional cement shall not be added at the job site to otherwise unacceptable mixes.
 - 4)** A metal plate(s) shall be attached in a prominent place on each truck mixer plainly showing the various uses for which it was designed. The data shall include the drum's speed of rotation for mixing and for agitating and the capacity for complete mixing and/or agitating only. A copy of the manufacturer's design, showing dimensions of blades, shall be available for inspection at the plant at all times. Accumulations of hardened concrete shall be removed to the satisfaction of the Engineer or designated representative.
 - 5)** The loading of the transit mixers shall not exceed capacity as shown on the manufacturer's plate attached to the mixer or 63 percent of the drum volume, whichever is the lesser volume. The loading of transit mixers to the extent of causing spill-out en route to delivery will not be

acceptable. Consistent spillage will be cause for disqualification of a supplier.

- 6) Excess concrete remaining in the drum after delivery and wash water after delivery shall not be dumped on the project site unless approval of the dump location is first secured from the Engineer or designated representative.

3. Volumetric Batching

- a. Use of volumetric batched concrete will be permitted provided the batching and continuous mixing operations conform to ASTM C 685, "Concrete Made By Volumetric Batching and Continuous Mixing". This type concrete shall be made from materials continuously batched by volume, mixed in a continuous mixer and delivered to the site in a freshly mixed and unhardened state. Tests and criteria for batching accuracy and mixing efficiency shall be as specified in ASTM C 685.
 - 1) A ticket system will be used that includes a copy for the Inspector. The ticket will have machine stamped time/date of concrete batch, a mix design designation, weight of cement, fly ash, sand and aggregates; exact nomenclature and written quantities of admixtures and water. Any item missing or incomplete on ticket may be cause for rejection of concrete.
 - 2) Each batching or mixing unit, or both, shall carry in a prominent place a metal plate or plates on which are plainly marked the gross volume of the unit in terms of mixed concrete, discharge speed and the weight-calibrated constant of the machine in terms of a revolution counter or other output indicator. The mixer shall produce a thoroughly mixed and uniform concrete.
 - 3) The batcher-mixer unit shall contain in separate compartments all the necessary ingredients needed for the manufacture of concrete. The unit shall be equipped with calibrated proportioning devices to vary the mix proportions and it shall produce concrete as required by the Work and ASTM C 685.

4. Truck-mixed Concrete

- a. The concrete shall be mixed in a truck mixer from 70 to 100 revolutions at the mixing speed designated by the manufacturer that will produce a uniform concrete mix. The concrete shall be delivered to the project in a thoroughly mixed and uniform mass and shall be discharged with a satisfactory degree of uniformity. Additional mixing at the job site, at the mixing speed designated by the manufacturer, may be allowed by the Engineer or designated representative as long as the concrete is discharged before the drum has revolved a total of 300 revolutions after the introduction of the mixing water to the cement and the aggregates.
- b. Re-tempering or adding concrete chemical admixtures is only permitted at the job site when concrete is delivered in a truck mixer. Water shall not be added after introduction of mixing water at the batch plant except on arrival at the job site with approval of the Engineer or designated representative, in order to adjust the slump of the concrete. When this water is added, the mix design water-cementitious-material ratio shall not be exceeded. The drum or blades shall be turned at least 30 additional revolutions at mixing speed to ensure thorough and uniform mixing of the concrete. Water or chemical admixtures shall not be added to the batch after any concrete has been discharged.

- c. When the concrete contains silica fume, mixing times and batching operations shall be adjusted as necessary to ensure that the material is completely and uniformly dispersed in the mix. The dispersion of the silica fume within the mix shall be verified in trial batches.

5. Hand-mixed Concrete

- a. Hand mixing of concrete may be permitted for small placements or in case of an emergency and then only on authorization of the Engineer or designated representative. Hand-mixed batches shall not exceed a 4 cubic foot (0.113 cubic meters) batch in volume. Material volume ratios shall not be leaner than 1 part cement, 2 parts large aggregate, 1 part fine aggregate and enough water to produce a consistent mix with a slump not to exceed 4 inches (100 mm). Admixtures shall not be used unless specifically approved by the Engineer or designated representative.

1.10 Excavation, Placing of Concrete, Finishing, Curing and Backfill

- A. Excavation, placing of concrete, finishing, curing and backfill shall conform to Standard Specification Item No. 401S, "Structural Excavation and Backfill", Standard Specification Item No. 410S, "Concrete Structures" and Standard Specification Item No. 411S, "Surface Finishes for Concrete".

1.11 Measurement

- A. Where measurement of concrete for a structure is not provided by another governing pay item, measurement shall be made under this specification in accordance with the following.
- B. The quantities of concrete of the various classifications which constitute the completed and accepted structure or structures in place will be measured by the cubic yard (cubic meters: 1 cubic meter is equal to 1.308 cubic yards), each, square yard (square meter: 1 square yard equals 0.836 square meters) or linear foot as indicated in the Contract Documents. Measurement will be as follows:

1. General

- a. Measurement based on dimensions shall be for the completed structure as measured in place. However, field-measured dimensions shall not exceed those indicated on the drawings or as may have been directed by the Engineer or designated representative in writing.
- b. No deductions shall be made for chamfers less than 2 inches (50 mm) in depth, embedded portions of structural steel, reinforcing steel, nuts, bolts, conduits less than 5 inches (125 mm) in diameter, pre/post tensioning tendons, keys, water stops, weep holes and expansion joints 2 inches (50 mm) or less in width.
- c. No measurement shall be made for concrete keys between adjoining beams or prestressed concrete planks.
- d. No measurement shall be made for fill concrete between the ends or adjoining prestressed concrete planks/box beams at bent caps or between the ends of prestressed concrete planks/box beams and abutment end walls.
- e. No measurement shall be made for inlet and junction box invert concrete.
- f. No measurement shall be made for any additional concrete required above the normal slab thickness for camber or crown.

2. Plan Quantity. For those items measured for plan quantity payment, adequate calculations have been made. If no adjustment is required by Article 403S.11, additional measurements or calculations will not be required or made.
3. Measured in Place. For those items not measured for Plan Quantity payment, measurement will be made in place, subject to the requirements of Article 403S.10.A.1 above.

1.12 Payment

- A. The work performed and materials furnished as prescribed by this item and measured in accordance with the applicable provisions of "Measurement" above will be paid for as follows. The Contractor shall submit a lump sum amount for Payment Item No. 403S, " Structure or Structural Component ".
- B. The quantity to be paid for will be that quantity indicated in the contract documents and/or shown on the drawings, regardless of errors in calculations, except as may be modified by the following.
- C. Plan Quantities will be adjusted:
 1. When a complete structure element has been erroneously included or omitted from the drawings, the quantity shown on the drawings for that element will be added to or deducted from the plan quantity and included for payment. A complete structure element will be the smallest portion of a total structure for which a quantity is included on the drawings. Quantities revised in this manner will not be subject to the provisions of the "General Conditions", Article 11.
 2. When the plan quantity for a complete structure element is in error by 5 percent or more, a recalculation will be made and the corrected quantity included for payment. Quantities revised in this manner will not be subject to the provisions of the "General Conditions", Article 11.
 3. When quantities are revised by a change in design, the "plan quantity" will be increased or decreased by the amount involved in the design change. Quantities revised in this manner will be subject to the provisions of the "General Conditions", Article 11.
 - a. The party to the contract requesting the adjustment shall present to the other, a copy of the description and location, together with calculations of the quantity for the structure element involved. When this quantity is certified correct by the Engineer or designated representative, it will become the revised plan quantity.
 - b. Payment for increased or decreased costs due to a change in design on those items measured as "Cubic Yard", "Each", "Square Foot", "Square Yard" or "Linear Foot" will be determined by Change Order. Quantities revised in this manner will be subject to the provisions of the "General Conditions", Article 11.

- c. The unit prices bid for the various classes of concrete shown shall include full compensation for furnishing, hauling, and mixing all concrete material; placing, finishing and curing all concrete; all grouting, pointing and finishing; furnishing and placing drains; furnishing and placing metal flashing strips; furnishing and placing expansion joint material required by this item; and for all forms and false work, labor, tools, equipment and incidentals necessary to complete the work.

1.13 Measurement and Payment

- A. No direct measurement or payment will be made for the work to be done, the equipment or materials to be furnished under this item, but shall be included in the lump sum bid for the item of construction in which this item is used.

Pay Item No. 403S:	(Structure or Structural Component)	Lump Sum
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END

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item 403S, "Concrete For Structures"	
City of Austin Standard Specification Items	
Designation	Description
Item No. 401S	Structural Excavation and Backfill
Item No. 410S	Concrete Structures
Item No. 411S	Surface Finishes for Concrete
Texas Department of Transportation: Departmental Material Specifications	
Designation	Description
DMS-4640	Chemical Admixtures for Concrete
American Association of State Highway & Transportation Officials, AASHTO Standard Method of Test for	
Designation	Description
Method T 26	Quality of Water to be Used in Concrete
American Concrete Institute, ACI	
Designation	Description
ACI 211.1	Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
American Society for Testing and Materials, ASTM	
Designation	Description
ASTM C 94	Specification For Ready-Mixed Concrete
ASTM C 150	Specification For Portland Cement
ASTM C 685	Concrete Made By Volumetric Batching and Continuous Mixing
ASTM C-1260	Standard Test Method for Potential Alkali Reactivity of Aggregates
ASTM D-512	Test Methods for Chloride Ion in Water
ASTM D-516	Test Methods for Sulfate Ion in Water
ASTM D-4191	Test Method for Sodium in Water by Atomic Absorption
ASTM D-4192	Test Method for Potassium Water by Atomic Absorption

Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
TEX-203-F	Sand Equivalent Test
TEX-401-A	Sieve Analysis of Fine and Coarse Aggregate
TEX-406-A	Mineral Finer than 75 µm (No. 200) Sieve in Mineral Aggregates (Decantation Test for Concrete Aggregates)
TEX-408-A	Organic Impurities in Fine Aggregate for Concrete
TEX-410-A	Abrasion of Coarse Aggregate Using The Los Angeles Machine
TEX-411-A	Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
TEX-413-A	Determination of Deleterious Materials in Mineral Aggregate
TEX-415-A	Slump of Portland Cement Concrete
TEX-416-A	Air Content of Freshly-Mixed Concrete by the Pressure Method
TEX-418-A	Compressive Strength of Cylindrical Concrete Specimens
TEX-612-J	Acid Insoluble Residue

Texas Department of Transportation: Publications

Designation	Description
Bulletin C-11	Construction Bulletin

Texas Department of Transportation: Departmental Material Specifications

Designation	Description
DMS-4610	Fly Ash
DMS-4620	Ground Granulated Blast-Furnace Slag
DMS-4630	Silica Fume
DMS-4635	Metakaolin

RELATED CROSS REFERENCE MATERIALS

Standard Specification Item 403S, "Concrete For Structures"

Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges

Designation	Description
Item 360	Concrete Pavement
Item 420	Concrete Structures
Item 421	Hydraulic Cement Concrete
Item 427	Surface Finishes for Concrete
Item 431	Pneumatically Placed Concrete
Item 520	Weighing and Measuring Equipment

Texas Department of Transportation: Departmental Material Specifications

Designation	Description
DMS-4650	Hydraulic Cement Concrete Curing Materials and Evaporation Retardants
DMS-6100	Epoxy and Adhesives
DMS 8900	Fly Ash

PART 1 -- GENERAL

1.1 Description

- A.** This item shall govern material requirements of admixtures for Portland cement concrete.
- B.** This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

1.2 Submittals

The submittal requirements of this specification item include:

- A.** Type and manufacturer of any proposed admixture.
- B.** Certification that proposed admixture meet the requirements of this specification, ASTM C260 and ASTM C494.
- C.** For a specific mix design, a statement of compatibility of products shall be submitted when admixtures from multiple manufacturers are proposed.

1.3 Materials

- A.** All admixture submittals must be approved by the Engineer or designated representative. No admixture shall be chloride-based or have chloride(s) added in the manufacturing process. Admixtures must be pretested by the Texas Department of Transportation (TXDOT) Materials and Tests Engineer and be included in the State's current approved admixture list. All admixtures must retain an approved status through the duration of a mix design's one-year approval period.
 - 1.** Air Entraining Admixture: An "Air Entraining Admixture" is defined as a material which, when added to a concrete mixture in the proper quantity, will entrain uniformly dispersed microscopic air bubbles in the concrete mix. The admixture shall meet the requirements of ASTM Designation: C 260 modified as follows:
 - a.** The cement used in any series of test shall be either the cement proposed for the specific work or a "reference" Type I cement from one mill.
 - b.** The air entraining admixture used in the reference concrete shall be Neutralized Vinsol Resin.
 - 2.** Water-reducing Admixture: A "Water-reducing Admixture" is defined as a material which, when added to a concrete mixture in the correct quantity, will reduce the quantity of mixing water required to produce concrete of a given consistency and required strength. This admixture shall conform to ASTM C 494, Type A.
 - 3.** Accelerating Admixture: An "Accelerating Admixture" is defined as an admixture that accelerates the setting time and the early strength development of concrete. This admixture shall conform to ASTM C 494, Type C. The accelerating admixture will contain no chlorides.
 - 4.** Water-reducing, Retarding Admixture: A "Water-reducing, Retarding Admixture" is defined as a material which, when added to a concrete mixture in the correct quantity, will reduce the quantity of mixing water required to produce concrete of a given consistency and retard the initial set of the concrete. This admixture shall conform to ASTM C 494, Type D.

5. High-range Water Reducing Admixtures: A "High-range Water Reducing Admixture", referred to as a superplasticizer, is defined as a synthetic polymer material which, when added to a low slump concrete mixture increases the slump without adversely affecting segregation, impermeability or durability of the mix. This admixture shall conform to ASTM C 494, Type F or G.
6. Fly Ash: Fly ash used in Portland cement concrete as a substitute for Portland cement or as a mineral filler shall comply with TXDOT Materials Specification D-9-8900 and be listed on TXDOT's current list of approved fly ash sources. Fly ash obtained from a source using a process fueled by hazardous waste (30 Texas Administrative Code, Section 335.1) shall be prohibited. This applies to any other specification concerning the use of fly ash. Contractor shall maintain a record of source for each batch. Supplier shall certify that no hazardous waste is used in the fuel mix or raw materials.

1.4 Certification and Product Information

- A. The Contractor shall submit the name of the admixture proposed and manufacturer's certification that the selected admixtures meet the requirements of this item and of ASTM C 260 and C 494 as applicable. Admixtures for a mix design shall be of the same brand. If more than one admixture is proposed in the concrete mix, a statement of compatibility of components shall accompany certification. Manufacturer's product literature shall specify when in the batching/mixing operation the admixture must be added.
- B. The Engineer or designated representative may request additional information such as infrared spectrophotometry scan, solids content, pH value, etc., for further consideration. Any unreported changes in formulation discovered by any of the tests prescribed herein may be cause to permanently bar the manufacturer from furnishing admixtures for Owner's work.

1.5 Construction Use of Admixtures

- A. All admixtures used shall be liquid except high-range water reducers which may be a powder. Liquid admixtures shall be agitated as needed to prevent separation or sedimentation of solids; however, air agitation of Neutralized Vinsol Resin will not be allowed.
- B. No admixture shall be dispensed on dry aggregates. Admixtures shall be dispensed at the batching site separately, but at the same time as the mixing water. Only high range water reducers may be introduced into the mix at the job site.
- C. When other admixtures are used with fly ash, the amount of the other admixture to be used shall be based on the amount of Portland cement only and not the amount of Portland cement and fly ash.
- D. When high-range water reducers are to be added at the job site, transit mixers shall be used. Admixture manufacturer literature shall indicate recommended mixing methods and time for the specific equipment and mix design used. The transit mix equipment shall not be loaded in excess of 63 percent of its rated capacity to ensure proper mixing of the admixture at the site. If during discharging of concrete a change in slump in excess of 30% is noted, the remaining concrete shall be rejected unless prior approval was given by the Engineer or designated representative to retemper a load with a second charge of admixture. Retempering with water shall not be allowed.
- E. Accelerating admixtures will not be permitted in combination with Type II cement.
- F. All mixes with air entrainment shall have a minimum relative durability factor of 80 in accordance with ASTM C 260. Dosage of air entrainment admixtures may be adjusted

by the Contractor to stay within the specified tolerances for air entrainment of Standard Specification Item No. 403S, "Concrete for Structures".

1.6 Measurement and Payment

- A.** The requirements of this specifications shall not be measured and paid for directly, but shall be included in the unit price bid for the item of construction in which this item is used.

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item No. 405S, "Concrete Admixtures"	
City of Austin Standard Specifications	
Designation	Description
Item No. 403S	Concrete for Structures
American Society for Testing and Materials, ASTM	
Designation	Description
ASTM C260	Air-Entraining Admixtures for Concrete
ASTM C495	Chemical Admixtures for Concrete
Texas Department of Transportation: Department Material Specification	
Designation	Description
DMS-8900	Fly Ash

RELATED CROSS REFERENCE MATERIALS	
Specification Item No. 405S, "Concrete Admixtures"	
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item 360	Concrete Pavement
Item 420	Concrete Structures
Item 421	Portland Cement Concrete
Item 427	Surface Finishes for Concrete
Item 431	Pneumatically Placed Concrete
Item 437	Concrete Admixtures
Item 520	Weighing and Measuring Equipment
Item 522	Portland Cement Concrete Plants
Item 524	Hydraulic Cement

END

PART 1 -- GENERAL

1.1 Description

- A.** This item shall govern furnishing and placement of reinforcing steel, deformed and smooth, of the size and quantity indicated on the drawings and in accordance with these specifications.
- B.** This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

1.2 Submittals

The submittal requirements of this specification item may include:

- A.** Evidence that the steel reinforcement producer is included on the TXDOT list of approved producing mills
- B.** Listing of the size, grade, type and quantity of reinforcing steel proposed for the project.
- C.** If welding of reinforcing steel is proposed, evidence that carbon equivalent (C.E.) of the proposed steel is at least 0.55% with a report of chemical analysis showing the percentages of elements necessary to establish C.E.
- D.** If epoxy coated steel is proposed, evidence that the steel reinforcement producer is included on the TXDOT list of approved epoxy coating applicators
- E.** If epoxy coated steel is proposed, written certification that the epoxy-coated reinforcing steel meets the requirements of this Item with a copy of the manufacturer's control tests.
- F.** When mechanical splices are proposed, the types of couplers proposed for use.

1.3 Materials

A. Approved Mills

- 1.** Prior to furnishing reinforcing steel, the producing mills must be included on the list of approved producing mills that is maintained by the Construction Division of the State of Texas Department of Transportation

B. Deformed Bars and Wire Reinforcement

- 1.** Unless indicated otherwise on the drawings, Bar reinforcement shall be Grade 60 and deformed. Reinforcing steel must conform to one of the following:
 - a.** ASTM A615/615M, Grades 40 or 60 (300 or 420)
 - b.** ASTM A996/996M, Type A, Grades 40 or 60 (300 or 420)
 - c.** ASTM A996/996M, Type R, Grade 60 (420), permitted in concrete pavement only (furnished as straight bars only without bends. Bend tests are not required)
 - d.** ASTM A706/706M
- 2.** In cases where the provisions of this item are in conflict with the provisions of the ASTM Designation to which reference is made, the provisions of this item shall govern.

3. The nominal size, area and weight (mass) of reinforcing steel bars covered by these specifications are as follows:

Bar Size Number 1/8 ins (mm)	Nominal Diameter, inches (mm)	Nominal Area, Sq. ins. (mm ²)	Weight/Linear Foot Lbs. (kg)
2 (6)	0.250 (6.6)	0.05 (32)	0.167 (.075)
3 (10)	0.375 (9.5)	0.11 (71)	0.376 (.171)
4 (13)	0.500 (12.5)	0.20 (127)	0.668 (.303)
5 (16)	0.625 (15.5)	0.31 (198)	1.043 (.473)
6 (19)	0.750 (19.0)	0.44 (285)	1.502 (.681)
7 (22)	0.875 (22.0)	0.60 (388)	2.044 (.927)
8 (25)	1.000 (25.5)	0.79 (507)	2.670 (2.211)
9 (29)	1.128 (28.5)	1.00 (641)	3.400 (1.542)
10 (32)	1.270 (32.0)	1.27 (792)	4.303 (1.952)
11 (36)	1.410 (36.0)	1.56 (958)	5.313 (2.410)
14 (43)	1.693 (43.0)	2.25 (1552)	7.65 (3.470)
18 (57)	2.257 (57.5)	4.00 (2565)	13.60 (6.169)

4. Smooth, round bars shall be designated by size number through a No. 4. Smooth bars above No. 4 shall be designated by diameter in inches.

C. Smooth Bar and Spiral Reinforcement

- Smooth bars and dowels for concrete pavement must have a minimum yield strength of 60 ksi (414 MPa) and meet ASTM A615/615M. Smooth bars that are greater in diameter than a No. 3 (10 mm) designation shall conform to ASTM A615 or meet the physical requirements of ASTM A36.
- Spiral reinforcement shall be either smooth or deformed bars or wire of the minimum size or gauge indicated on the drawings. Bars for spiral reinforcement shall comply with ASTM A615 Grade 40(300), ASTM A996, Type A, Grade 40 (300); or ASTM A675, Grade 80(550), meeting dimensional requirements of ASTM A615. Smooth wire shall comply with ASTM A82, and deformed wire shall comply with ASTM A496.

D. Weldable Reinforcing Steel

- Reinforcing steel to be welded must comply with ASTM A706 or have a carbon equivalent (C.E.) of at most 0.55%. A report of chemical analysis showing the percentages of elements necessary to establish C.E. is required for reinforcing steel that does not meet ASTM A706 to be structurally welded. No tack welding will be allowed. All welding shall conform to the requirements of AWS D1.1/D1.1M.
- Carbon Equivalent (C.E.) shall be calculated as follows:

$$\text{C.E.} = \%C + 1.67*(\% \text{ Mn}) + .025*(\% \text{ Cu}) + .05*(\% \text{ Ni}) + .01*(\% \text{ Cr}) - .02*(\% \text{ Mo}) - .1*(\% \text{ V})$$

Where C is carbon,

Mn is manganese

Cu is copper

Ni is nickel
 Cr is chromium
 Mo is molybdenum, and
 V is vanadium.

3. The requirements above do not apply to the following miscellaneous welding applications:
 - a. Splicing reinforcing steel to extend bars in the bottom of a drilled shaft;
 - b. Attaching chairs to the reinforcing steel cage of a drilled shaft;
 - c. Armor joints and their supports;
 - d. Screed rail and form hanger supports where permitted on steel units;
 - e. Reinforcing steel to R-bars for lateral stability between prestressed beams, spirals, or bands of reinforcing bars in drilled shaft cages;
 - f. Permanent bridge deck forms;
 - g. Steel added in railing when slip-form construction is used; and
 - h. Other similar miscellaneous members that have no load carrying capacity in the completed structure.

E. Welded Wire Fabric

1. Wire shall conform to the requirements of the Standard Specifications for Cold-Drawn Steel Wire for Concrete Reinforcement, ASTM A 82 or A 496. Wire fabric, when used as reinforcement, shall conform to ASTM A 185 or A 497.
2. When wire is ordered by size numbers, the following relation between size number, diameter in inches and area shall apply unless otherwise indicated on the drawings:

Size, W Number 1/100 in ² (mm ²)	Nominal Diameter inch (mm)	Nominal Area, sq. inches (mm ²)
31 (200)	0.628 (16.0)	0.310 (200)
30 (194)	0.618 (15.7)	0.300 (194)
28 (181)	0.597 (15.2)	0.280 (181)
26 (168)	0.575 (14.6)	0.260 (168)
24 (155)	0.553 (14.0)	0.240 (155)
22 (142)	0.529 (13.4)	0.220 (142)
20 (129)	0.505 (12.8)	0.200 (129)
18 (116)	0.479 (12.2)	0.180 (116)
16 (103)	0.451 (11.5)	0.160 (103)
14 (90)	0.422 (10.7)	0.140 (90)
12 (77)	0.391 (9.9)	0.120 (77)
10 (65)	0.357 (9.1)	0.100 (65)
8 (52)	0.319 (8.1)	0.080 (52)
7 (45)	0.299 (7.6)	0.070 (45)

Size, W Number 1/100 in² (mm²)	Nominal Diameter inch (mm)	Nominal Area, sq. inches (mm²)
6 (39)	0.276 (7.0)	0.060 (39)
5.5 (35)	0.265 (6.7)	0.055 (35)
5 (32)	0.252 (6.4)	0.050 (32)
4.5 (29)	0.239 (6.1)	0.045 (29)
4 (26)	0.226 (5.7)	0.040 (26)
3.5 (23)	0.211 (5.4)	0.035 (23)
3 (19)	0.195 (5.0)	0.030 (19)
2.5 (16)	0.178 (4.5)	0.025 (16)
2 (13)	0.160 (4.1)	0.020 (13)
1.5 (9)	0.138 (3.5)	0.015 (9.7)
1.2 (8)	0.124 (3.1)	0.012 (7.7)
1 (6)	0.113 (2.9)	0.010 (6.5)
0.5 (3)	0.080 (2.0)	0.005 (3.2)

3. Where deformed wire is required, the size number shall be preceded by D and for smooth wire the prefix W shall be shown.
4. Welded wire fabric shall be designated as follows: 6 x 12 - W16 x W8, which indicates a 6 in. (150 mm) longitudinal wire spacing and 12-in (300 mm) transverse wire spacing with smooth No. 16 (103) wire longitudinally and smooth no. 8 (52) wire transversely.

F. Epoxy Coating

1. Epoxy coating shall be required as indicated on the drawings. Prior to furnishing epoxy-coated reinforcing steel, the epoxy applicator must be included on the list of approved applicators that is maintained by the Construction Division of the State of Texas Department of Transportation.
2. The reinforcing steel shall be epoxy coated in accordance with the following.

Epoxy Coating Requirements for Reinforcing Steel

Material	Specification
Bar	ASTM A775 or A934
Wire or Fabric	ASTM A884 Class A or B
Mechanical Coupler	As indicated on the drawings
Hardware	As indicated on the drawings

3. The epoxy coating material and coating repair material shall comply with TxDOT's DMS-8130, "Epoxy Powder Coating for Reinforcing Steel". The applicator shall not

patch more than ¼ inch total length in any foot (20 mm total length in any meter) at the applicator's plant.

4. The epoxy-coated reinforcing steel shall be sampled and tested in accordance with TxDOT Test Method Tex-739-I, "Sampling and Testing Epoxy Coated Reinforcing Steel".
5. The identification of all reinforcing steel shall be maintained throughout the epoxy coating and fabrication and until delivery to the project site.
6. Written certification that the epoxy-coated reinforcing steel meets the requirements of this Item shall be provided along with a copy of the manufacturer's control tests.

G. Mechanical Couplers

1. When mechanical splices in reinforcing steel bars are indicated on the drawings, the following types of couplers may be used:
 - a. Sleeve-filler
 - b. Sleeve-threaded
 - c. Sleeve-swaged, or
 - d. Sleeve-wedge.

H. Chairs and Supports

1. Chairs and Supports shall be steel, precast mortar or concrete blocks cast in molds meeting the approval of the Engineer or designated representative of sufficient strength to position the reinforcement as indicated on the drawings when supporting the dead load of the reinforcement, the weight of the workers placing concrete and the weight of the concrete bearing on the steel. Chairs shall be plastic coated when indicated on the drawings.

Chair Types and Applicable Uses	
Structural or Architectural Elements (columns, beams, walls, slabs) exposed to weather, not subjected to sand blasting, water blasting or grinding.	Galvanized steel or steel chairs with plastic coated feet.
Structural or Architectural Elements exposed to weather and subject to sand blasting, water blasting or grinding.	Stainless steel chairs.
Structural or Architectural Elements not exposed to weather or corrosive conditions.	Uncoated steel chairs
Slabs and grade beams cast on grade.	Steel chairs with a base with 9 inch ² (58 cm ²) minimum area or sufficient area to prevent the chair from sinking into fill or subgrade. Precast mortar or concrete blocks meeting the requirements of this item may be used.

1.4 Bending

1. The reinforcement shall be bent cold, true to the shapes indicated on the drawings. Bending shall preferably be done in the shop. Irregularities in bending shall be cause for rejection. Improperly fabricated, damaged or broken bars shall be replaced at no additional expense to the City. Damaged or broken bars embedded in a previous concrete placement shall be repaired using a method approved by the Engineer or designated representative.
2. Unless otherwise indicated on the drawings, the inside diameter of bar bends, in terms of the nominal bar diameter (d), shall be as follows:
 - a. Bends of 90 degrees and greater in stirrups, ties and other secondary bars that enclose another bar in the bend.

Bar Number in 1/8 inches (mm)	Diameter
3, 4, 5 (10, 13, 16)	4d
6, 7, 8	6d

- b. All bends in main bars and in secondary bars not covered above.

Bar Number in 1/8 inches (mm)	Diameter
3 thru 8 (10 thru 25)	6d
9, 10, 11 (29, 32, 36)	8d
14, 18 (43, 57)	10d

1.5 Tolerances

- A. Fabricating tolerances for bars shall not be greater than shown on Standard (Detail) 406S-1.

1.6 Storing

- A. Steel reinforcement shall be stored above the surface of the ground upon platforms, skids or other supports and shall be protected as far as practicable from mechanical injury and surface deterioration caused by exposure to conditions producing rust. When placed in the work, reinforcement shall be free from dirt, paint, grease, oil or other foreign materials. Reinforcement shall be free from injurious defects such as cracks and laminations. Rust, surface seams, surface irregularities or mill scale will not be cause for rejection, provided the minimum dimensions, cross sectional area and tensile properties of a hand wire brushed specimen meets the physical requirements for the size and grade of steel indicated on the drawings.

1.7 Splices

- A. Splicing of bars, except when indicated on the drawings or specified herein, will not be permitted without written approval of the Engineer or designated representative. No substitution of bars will be allowed without the approval of the Engineer or designated representative. Any splicing of substituted bars shall conform to the requirements in the Table below.
- B. Splices not indicated on the drawings will be permitted in slabs not more than 15 inches (380 mm) in thickness, columns, walls and parapets.

- C.** Splices will not be permitted in bars 30 feet (9.1 meters) or less in plan length unless otherwise approved. For bars exceeding 30 feet (9.1 meters) in plan length, the distance center to center of splices shall not be less than 30 feet (9.1 meters) minus 1 splice length, with no more than 1 individual bar length less than 10 feet (3 meters). Splices not indicated on the drawings, but permitted hereby, shall conform to the Table below. The specified concrete cover shall be maintained at such splices and the bars placed in contact and securely tied together.

Minimum Lap Requirements		
Bar Number in 1/8 inches (mm)	Uncoated Lap Length	Coated Lap Length
3 (10)	1 foot 4 inches (0.4 meters)	2 foot 0 inches (0.610 meters)
4 (13)	1 foot 9 inches (0.533 meters)	2 foot 8 inches (0.813 meters)
5 (16)	2 foot 2 inches (0.660 meters)	3 feet 3 inches (0.991 meters)
6 (19)	2 foot 7 inches (0.787 meters)	3 feet 11 inches (1.194 meters)
7 (22)	3 feet 5 inches (1.041 meters)	5 feet 2 inches (1.575 meters)
No. 8 (25)	4 feet 6 inches (1.372 meters)	6 feet 9 inches (2.057 meters)
No. 9 (29)	5 feet 8 inches (1.727 meters)	8 feet 6 inches (2.591 meters)
No. 10 (32)	7 feet 3 inches (2.210 meters)	10 feet 11 inches (3.327 meters)
No. 11 (36)	8 feet 11 inches (2.718 meters)	13 feet 5 inches (4.089 meters)

- D.** Spiral steel shall be lapped a minimum of 1 turn. Bar No. 14 and No. 18 may not be lapped.
- E.** Welded wire fabric shall be spliced using a lap length that includes an overlap of at least 2 cross wires plus 2 inches (50 mm) on each sheet or roll.
- F.** Splices using bars that develop equivalent strength and are lapped in accordance with the table above are permitted.
- G.** Welding of reinforcing bars may be used only where indicated on the drawings or as permitted herein. All welding operations, processes, equipment, materials, quality of work and inspection shall conform to the requirements indicated on the drawings. All splices shall be of such dimension and character as to develop the full strength of the bar being spliced.
- H.** End preparation for butt-welding reinforcing bars shall be done in the field, except Bar No. 6 and larger shall be done in the shop. Delivered bars shall be of sufficient length to permit this practice.
- I.** For box culvert extensions with less than 1 foot (0.3 meters) of fill, the existing longitudinal bars shall have a lap with the new bars as shown in the table above. For

box culvert extensions with more than 1 foot (0.3 meters) of fill, a minimum lap of 12 inches (300 mm) will be required.

- J. Unless otherwise indicated on the drawings, dowel bars transferring tensile stresses shall have a minimum embedment equal to the minimum lap requirements shown in the table above. Shear transfer dowels shall have a minimum embedment of 12 inches (300 mm).

1.8 Placement

- A. Reinforcement shall be placed as near as possible in the position indicated on the drawings. Unless otherwise indicated on the drawings, dimensions shown for reinforcement are to the centers of the bars. In the plane of the steel parallel to the nearest surface of concrete, bars shall not vary from plan placement by more than 1/12 of the spacing between bars. In the plane of the steel perpendicular to the nearest surface of concrete, bars shall not vary from plan placement by more than ¼ inch (6 mm). Cover of concrete to the nearest surface of steel shall be as follows:

	Minimum Cover, Inches (mm)
Concrete cast against and permanently exposed to earth	3 (76 mm)
Concrete exposed to earth or weather:	
Bar No. 6 (19) through No. 18 bars (57)	2 (51 mm)
Bar No. 5 (16), W31 (W200) or D31 (D200) wire and smaller	1½ (38 mm)
Concrete not exposed to weather or in contact with ground:	
Slabs, walls, joists:	
Bar No. 14 (43) and 18 (57)	1½ (38mm)
Bar No. 11 (36) and smaller	1 (25 mm)
Beams, columns:	
Primary reinforcement, ties, stirrups, spirals	1 ½ (38 mm)
Shells, folded plate members:	
Bar No. 6 (19) and larger	1 (25 mm)
Bar No. 5 (16), W31 (W200) or D31 (D200) wire, and smaller	1 (25 mm)

- B. Vertical stirrups shall always pass around the main tension members and be attached securely thereto.
- C. The reinforcing steel shall be located accurately in the forms and held firmly in place before and during concrete placement by means of bar supports that are adequate in strength and number to prevent displacement and to keep the steel at the required distance from the form surface. Bars shall be supported by means of approved galvanized metal spacers, metal spacers with plastic coated tips, stainless steel spacers, plastic spacers or approved precast mortar or concrete blocks when supports are in contact with removable or stay-in-place forms. Bright basic bar supports shall be used to support reinforcing steel placed in slab overlays on concrete panels or on

existing concrete slabs. Bar supports in contact with soil or subgrade shall be approved.

- D.** For bar supports with plastic tips, the plastic protection must be at least 3/32 in. (2.4 mm) thick and extend upward on the wire to a point at least ½ in. (12.5 mm) above the formwork.
- E.** For approval of plastic spacers on a project, representative samples of the plastic shall show no visible indications of deterioration after immersion in a 5 percent solution of sodium hydroxide for 120 hours.
- F.** All accessories such as tie wires, bar chairs, supports, or clips used with epoxy-coated reinforcement shall be of steel, fully coated with epoxy or plastic. When approved by the Engineer or designated representative, plastic supports may also be used with epoxy-coated reinforcement.
- G.** All reinforcing steel shall be tied at all intersections, except that where spacing is less than 1 foot (300 mm) in each direction, alternate intersections only need be tied. For reinforcing steel cages for other structural members, the steel shall be tied at enough intersections to provide a rigid cage of steel. Mats of wire fabric shall overlap each other 1 full space as a minimum to maintain a uniform strength and shall be tied at the ends and edges.
- H.** Where prefabricated deformed wire mats are specified or if the Contractor requests, welded wire fabric may be substituted for a comparable area of steel reinforcing bar plan, subject to the approval of the Engineer or designated representative.
- I.** Mortar or concrete blocks shall be cast to uniform dimensions with adequate bearing area. A suitable tie wire shall be provided in each block, to be used for anchoring to the steel. Except in unusual cases and when specifically authorized by the Engineer, the size of the surface to be placed adjacent to the forms shall not exceed 2½ inches (63.5 mm) square or the equivalent thereof in cases where circular or rectangular areas are provided. Blocks shall be cast accurately to the thickness required and the surface to be placed adjacent to the forms shall be a true plane, free of surface imperfections. The blocks shall be cured by covering them with wet burlap or mats for a period of 72 hours. Mortar for blocks should contain approximately 1 part hydraulic cement to three parts sand. Concrete for blocks should contain 850 pounds of hydraulic cement per cubic yard (500 kilograms per cubic meter) of concrete
- J.** Individual bar supports shall be placed in rows at 4-ft (1.22 meters) maximum spacing in each direction. Continuous type bar supports shall be placed at 4-ft (1.22 meters) maximum spacing. Continuous bar supports shall be used with permanent metal deck forms.
- K.** The exposure of the ends of longitudinals, stirrups and spacers used to position the reinforcement in concrete pipe and in precast box culverts or storm drains is not a cause for rejection.
- L.** Reinforcing steel for bridge slabs, top slabs of direct traffic culverts, and top slabs of prestressed box beams at all intersections, except tie only alternate intersections where spacing is less than 1 ft. (300 mm) in each direction.
- M.** For steel reinforcing cages for other structural members, reinforcement shall be supported and tied in such a manner that a sufficiently rigid cage of steel is provided. Fasten mats of wire fabric securely at the ends and edges. If the cage is not adequately supported to resist settlement or floating upward of the steel, overturning of truss bars or movement in any direction during concrete placement, permission to continue concrete placement will be withheld until corrective measures are taken. Sufficient

measurements shall be made during concrete placement to insure compliance with the above.

- N.** No concrete shall be deposited until the Engineer or designated representative has reviewed the placement of the reinforcing steel and all mortar, mud, dirt, etc, shall be cleaned from the reinforcement, forms, workers' boots and tools. Do not place concrete until authorized by the Engineer or designated representative.

1.9 Handling, Placement and Repair of Epoxy-coated Reinforcement Steel

A. Handling

- 1.** Systems for handling coated-reinforcement with padded contact areas shall be provided. Handling bands shall be padded to prevent damage to the coating. Bundles of coated reinforcement shall be lifted with a strongback, spreader bar, multiple supports or a platform bridge. The bundled reinforcement shall be carefully transported and stored on protective cribbing. The coated reinforcement should not be dropped or drug during handling.

B. Construction Methods

- 1.** Coated reinforcement shall not be flame-cut but shall be sawn or shear-cut only when approved. Cut ends shall be coated as specified in Section C, "Repair of Coating".
- 2.** Coated reinforcement steel shall not be welded or mechanically coupled except where specifically indicated on the drawings. When welding or coupling is indicated on the drawing, the epoxy coating shall be removed at least 6 in. (150 mm) beyond the weld limits before welding and 2 in. (50 mm) beyond the limits of the mechanical coupler before assembly. After the welding or coupling operation is completed the steel shall be cleaned of oil, grease, moisture, dirt, welding contamination (slag or acid residue) and rust to a near-white finish. The existing epoxy coating shall be examined for damage and any damaged or loose epoxy shall be removed to expose sound epoxy coating.
- 3.** After cleaning the coated-steel, the splice area shall be coated with epoxy repair material to a thickness of 7 to 17 mils (0.18 to 0.43 mm) after curing. A second application of the repair material shall be applied to the bar and coupler interface to ensure complete sealing of the joint.

C. Repair of Coating

- 1.** The material used for coating repair shall comply with the requirements of this Item and ASTM D3963/D3963M, "Specification for Fabrication and Jobsite Handling of Epoxy-coated Reinforcing Steel Bars". Repairs shall be made in accordance with procedures recommended by the manufacturer of the epoxy coating powder. For areas to be patched, a minimum coating thickness as required for the original coating shall be applied. All visible damage to the coating shall be repaired.
- 2.** Sawed and sheared ends, cuts, breaks and other damage shall be promptly repaired before additional oxidation occurs. The areas to be repaired shall be cleaned to ensure that they free from surface contaminants. Repairs shall be made in the shop or in the field as required.

1.10 Measurement and Payment

- A.** Measurement of the Specification Item, "Reinforcing Steel", as specified herein as "Reinforcing Steel or Epoxy-Coated Reinforcing Steel", will be by the "Lump Sum".
- B.** Payment, when included as a contract pay item, will be made under:

Pay Item No. 406S:	Reinforcing Steel or Epoxy-Coated Reinforcing Steel	Lump Sum
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END

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item 406S, "Reinforcing Steel"	
American Society for Testing and Materials, ASTM	
Designation	Description
ASTM A 36/A 36M	Carbon Structural Steel
ASTM A 82	Steel Wire, Plain, for Concrete Reinforcement
ASTM A 185	Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 496	Steel Wire, Deformed, for Concrete Reinforcement
ASTM A 497	Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615/A 615M	Deformed and Plain Billet-steel Bars for Concrete Reinforcement
ASTM A 675/A 675M	Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
ASTM A 706/A 706M	Low- Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 775/A 775M	Epoxy-Coated Reinforcing Steel Bars
ASTM A 884/A 884M	Epoxy-Coated Steel Wire and Welded Wire Fabric For Reinforcement
ASTM A 934/A 934M	Epoxy-Coated Prefabricated Reinforcing Steel Bars
ASTM A 996/A 996M	Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
ASTM D3963/D3963M	Fabrication and Jobsite Handling of Epoxy-coated Reinforcing Steel Bars
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
Tex-739-I	Sampling and Testing Epoxy Coated Reinforcing Steel
City of Austin Standard (Details)	
Designation	Description
Standard 406S-1	Reinforced Steel Tolerances
Texas Department of Transportation: Departmental Material Specifications	
Designation	Description

DMS 8130	Epoxy Powder Coating for Reinforcing Steel
American Welding Society	
Designation	Description
AWS D1.1/D1.1M	Structural Welding Code

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item 406S, "Reinforcing Steel"	
City of Austin Standard Specification Items	
Designation	Description
Item No. 360	Concrete Pavement
Item No. 403S	Concrete for Structures
Item No. 410S	Concrete Structures
Item No. 414S	Concrete Retaining Walls
Item No. 420S	Drilled Shaft Foundations
Item No. 830S	Traffic Signal Controller Foundation
Item No. 831S	Traffic Signal Drilled Shaft Foundation
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 360	Concrete Pavement
Item No. 420	Concrete Structures
Item No. 421	Hydraulic Cement Concrete
Item No. 422	Reinforced Concrete Slab
Item No. 423	Retaining Walls
Item No. 440	Reinforcing Steels

END

PART 1 -- GENERAL

1.1 Description

- A.** This item shall govern the furnishing of all materials and the application by the methods of construction indicated on the Drawings for the application of a surface finish to concrete.
- B.** This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

1.2 Submittals

The submittal requirements of this specification item include:

- A.** Type and manufacturer of cement(s).
- B.** Type and manufacturer of membrane curing compound.
- C.** Type and manufacturer of adhesive grout.
- D.** Type and manufacturer of resin paint.
- E.** Samples as requested.
- F.** Locations of proposed grade/class of finishes.

1.3 Materials

- A.** Masonry Sand
 - 1.** Masonry sand shall conform to ASTM C 144.
- B.** White Cement
 - 1.** White cement shall conform to ASTM C 150.
- C.** Portland Cement
 - 1.** All cement unless otherwise indicated shall be Portland cement conforming to ASTM C 150.
 - 2.** Portland cement manufactured in a cement kiln fueled by hazardous waste shall be considered as an approved product if the production facility is authorized to operate under regulation of the Texas Natural Resource Conservation Commission (TNRCC) and the U. S. Environmental Protection Agency (EPA). Supplier shall provide current TNRCC and EPA authorizations to operate the facility.
- D.** Membrane Curing
 - 1.** Membrane curing shall conform to Item No. 409S, "Membrane Curing".
- E.** Adhesive Grout
 - 1.** This subsection sets forth the requirements for three epoxy adhesives with different viscosities designed to bond fresh Portland Cement concrete to existing Portland
 - 2.** Cement concrete, hardened concrete to hardened concrete and steel to fresh or hardened concrete. These adhesives are as follows:

3. Type V: Standard (medium viscosity) for applying to horizontal and vertical surfaces. This material is suitable for surface sealing of fine cracks in concrete.
4. Type VI: Low viscosity for application with spray equipment to horizontal surfaces.
5. Type VII: Paste consistency for overhead application and where a high buildup is required. This material is suitable for surface sealing of cracks in concrete, which are veed out prior to sealing, and for grouting of dowel bars where clearance is 1/16 inch (1.6 mm) or less.
 - a. Mixing Ratio: The ratio of resin and hardener components to be mixed together to form the finished adhesive shall be either 1 to 1 or 2 to 1 by volume.
 - 1) Any specific coloring of resin and/or hardener components desired will be stated by the Engineer or designated representative.
 - 2) Fillers, pigments and thixotropic agents. All fillers, pigments and/or thixotropic agents in either the epoxy resin or hardener component must be of sufficiently fine particle size and dispersed so that no appreciable separation or settling will occur during storage.
 - 3) Any fillers present in the low viscosity version must be of such a nature that they will not interfere with application by spray equipment or abrade or damage such equipment.
 - 4) The concrete adhesive shall contain no volatile solvents.
 - b. Consistency: The adhesives shall comply with the following:

	Type V	Type VI	Type VII
Viscosity of mixed adhesive 77° ± 1°F, (25° ± -17°C) Poises	400 Maximum	150 Maximum	must be sufficiently fluid to apply by trowel or spatula without difficulty
Pot Life at 77°F (25°C), minutes minimum - 30			
Set Time at 77°F (25°C) (Time required to attain 180 psi (1.3 mPa)), hours maximum - 12			

- 1) Thixotropy test shall be performed at both 77° and 120°F (25° and 49°C). Average thickness of cured adhesive remaining on test panel, mils minimum.

Type V	Type VII
30	45

- 2) Samples of the individual components in sealed containers shall be maintained at 115° + 3°F (46° + -16°C) for 2 weeks. The mixed adhesive prepared from these samples must still comply with the minimum thixotropy requirements.
- 3) The viscosity of the Type V and Type VI versions must not show an increase of more than 20 percent compared with the viscosity prior to the stability test. The Type VII adhesive must still be sufficiently fluid to apply by trowel or spatula without difficulty.

c. Physical Properties of the Cured Adhesive

Property	Requirements
Adhesive Shear Strength, psi (mPa), minimum	2200 (15)
Water Gain, percent by weight (mass), maximum	0.20
Ability to bond fresh Portland cement concrete to cured Portland cement concrete psi (mPa), minimum (7 days cure time)	400 (2.8)

6. Synthetic Resin Paint

- a.** Type X Epoxy: This is a high solids epoxy coating designed for application by brush or roller. The materials can also be applied by airless spray by addition of a maximum of 5 percent toluene solvent at the direction of the Engineer or designated representative.
- b.** Raw Materials: The basic raw materials to be incorporated into this coating are listed below, along with the specific requirements for each material. The final decision as to the quality of materials shall be made by the Engineer or designated representative. After the Engineer or designated representative has approved the brand names of raw materials proposed by the Contractor, no substitution will be allowed during the manufacture without prior approval of the Engineer or designated representative.
- c.** Epoxy Resin: The basic epoxy resin used in the formulation shall be an unmodified liquid resin conforming to the following chemical and physical requirements:

Viscosity at 25.0 + 0.1 C, cps	7,000 to 10,000
Weight per epoxy equivalent, gms per gm - mole	175 to 195
Color (Gardner Number), maximum	5
Hydrolyzable chlorine, maximum % by weight	0.2
Specific gravity, 25/25 degrees	1.14 to 1.18

- d.** Test methods to be used in determining these qualities are listed below:
 - 1)** Viscosity - Test for Kinematic Viscosity (ASTM Designation: D 445).
 - 2)** Weight per Epoxy Equivalent - Test for Epoxy Content of Epoxy Resins (ASTM Designation: D 1652).
 - 3)** Color - Test for Color of Transparent Liquids (Gardner Color Scale) (ASTM Designation: D 1544).
 - 4)** Hydrolyzable Chlorine - Test for Hydrolyzable Chlorine Content of Liquid Epoxy Resins (ASTM Designation D: 1726).
 - 5)** Specific Gravity - Method of Test for Density of Paint, Varnish, Lacquer and Related Products (ASTM Designation: D 1475).

7. Pigment

- a.** Titanium Dioxide: The titanium dioxide used in this formulation shall be equivalent to DuPont R-900. This shall be a pure, chalk-resistant, rutile titanium dioxide meeting the requirements of ASTM D 476, Type III.
- b.** Extender: The extender used in this formulation shall be Nyad 400, manufactured by Interpace Pigments. Specific requirements are as follows:

Particle size distribution	Minimum	Maximum
Minus 20 microns, percent by weight	95	
Minus 10 microns, percent by weight	70	80
Minus 5 microns, percent by weight	40	50
Minus 3 microns, percent by weight	30	40
Minus 1 micron, percent by weight	14	20
Oil Absorption (rub out, lbs/100 lbs)		25 maximum
Brightness (G.E.)	92.5 minimum	

1.4 Grade of Finish

A. General

- 1.** The grade and/or class of finish shall be as described herein and as indicated.
- 2.** "Grade" of finish designates the areas to which a higher finish is to be applied beyond the requirements of an Ordinary Surface Finish. Four grades of finish are included herein.
- 3.** "Class" of finish designates the materials or the process to be used in providing the grade of finish. Three classes of finish are included herein.
- 4.** For structures and surfaces not described herein under grade of finish, a class of finish only may be indicated. Where neither a grade nor class is specified, an Ordinary Surface Finish only will be required as specified in Item No. 410S, "Concrete Structures".
- 5.** Where the plans specify a grade and class of finish, i.e., Grade II, Class C, only that type of finish shall be furnished.
- 6.** Where the plans specify a grade of finish only, i.e., Grade I Finish, any of the classes of finish may be furnished. Only one class of finish shall be furnished on any individual structure, twin structures or on structures in close proximity to each other, except as specified for prestressed concrete members below.

B. Grade I

- 1.** The following areas shall receive a Class A, B or C (two rub) Finish, except that prestressed members shall receive either a Class A or B Finish only.
- 2.** All concrete surfaces of railing, including the parapet types; exterior vertical faces of slabs, slab spans, arches and box girders; the outside and bottom surfaces of fascia beams or girders (including prestressed members); the underside of overhanging slabs to the point of juncture of the supporting beam; all exposed vertical surfaces of bents and piers and bottom surfaces of bent caps; all exposed surfaces of tie beams, abutments, bridge wingwalls, culvert headwalls and wingwalls and retaining walls exposed to view after all backfill and is placed.

3. Unless otherwise indicated, the underside of the slab of slab spans shall be finished its entire width.
 4. Unless otherwise indicated, exposed surfaces of pump houses and other miscellaneous concrete surfaces shall receive a Class A, B or C (one rub) Finish.
- C. Grade II**
1. All concrete surfaces of railing, including the parapet types, all exposed surfaces of bridge wingwalls and the exterior vertical faces of slabs and slab spans shall receive a Class A, B or C (two rub) Finish. All other surfaces described under Grade I Finish shall receive a Class A or B finish only. The underside of slab spans shall receive an Ordinary Surface Finish only.
- D. Grade III**
1. All concrete surfaces of railing, including the parapet types, all exposed surfaces of bridge wingwalls and the exterior vertical faces of slabs shall receive a Class A, B or C (two rub) Finish. All other surfaces described under Grade I Finish shall receive an Ordinary Surface Finish.
- E. Grade IV**
1. The top and roadway faces only of all concrete railing, including the parapet types and bridge wingwalls shall receive a Class A, B or C (one rub) Finish. All other surfaces described under Grade I shall receive an Ordinary Surface Finish.
- 1.5 Class of Finish**
- A.** The Class of Finish designates either an adhesive grout material, a paint-type material or a rubbing process applied to surfaces specified in "Grade of Finish", as required above and/or as indicated.
- B.** Unless otherwise indicated the color shall be concrete gray.
1. Class A
 - a. This finish shall consist of an adhesive grout textured coating with a minimum 1/16 inch thickness, composed of 1 part white cement, 1 part natural (gray) cement, 2 parts masonry sand, 1 part (latex) emulsion and enough water to form a viscous slurry of a consistency that may be applied by spray gun, brush or roller without appreciable running or sagging. The proportions of white and gray cement may be varied slightly to obtain the desired color.
 - b. Gradation of the masonry sand shall be as required to produce a texture satisfactory to the Engineer or designated representative.
 - c. Prepackaged materials meeting these requirements and acceptable to the Engineer or designated representative as to color, texture and appearance will be permitted.
 2. Class B
 - a. The finish shall be a paint-type material, consisting of a synthetic resin, containing fibrous as well as texturing pigments, which when applied by a 1 coat spray application at the rate of 45 ± 5 square feet per gallon (15.9 ± 1.9 square meters per liter) yield an acceptable textured coating. Certification by the manufacturer of the above materials will be required.
 3. Class C
 - a. This finish shall consist of a one rub or two rub system, as the case may be, meeting the requirements set forth below under "Construction Methods".

1.6 Approval of Surface Finishing Materials

- A.** The material to be furnished shall meet the requirements of TxDOT Specification DMS-8110, Structural Coatings, latest revision.
- B.** In addition to the above, the manufacturer shall furnish the following:
 - 1.** At the time of original request for approval of the surface furnishing material, the manufacturer shall supply a 1-gallon (3.8 L) sample of the material to the Engineer or designated representative, if requested.
 - 2.** Each 6 months after approval of the material, the manufacturer shall furnish a notarized certification indicating that the material originally approved has not been changed or altered in any way. Any change in formulation of a surface finish shall require retesting prior to use.
- C.** The Engineer or designated representative may request additional information to be submitted such as infrared spectrophotometry scan, solids content, etc., for further identification. A change in formula discovered by any of the tests prescribed herein or by other means and not reported and retested, may be cause to permanently bar the manufacturer from furnishing surface finish materials for City work.
- D.** The City reserves the right to perform any or all of the tests required by this specification as a check on the tests reported by the manufacturer. In case of any variance the City tests will govern.

1.7 Construction Methods

- A.** Prior to application of any of the finishes required herein, concrete surfaces shall be given an Ordinary Surface Finish. For Class A and B materials, concrete surfaces shall be clean and free of dirt, grease, curing compound or any other bond breaking substance. Class A shall be applied on moistened surfaces but Class B requires a dry surface. The temperature of the atmosphere, concrete and compound shall be above 50°F (10°C) for Classes A and B at the time of application. The finished surfaces shall be protected against rain or freezing for a period of 24 hours after application.
- B.** Class A materials shall be applied by spraying, by roller or by brush. Class B materials shall be applied by spraying only. All applications shall provide an acceptable texture of the proper coverage.
- C.** The Class A and B material shall be applied after all preparation work required by Ordinary Surface Finish has been completed.
- D.** The Class C Finish shall be performed with a carborundum stone as follows, after all preparatory work required by Ordinary Surface Finish has been completed:
- E.** For a two-rub system, the first rubbing shall bring the wetted concrete face to a paste and produce a smooth dense surface without pits, form marks or other irregularities. The use of cement or grout to form the paste will not be permitted. Striping with a brush and washing after the first rubbing will not be required. Chamfer lines shall be finished during the second rubbing.
- F.** The first rubbing shall be done soon after form removal. Membrane curing, if used, shall be applied after the first rub is complete. Prior to the second rubbing, any remaining curing membrane shall be removed from the surface by brushing, buffing or other satisfactory methods.
- G.** The second rubbing shall be performed when conditioning the structure for final acceptance. The specified surfaces shall be cleaned of drip marks and discolorations and given a final rubbing. The surface shall be striped neatly with a brush and the

paste allowed to take a reset, after which the surfaces shall be washed with clean water leaving them with a neat and uniform appearance and texture.

- H. For a one rub system, the rubbing requirements shall be the same as for the first rub above, except chamfer lines shall be finished and the paste spread uniformly, striped with a brush and allowed to take a reset after which the surfaces shall be washed with clean water leaving them with a neat and uniform appearance and texture.

1.8 Special Surfaces Finishes

A. General

- 1. When special surface finishes are required for retaining walls, panels, copings or similar construction, the Contractor shall prepare sample panels for approval of the finish and the method of application. Unless otherwise indicated, panel or pattern arrangement and dimensions may be varied to achieve a more pleasing appearance or to utilize forming material more efficiently when approved by the Engineer or designated representative. Aggregates, materials, variation of panel or pattern arrangement, dimensions and other features affecting the work shall be approved prior to start of the work.

B. Striated Finish

- 1. The striated (grooved) pattern shall be as indicated or as approved by the Engineer or designated representative.
- 2. The finish shall be made by lining the forms with striated sheets of plywood, plastic, fiberglass, metal or other material acceptable to the Engineer or designated representative. The striations on the panels shall be of a smooth, wide pattern, not sharp or angular.
- 3. A chamfer groove shall be used along all edges of each panel. All ties, bolts or other forming accessories shall be located along the chamfer grooves or panel edges.

C. Exposed Aggregate Finish

1. Structural Concrete

- a. Exposed aggregate panels may be either raised, recessed or as indicated with the sides of each panel chamfered as directed by the Engineer or designated representative.
- b. The aggregate used for this finish shall be approved by the Engineer or designated representative. Unless otherwise indicated, aggregate shall conform to the grading requirements of Grade 2 aggregate except that a minimum of 50 percent shall be retained on the $\frac{3}{4}$ -inch (19 mm) sieve. Gravel of predominately rounded particles shall be used, except that when indicated or approved by the Engineer or designated representative in writing, crushed stone may be used. The aggregate shall be large enough to remain firmly anchored in the face of the final product. The depth shall be $\frac{1}{4}$ -inch (6.4 mm) minimum to $\frac{1}{2}$ -inch (12.7 mm) maximum, unless otherwise indicated or directed by the Engineer or designated representative.
- c. A surface retarder that penetrates the concrete approximately $\frac{1}{4}$ (6.4 mm) inch shall be applied to the forms or concrete surface as an aid in achieving the desired finish. Wood forms may require 2 or 3 coatings to compensate for absorption. Form joints shall be taped or caulked to prevent escape of the retarder during placing operations.

- d.** Treated form surfaces shall be protected from sun and rain while exposed to the atmosphere. In case of high humidity or if rain has dampened the forms prior to placing concrete, a reapplication of the surface retarder may be required to provide uniform coverage of the retarder on the forms.
- e.** Adjacent areas of fresh concrete not requiring exposed aggregate finish shall be protected when the retarder is applied.
- f.** The finish shall be obtained by sandblasting, bush hammering, water blasting or other methods, as approved by the Engineer or designated representative. Horizontal surfaces may be finished by a combination of brushing and washing, but only after the concrete has set sufficiently to prevent loosening of the aggregate.
- g.** Unless otherwise directed by the Engineer or designated representative, forms for surface requiring exposed aggregate finish shall be removed 12 to 15 hours after concrete placement. The exposed aggregate operation shall be accomplished immediately after form removal. Except for the time required for obtaining the exposed aggregate finish, curing of all surfaces shall be maintained for the minimum 4 day curing time. All surfaces shall be either water cured or may be cured with an approved clean membrane compound. If water curing is used, it shall be followed by a clear membrane curing compound conforming to Item No. 409S, "Membrane Curing".
- h.** Care shall be taken to ensure proper vibration at all points of concrete placement to prevent honeycomb or segregation of the materials. Vibration shall be done in such a manner as to provide adequate penetration of previously placed concrete lifts. Care shall be taken to prevent contact of the vibrator with the face form.

2. Sidewalks

- a.** When exposed aggregate surfaces are required for sidewalks, driveways and/or medians, the coarse aggregate shall consist of particles with at least 40 percent crushed faces. Uncrushed gravel, polished aggregates and clear resilient coatings are not acceptable. Grade 5 coarse aggregates shall be used for exposed aggregate finishes for sidewalks, driveways and/or medians.

1.9 Measurement and Payment

- A.** No direct measurement or payment will be made for the work to be done, the equipment or materials to be furnished under this item, but shall be included in the lump sum bid for the item of construction in which this item is used.

END

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item No. 411S, " Surface Finishes for Concrete"	
City of Austin Standard Specification Items	
Designation	Description
Item No. 410S	Concrete Structures
Texas Department of Transportation: Manual of Testing Procedures	
Designation	Description
DMS-8110	Coatings for Concrete
American Society for Testing and Materials (ASTM)	
Designation	Description
C 144	Aggregate for Masonry Mortar
C 150	Portland Cement
D 445	Kinematic Viscosity of Transparent and Opaque Liquids
D 476	Standard Classification for Dry Pigmentary Titanium Dioxide Products
D 1475	Standard Test Method for Density of Liquid Coatings, Inks and Related Products
D 1544	Standard Test Method for Color of Transparent Liquids (Gardner Color Scale)
D 1652	Standard Test Method for Epoxy Content of Epoxy Resins
D 1726	Standard Test Method for Hydrolyzable Chloride Content of Liquid Epoxy Resins

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item No. 411S, " Surface Finishes for Concrete"	
City of Austin Standard Specification Items	
Designation	Description
Item No. 403S	Concrete for Structures
Item No. 410S	Concrete Structures
Item No. 411S	Surface Finished for Concrete

610S.1 Description and Definitions

This item shall govern the proper care, protection and treatment of trees and other vegetation in the vicinity of the permitted development activity (as defined in Land Development Code 25-1-21(27)). All work shall be performed in accordance with the City approved drawings and specifications (e.g. Standard Series 600) or as approved by the City Arborist (as defined below). Tree pruning and/or treatments shall be performed under the direct supervision of a qualified arborist (as defined below) or as allowed by the City Arborist.

Definitions

City Arborist - City official designated by the Director of the Planning and Development Review Department (Land Development Code 25-8-603) or as designated by the City Arborist.

Oak wilt - a tree disease caused by a fungus "Ceratoystis fagacearum" that infects the vascular system of Oak "genus Quercus" trees and prevents water transport through the trunk and canopy of the tree. This usually fatal tree disease can be spread by certain insects that come into contact with tree wounds or by interconnected tree roots. February through June is a high risk period due to the stage of the fungus and insect activity. See section 610S.4(H) for additional requirements for preventing Oak wilt infection.

Qualified Arborist - an individual engaged in the profession of arboriculture or closely related field who, through experience, education, and related training, possesses the competence to provide for, or supervise, the management of trees and other woody plants (as defined in the most current version of ANSI A300 (Part 1)-2001, section 4.1).

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

610S.2 Submittals

The following is a list of the minimum submittal requirements for this specification item shall include:

- A. Identification of the location, type of protective fencing (i.e. A, B or C), materials of construction and installation details;
- B. Qualified Arborist credentials (i.e. proof of certification from the International Society of Arboriculture, licenses, resume and/or references);
- C. Type, location and construction details for proposed tree wells;
- D. Location, type, materials of construction and installation details for permeable paving;
- E. Proposed nutrient mix specifications and when required by the City Arborist, soil and/or foliar analysis for fertilizer applications.

610S.3 Materials

- A. Protective Fencing and Signage

Protective fencing is designated as the materials used to protect the root zones of trees as illustrated in City of Austin Standard Detail 610S-1. Three basic types of protective fencing materials are allowed by the City of Austin. Type A and Type B are typical applications and shall be installed where damage potential to a tree root system is high, while Type C shall be installed where damage potential is minimal. The specific

type of protective fencing for the work shall be as indicated on the drawings. Type C fence materials shall be subject to approval by the City Arborist. Type C fencing shall be replaced by Type A or Type B fencing as directed by the City Arborist if it fails to perform the necessary function.

1. Type A Chain Link fence (Typical Application-high potential damage)

Type A protective fencing shall be installed in accordance with City of Austin Standard Details 610S-2 and 610S-4 and shall consist of a minimum five-foot (1.5 meters) high chain link fencing with tubular steel support poles or "T" posts.

2. Type B Wood Fence (Typical Application-high potential damage)

Type B protective fencing shall be installed in accordance with City of Austin Standard Details 610S-3 and 610S-5 and shall consist of any vertical planking attached to 2x4-inch (50 x 100 mm) horizontal stringers which are supported by 2x4-inch (50 x 100 mm) intermediate vertical supports and a 4x4-inch (100 x 100 mm) at every fourth vertical support .

3. Type C Other Materials (Limited Application-minimal potential damage)

The following materials may be permitted as alternates for limited or temporary applications (3 days or less) where tree damage potential is minimal (as determined by the City Arborist):

(a) High visibility plastic construction fencing.

The fabric shall be 4 feet (1.2 meters) in width and made of high density polyethylene resin, extruded and stretched to provide a highly visible international orange, non-fading fence. The fabric shall remain flexible from -60°F to 200°F (-16°C to 93°C) and shall be inert to most chemicals and acid. The fabric pattern may vary from diamond to circular with a minimum unit weight of 0.4 lbs./Ft. (0.6 kilograms per meter).

The fabric shall have a 4 foot (1.2 meters) width minimum tensile yield strength (Horizontal) of 2000 psi [13.9 megaPascals], ultimate tensile strength of 2680 psi [18.5 megaPascals] (Horizontal) and a maximum opening no greater than 2 inches (50 mm).

(b) Other approved equivalent restraining material.

The fencing materials, identified in (a) and (b) above, shall be supported by steel pipe, tee posts, U posts or 2" x 4" (50 mm x 100 mm) timber posts that are a minimum of 5½ feet (1.68 meters) in height and spaced no more than 8 feet (2.44 meters) on centers. The fabric shall be secured to post by bands or wire ties.

4. Signage

A laminated sign, no smaller than 8.5 X 11 inches, shall be posted on each tree protective device, and at least every 100 linear feet on protective fencing, identifying the following information: Tree & Root Protection Zone, Per City of Austin code (Chapter 25-8, Subchapter B, Article 1) this protective device is to remain in place for the entirety of the development project and illegal removal is subject to fines and work suspensions. Additional information can be obtained at the City Arborist (512-974-1876) web site (<http://www.ci.austin.tx.us/trees>). Zona de Protección del Árbol y las Raíces: el dispositivo protector debe quedarse en el lugar para la totalidad del proyecto de la construcción. Para información

adicional, contacta la Arborista Municipal (512) 974-1876 o http://www.ci.austin.tx.us/trees/trees_spanish.htm.

B. Trunk Protection (Limited Application)

When indicated on the drawings or directed by the City Arborist tree trunk protection shall be provided in accordance with City of Austin Standard Details 610S-4 and 610S-5. Tree trunk protection shall consist of any 2 x 4-inch (50 x 100 mm) or 2 x 6-inch (50 x 150 mm) planking or plastic strapping and shall be attached in a manner that does not damage the tree.

C. Tree Dressing

Wound treatments should not be used to cover wounds or pruning cuts, except when recommended for disease (see section 610S.4 (H)), insect, mistletoe, or sprout control (from ANSI A300 (Part 1)-2001, section 5.4.1).

D. Tree Wells for Raised Grades

When existing grades are raised by more than 4 inches (10.16 cm), the tree root system shall be protected by the installation of tree wells in accordance with City of Austin Standard Detail 610S-6. Native stone or non-toxic timber shall be used for the separator wall of the well and PVC conforming to ASTM D-2729, SDR-35 shall be used for the aeration systems in fill areas.

E. Permeable Paving (Environmental Criteria Manual Section 3.5.A.1)

Permeable segmented pavers in conjunction with PVC pipe aeration system or concrete on gravel base with cored holes shall be used to protect existing tree root zones when indicated on the drawings or directed by the City Arborist.

F. Fertilizer

Humate/nutrient solutions with mycorrhizae components or soil injection at recommended rates are to be used when appropriate. Construction which will be completed in less than 90 days may use materials at half the recommended rates. Alternative organic fertilizer materials are acceptable when approved by the City Arborist.

610S.4 Construction Methods

A. Protective Fencing

All trees and shrubs in the proximity of the construction site shall be carefully checked for damage prior to initiation of the permitted development activity.

All individual or groups of trees, shrubs, and natural areas shown to be protected on the drawings or identified to be protected by the City Arborist, shall be protected during construction with temporary fencing as indicated on the drawings or as directed by the City Arborist.

Protective fences (section 610S.4.A) shall be installed prior to the start of any site preparation work (clearing, grubbing, or grading), and shall be maintained in functioning condition throughout all phases of the construction project.

Protective fence locations in close proximity to intersecting streets or drives shall adhere to the sight distance (Section 1.3.1.C.6) and desirable sight triangle (Figure 1-6 criteria found in the City of Austin Transportation Criteria Manual).

1. Protective fences shall be constructed at the locations (typically the outer limits of the critical root zone) and with materials indicated on the drawings to prevent the following (Environment Criteria Manual, Appendix P-2, Note 6):
 - (a) Soil compaction in the root zone area resulting from vehicular traffic or storage of equipment or materials.
 - (b) Critical root zone disturbances due to grade changes [greater than 4" (10.16 cm) cut or fill] or trenching not reviewed and authorized by the City Arborist.
 - (c) Damage to exposed roots, trunks or limbs by mechanical equipment.
 - (d) Other activities detrimental to trees such as chemical storage, concrete truck cleaning, and fires.
2. Exceptions to the installation of protective fences at the tree drip lines may be permitted in the following cases:
 - (a) Where there is to be an approved grade change, impermeable paving surface, tree well, or other such site development, the fence shall be erected no more than 2 feet (0.6 meters) beyond the area of disturbance unless approved by the City Arborist;
 - (b) When permeable paving is to be installed within a tree's critical root zone, the fence shall be erected at the outer limits of the permeable paving area (prior to any site grading so that this enclosed area is graded separately to minimize root damage);
 - (c) When trees are located close to a proposed building or other construction activity (Environment Criteria Manual, Appendix P-2, Note 6.c), the fence shall be erected up to 10 feet (3 meters) to allow work space between the fence and the structure. Apply organic mulch to a depth of 8 inches [30.48 cm] in the unprotected root zone area;
 - (d) When there are street-side pedestrian walkways, fences shall be constructed in a manner that does not obstruct safe passage;
 - (e) When there are severe space constraints due to tract size or other special requirements, the Contractor shall contact the City Arborist to discuss alternatives.

When any of the exceptions listed above will result in a fence being located closer than five (5) feet (1.5 meters) to a tree trunk, the Contractor shall also protect the trunk with strapped-on planking to a height of 8 feet [2.4 meters] (or to the limits of lower branching) in addition to the fencing requirement (City of Austin Standard Details 610S-4 and 610S-5).

B. Pruning and Repair of Damage

Tree pruning, to provide clearance for the work and/or to remove hazards, shall be performed under the direct supervision of a qualified arborist and shall follow standards identified in ANSI A300 (Part 1), "Pruning". A minimum clearance height of eight (8) feet (2.4 meters) above the street level must be provided and maintained for all existing trees if adjacent to a sidewalk. However, if the limbs of trees overhang the curb line or edge of travel lane of any street, a minimum clearance height of fourteen (14) feet (4.2 meters) is required (Transportation Criteria manual section 6.2.3,A, 4, "Clearance Height"). Pruning shall provide the minimum clearance needed to perform the work or remove a hazard unless otherwise directed by the City Arborist to comply with transportation criteria or to mitigate for damage.

If tree damage compromises a tree's structural integrity then the area shall be adequately secured until a qualified arborist makes an assessment of the tree and corrective actions are completed with approval from the City Arborist. Damage to oak trees shall be treated immediately, with consideration for site safety, to reduce the risk of Oak Wilt infection (See 610S.4.H, "Oak Wilt Prevention"). Tree root wounds shall be treated to remove loose, damaged tissue from in and around the wound or if necessary the root shall be cut cleanly and covered with topsoil, or other material approved by the City Arborist, to prevent drying of root tissue and to create a favorable environment for root sprouting. Trunk wounds shall also be treated to remove loose, damaged tissue around the wound. Tree canopy repairs shall be performed in accordance with the most current version of ANSI A300 (Part 1), "Pruning", to prevent further damage to the tree and to promote recovery of the tree to sound condition. The ANSI standard describes proper pruning methods for limb removal and for making finish pruning cuts.

Trees damaged or removed without prior approval or where minimum design criteria is exceeded due to failure to maintain approved tree protection shall be mitigated (Environmental Criteria Manual section 3.5.4, "Mitigation Measures") in accordance with Land Development Code Chapter 25-8, Subchapter B, Article 1.

All trees damaged during construction shall receive an application of fertilizer within the drip line conforming to Standard Specification Item No. 606S, "Fertilizer" at the rate of 4 pounds per caliper inch (.07 kilograms per caliper mm).

C. Cutting and Filling Around Trees

When the depth of an excavation or embankment exceeds 4 inches (10.16 cm) within the critical root zone of any tree with a trunk diameter greater than 8 inches (200 mm), the City Arborist may require a tree well to be constructed per the City of Austin approved specifications and details (Section 610S.3.D and City of Austin Standard Detail 610S-6).

D. Paving Around Trees

Where new paving within the ½ critical root zone of any tree greater than a 8 inches (10.16 cm) diameter is approved, a permeable pavement and aeration system may be required by the City Arborist per the City of Austin Standard Detail (Section 610S.3.E, Environmental Criteria Manual Section 3.5.3.A.1 and Figure 3-8) must be installed as indicated on the Drawings, except for street construction.

E. Tree Removal

Tree removal shall comply with Land Development Code Chapter 25-8, Subchapter B, Article 1. An approved permit, or an approved site plan is required for removal of trees 8" and larger (see Environmental Criteria manual section 3.3.2.A.2 and figure 3-1 for measurement standards) with additional requirements for City Parkland properties and for Hill Country Roadway Corridor sites. Trees 19 inches in diameter and greater are defined as protected trees and require specific review from the City Arborist to approve a permit or site plan for removal. In addition heritage trees require a more extensive evaluation by the City Arborist and may require rulings from boards and commissions.

All trees to be removed shall be performed in a manner that does not damage the canopies, trunks or root systems of remaining trees and that protects all existing facilities, improvements and vegetation. Removal of oak trees shall follow the Oak Wilt Prevention procedures per the City of Austin Standards (Section 610S.4,(H)). All tree material shall be removed from the site unless authorized by the City Arborist or if it will be used as wood chips or mulch.

When a tree or shrub is scheduled for removal, it shall be cut to a maximum depth of 12 inches (30.5 cm) below the surrounding grade (the tree(s) should be removed at grade, and with hand saws, in situations where other tree root systems are present which are to be preserved). When applicable, after tree removal, soil shall be placed in the hole to a depth matching the existing grade.

All damage resulting from tree removal or pruning shall be repaired at the Contractor's own expense and shall follow guidelines in this specification.

F. Final Cleanup

All temporary tree and shrub preservation and protection measures shall be removed when the construction has been completed and any mulch applications shall be removed or reduced to no more than 3 inches (7.62 cm) depth.

G. Root Zone Aeration and Fertilization

As a component of an effective remedial tree care program per Environmental Criteria Manual section 3.5.4, preserved trees within the limits of construction may require soil aeration and supplemental nutrients. Soil and/or foliar analysis should be used to determine the need for supplemental nutrients. The City Arborist may require these analyses as part of a comprehensive tree care plan. Soil pH shall be considered when determining the fertilization composition as soil pH influences the tree's ability to uptake nutrients from the soil. If analyses indicate the need for supplemental nutrients, then humate/nutrient solutions with mycorrhizae components are highly recommended. In addition, soil analysis may be needed to determine if organic material or beneficial microorganisms are needed to improve soil health. Materials and methods are to be approved by the City Arborist (512-974-1876) prior to application. The owner or general contractor shall select a fertilization contractor and ensure coordination with the City Arborist.

Pre-construction treatment should be applied in the appropriate season; ideally the season preceding the proposed construction. Minimally, areas to be treated include the entire critical root zone of trees as depicted on the City approved plans. Treatment should include, but not limited to, fertilization, soil treatment, mulching, and proper pruning.

Post-construction treatment should occur during final revegetation or as determined by a qualified arborist after construction. Construction activities often result in a reduction in soil macro and micro pores and an increase in soil bulk density. To ameliorate the degraded soil conditions, aeration via water and/or air injected into the soil is needed or by other methods as approved by the City Arborist. The proposed nutrient mix specifications and soil and/or foliar analysis results need to be provided to and approved by the City Arborist prior to application (Fax # 512-974-3010). Construction which will be completed in less than 90 days may use materials at ½ recommended rates. Alternative organic fertilizer materials are acceptable when approved by the City Arborist. Within 7 days after fertilization is performed, the contractor shall provide documentation of the work performed to the City Arborist, Planning and Development Review Department. P.O. Box 1088, Austin, TX 78767. This note should be referenced as item #1 in the Sequence of Construction.

H. Oak Wilt Prevention Policy

1. Purpose and Scope

The purpose of this Oak Wilt Prevention Policy is to identify measures that city staff and city-hired contractors and their sub-contractors, who perform the services of removing or trimming trees, will take to prevent the spread of oak wilt.

2. Definitions

Oak Wilt Disease: A tree disease caused by the fungus, *Ceratocystis fagacearum*. The fungus infects the vascular system of a tree. The vascular system contains vessels which transport moisture throughout the tree. The vessels of an infected tree effectively become blocked by the infection of the fungus, and cannot transport adequate moisture to sustain a healthy or living tree. In most cases, the end result is tree mortality.

3. Prevention Policy

- (a) Prior to beginning field work, all city staff associated with projects involving potential contact with oak trees shall be made aware of the city's official Oak Wilt Policy by receiving and reading a written copy of this policy. Staff receiving a written copy of the policy shall include, but not limited to, project managers, equipment operators responsible for removing or trimming trees, or operators using heavy equipment which could cause wounding of susceptible oaks in the use of the equipment. In addition, individual city departments will provide a written copy of the Oak Wilt Policy to contractors participating in city projects in areas where oak trees are present before initiating field work.
- (b) When possible, city staff and contractors should avoid trimming, pruning, or wounding Live Oaks and Red Oaks (Spanish, Shumard, Texas Red, and Blackjack oaks) from February through June.
- (c) At all times and irrespective of limb size, all cuts and wounds to oak trees shall be dressed immediately using a non-phytotoxic tree wound dressing. Stump cuts and damaged roots (both above and below ground) shall also be dressed.
- (d) Disinfection of pruning tools, saws, and related equipment is mandatory during the trimming or pruning of oak trees. Disinfection of tree removal and trimming equipment shall occur before work begins in a project area, between work in individual oak trees, and again prior to leaving a project area. Acceptable disinfectants include either aerosol disinfectant or a 10 percent bleach-water solution.

*NOTE: Although this policy would require the disinfection of pruning equipment before and between oak trees as a precaution, research does not substantiate disinfection as a means of preventing the transmission of the oak wilt disease.

4. Disposal Policy

- (a) Chipping or shredding the wood from infected trees to use as mulch is an acceptable means of recycling the wood. Chipping or shredding allows the wood to dry out quickly, thereby killing the fungus.
- (b) Burning diseased wood is an acceptable means of disposal. Burning diseased logs will kill the fungus, and the fungus will not spread with the smoke.
- (c) Logs from diseased Red Oaks, that are not chipped, shredded, or burned shall be disposed of at a landfill.
- (d) Firewood from diseased Red Oak trees shall not be stored near healthy trees where fungal spores or insects that carry the spores have the potential to spread the fungus to healthy trees. It is recommended to store oak firewood under a sheet of clear plastic, tightly sealing the edges of plastic with soil or bricks. Doing so will prevent any spore carrying beetles from escaping and will

solarize and heat the stored firewood to speed the drying process. It is also recommended to use clear plastic, as black plastic will reveal any escape holes to the beetles.

- (e) In situations where diseased Red Oak trees are identified and are not accessible for chipping, shredding, or removal, the trunk of the diseased tree should be girdled, and the stem treated with an appropriate herbicide to deaden the tree and hasten the desiccation and drying of the wood below the minimum moisture content that could support the development of fungal spores.

610S.5 Measurement and Payment

- A. Measurement of the Specification Item, "Preservation of Trees and Other Vegetation", will be by the "Lump Sum".
- B. Payment, when included as a contract pay item, will be made under:

Pay Item 610S:	Preservation of Trees and Other Vegetation	Lump Sum
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End

SPECIFIC CROSS REFERENCE MATERIALS	
<u>Specification Item 610S, "Preservation of Trees and Other Vegetation"</u>	
<u>City of Austin Standard Specification Items</u>	
<u>Designation</u>	<u>Description</u>
Item No. 606S	Fertilizer
<u>City of Austin Standard Details</u>	
<u>Designation</u>	<u>Description</u>
Item No. 610S-1	Tree Protection Fence Locations
Item No. 610S-2	Tree Protection Fence, Type A, Chainlink
Item No. 610S-3	Tree Protection Fence, Type B, Wood
Item No. 610S-4	Tree Protection Fence, Modified Type A, Chainlink
Item No. 610S-5	Tree Protection Fence, Modified Type B, Wood
Item No. 610S-6	Tree Protection, Tree Wells
<u>City of Austin Transportation Criteria Manual</u>	
<u>Designation</u>	<u>Description</u>
Section 1.3.1.C.6	Sight Distance
Section 6.2.3.A.4	Clearance Height
Figure 1-6	Desirable Sight Triangle
<u>City of Austin Environmental Criteria Manual</u>	
<u>Designation</u>	<u>Description</u>
Appendix P-2, Note 6	Exceptions to Installing Fences

Appendix P-2, Note 6c	Trees close to proposed buildings - - -
Appendix P-6	Remedial Tree Care Notes
Section 3.3.2.A.2	Diameter of trees - - -
Section 3.5.0	Design Criteria
Section 3.5.3.A.1	Permeable Paving
Figure 3-8	Example of Minimum Design Criteria Applied to Permeable Parking
<u>City of Austin Land Development Code</u>	
<u>Designation</u>	<u>Description</u>
Section 25-8-603	Tree Protection Administration
Section 25-8-623	Inspection by City Arborist
<u>ASTM, American Society for Testing and Materials</u>	
<u>Designation</u>	<u>Description</u>
D-2729	Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings

<u>RELATED CROSS REFERENCE MATERIALS</u>	
<u>Specification 610S, "Preservation of Trees and Other Vegetation"</u>	
<u>City of Austin Standard Specification Items</u>	
<u>Designation</u>	<u>Description</u>
Item No. 101S	Preparing Right-of-way
Item No. 102S	Clearing and Grubbing
Item No. 111S	Excavation
Item No. 120S	Channel Excavation
Item No. 132S	Embankment
Item No. 608S	Planting
<u>Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges</u>	
<u>Designation</u>	<u>Description</u>
Item No. 100	Preparing Right-of-way
Item No. 110	Excavation
Item No. 132	Embankment
Item No. 158	Specialized Excavation Work
Item No. 160	Furnishing and Placing Topsoil
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering

641S.1 Description

This item governs the construction of a stabilized pad of crushed stone located at any point where traffic will be entering or leaving a construction site to or from a public right-of-way, street, alley, sidewalk or parking area. The removal of the stabilized pad of crushed stone shall also be included in the item. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking or deposition of sediment onto public right-of-way (Environmental Criteria Manual Section 1.4.2.N.4).

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

641S.2 Submittals

The submittal requirements for this specification item shall include:

- A. Source, type and gradation of rock.
- B. Drainage technique (i.e. drainage swale or entrance grading) proposed to prevent runoff from exiting the construction site.

641S.3 Materials

Aggregate for construction shall conform to the following gradation:

Table 1: Aggregate Gradation Chart (TEX 401-A, % Retained per sieve)		
US 8 inch (SI 200 mm)	US 5 inch (SI 125 mm)	US 2 inch (SI 50 mm)
0	90-100	100

641S.4 Construction Methods

All trees, brush, stumps, obstructions and other objectionable material shall be removed and disposed of in a manner that will not interfere with the excavation and construction of the entrance as indicated on the Drawings or as presented in Standard Details No. 641S-1. The entrance shall not drain onto the public right-of-way or shall not allow surface water runoff to exit the construction site.

When necessary, vehicle wheels shall be cleaned to remove sediment prior to entrance onto public right-of-way. When vehicle washing is required, it shall be done on an area stabilized with crushed stone, which drains into an approved sediment trap or sediment basin. All sediment shall be prevented from entering any storm drain, ditch or watercourse through use of sand bags, gravel, boards, silt fence (Standard Specification Item No 642S) or other methods approved by the Engineer or designated representative.

The entrance shall be maintained in a condition that will prevent tracking or disposition of sediment onto public right-of-way. This restriction may require periodic top dressing with additional stone as conditions demand, as well as the repair and/or cleanout of any measures used to trap sediment. All sediment that is spilled, dropped, washed or tracked onto public right-of-way must be removed immediately.

641S.5 Measurement and Payment

- A. Measurement of the Specification Item, " Stabilized Construction Entrance", will be by the "Lump Sum".
- B. Payment, when included as a contract pay item, will be made under:

Pay Item No. 641S:	Stabilized Construction Entrance	Lump Sum
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END

<u>SPECIFIC CROSS REFERENCE MATERIALS</u>	
<u>Specification 641S, "Stabilized Construction Entrance (SCE)"</u>	
<u>City of Austin Environmental Criteria Manual</u>	
<u>Designation</u>	<u>Description</u>
Section 1.4.2.N.4	Stabilized Construction Entrance "Design Criteria"
<u>City of Austin Standard Details</u>	
<u>Designation</u>	<u>Description</u>
Number 641S-1	Stabilized Construction Entrance
<u>City of Austin Standard Specifications</u>	
<u>Designation</u>	<u>Description</u>
Item No. 642S	Silt Fence (SF)

<u>RELATED CROSS REFERENCE MATERIALS</u>	
<u>Specification 641S, "Stabilized Construction Entrance (SCE)"</u>	
<u>City of Austin Environmental Criteria Manual</u>	
<u>Designation</u>	<u>Description</u>
Section 1.4.2.J	Sandbag Berm
Figure 1-11	Sand Bag Berm
Section 1.4.2.G	Silt Fence
<u>City of Austin Standard Specifications</u>	
<u>Designation</u>	<u>Description</u>
Item No. 101S	Preparing Right-of-way
Item No. 102S	Clearing and Grubbing
Item No. 111S	Excavation
Item No. 120S	Channel Excavation
Item No. 401S	Structural Excavation and Backfill
Item No. 610S	Preservation of Trees and Other Vegetation
<u>Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges</u>	
<u>Designation</u>	<u>Description</u>
Item No. 100	Preparing Right-of-way
Item No. 110	Excavation

Item No. 132	Embankment
Item No. 158	Specialized Excavation Work
Item No. 168	Vegetative Watering

642S.1 Description

This item shall govern the provision and placement of a silt fence fabric fence (Environmental Criteria Manual Section 1.4.5.G) including maintenance of the fence, removal of accumulated silt, removal of the silt fence and re-vegetation of disturbed areas upon completion of the project.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

642S.2 Submittals

The submittal requirements for this specification item shall include:

- A. Source, manufacturer, characteristics and test data for the silt fence fabric,
- B. Manufacturer, characteristics and test data for the posts and wire fence.
- C. Re-vegetation program, including:
 - 1. Identification of the type, source, mixture, Pure Live Seed (PLS) and rate of application of the seeding.
 - 2. Type of mulch.
 - 3. Type of tacking agent.
 - 4. Type and rate of application of fertilizer.

642S.3 Materials

- A. Fabric
 - 1. General:

The silt fence fabric shall be of nonwoven polypropylene, polyethylene or polyamide thermoplastic fibers with non-raveling edges. The silt fence fabric shall be non-biodegradable, inert to most soil chemicals, ultraviolet resistant, unaffected by moisture or other weather conditions, and permeable to water while retaining sediment. The silt fence fabric shall be supplied in rolls a minimum of 36 inches (0.9 meter) wide.
 - 2. Physical Requirements:

The fabric shall meet the requirements presented in Table 1, when sampled and tested in accordance with the methods indicated herein, on Standard Detail No. 642S-1 and/or on the Drawings.
- B. Posts:

Posts shall be steel Tee or Y-posts, not less than 4 feet (1.22 meters) in length with a minimum weight of 1.25 pounds per foot (1.86 kilograms per meter) with a minimum Brinell Hardness of 143. Hangers shall be adequate to secure fence and fabric to posts. Posts and anchor plates shall conform to ASTM A-702. Caps are required (*not specifying discretionary criteria).
- C. Wire Fence:

Wire fence shall be welded wire fabric 2 in. x 4 in. 12.5 SWG, wire diameter 0.099 in. (± 0.005 in.), and shall conform to Standard Specification Item No. 406, "Reinforcing Steel".

TABLE 1. Silt Fence Fabric Requirements		
Physical Properties	Method	Requirements
Fabric Weight in ounces per square yard (grams/square meter)	TEX-616-J ¹	5.0 minimum (150 minimum)
Equivalent Sieve Opening Size: US Standard (SI Standard sieve size)	CW-02215 ²	40 to 100 (425 to 150 μ m)
Mullen Burst Strength: lbs. per sq. inch (psi) megaPascal (mPa)	ASTM D-3786 ³	280 minimum (1.9 minimum)
Ultraviolet Resistance; % Strength Retention	ASTM D-1682 ⁴	70 minimum

¹ TxDOT Test Method Tex-616-J, "Testing of Construction Fabrics".

² US Army Corps of Engineers Civil Works Construction Guide Specification CW-02215, "Plastic Filter Fabric".

³ ASTM D-3786, " Test Method for Hydraulic Bursting Strength of Knitting Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method".

⁴ ASTM D-1682, " Test Methods for Breaking Load and Elongation of Textile Fabrics ".

642S.4 Construction Methods

The silt fence fabric shall be securely attached to the posts and the wire support fence with the bottom 12 inches (300 mm) of the material buried in a trench a minimum of 6 inches (150 mm) deep and 6 inches (150 mm) wide to prevent sediment from passing under the fence. When the silt fence is constructed on impervious material, a 12-inch (300-mm) flap of fabric shall be extended upstream from the bottom of the silt fence and weighted to limit particulate loss. No horizontal joints will be allowed in the silt fence fabric. Vertical joints shall be overlapped a minimum of 12 inches (300 mm) with the ends sewn or otherwise securely tied.

The silt fence shall be a minimum of 24 inches (0.6 meter) high. Posts shall be embedded a minimum of 12 inches (300 mm) in the ground, placed a maximum of 8 feet (2.4 meters) apart and set on a slight angle toward the anticipated runoff source. When directed by the Engineer or designated representative, posts shall be set at specified intervals to support concentrated loads.

* Per OSHA §1926.701, "all protruding reinforcing steel, onto and into which employees could fall, shall be guarded to eliminate the hazard of impalement". Caps must be large enough to dissipate the forces of impact to prevent impalement from a reasonably foreseeable fall distance. It should be noted that the use of impalement protection caps is but one method of protection; covers or wooden troughs can be another means of meeting the guarding requirement. For City of Austin purposes, this also applies to t-posts and wooden stakes.

The silt fence shall be repaired, replaced, and/or relocated when necessary or as directed by the Engineer or designated representative. Accumulated silt shall be removed when it reaches a depth of 6 inches (150 mm).

642S.5 Measurement and Payment

- A. Measurement of the Specification Item, " Silt Fence", will be by the "Lump Sum".
- B. Payment, when included as a contract pay item, will be made under:

Pay Item No. 642S:	Silt Fence	Lump Sum
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END

<u>SPECIFIC CROSS REFERENCE MATERIALS</u>	
<u>Specification 642S, "Silt Fence"</u>	
<u>City of Austin Environmental Criteria Manual</u>	
<u>Designation</u>	<u>Description</u>
Section 1.4.5.G	Silt Fence
<u>City of Austin Standard Details</u>	
<u>Designation</u>	<u>Description</u>
Number 642S-1	Silt Fence
<u>City of Austin Technical Specifications</u>	
<u>Designation</u>	<u>Description</u>
Item No. 406	Reinforcing Steel
<u>American Society For Testing and Materials (ASTM)</u>	
<u>Designation</u>	<u>Description</u>
A-702	Specification for Steel Fence Posts and Assemblies, Hot Wrought
D-1682	Test Methods for Breaking Load and Elongation of Textile Fabrics
D-3786	Test Method for Hydraulic Bursting Strength of Knitting Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method
<u>Texas Department of Transportation Manual of Testing Procedures</u>	
<u>Designation</u>	<u>Description</u>
Tex-616-J	Testing of Construction Fabrics
<u>U.S. Army Corps of Engineers</u>	
<u>Designation</u>	<u>Description</u>
CW-02215	Civil Works Construction Guide Specification "Plastic Filter Fabric"

<u>RELATED CROSS REFERENCE MATERIALS</u>	
<u>Specification 642S, "Silt Fence"</u>	
<u>City of Austin Environmental Criteria Manual</u>	
<u>Designation</u>	<u>Description</u>
Table 1-1.3	Recommended Design Values For Functional Controls

Table 1-2	Maximum Water Depth At The Barrier
<u>City of Austin Standard Specifications</u>	
<u>Designation</u>	<u>Description</u>
Item No. 101S	Preparing Right-of-way
Item No. 102S	Clearing and Grubbing
Item No. 111S	Excavation
Item No. 120S	Channel Excavation
Item No. 401S	Structural Excavation and Backfill
Item No. 610S	Preservation of Trees and Other Vegetation

700S.1 Description

This item shall govern the mobilization of personnel, equipment and materials at the work site for other contract items that will be performed by the Contractor. Mobilization shall include, but not be limited to the movement of equipment, personnel, material, supplies, etc. to the Work site; the installation of temporary facilities (when not paid for separately) and the establishment of office and other necessary facilities prior to the initiation of the Work. The cost of the Payment Bond and Performance Bond on the Work that is delayed due to circumstances beyond Contractor's control, a closed construction season or for the convenience of the City of Austin will be considered part of the mobilization item under this Contract.

700S.2 Measurement.

Measurement of the Specification Item, "Mobilization", as specified herein as "Total Mobilization Payment", will be by the "Lump Sum", as the Work progresses.

700S.3 Payment.

The adjusted contract amount as used below is defined as the original contract amount less the lump sum bid for Mobilization and any payments for materials or equipment not yet incorporated in the Work. The Contractor shall submit a lump sum amount for Payment Item No. 700S-TM, "Total Mobilization Payment".

"Initial Mobilization Payout" as used below is defined as:

1. 8% of the original contract amount for projects with an original contract amount of \$ 0.5 million or less; or
2. 4% of the original contract amount for projects with an original contract amount greater than \$ 0.5 million.

In those instances where the "Initial Mobilization Payout", as defined above, exceeds the "Total Mobilization Payment" lump sum bid item (i.e. Payment Item No. 700S-TM), the "Total Mobilization Payment" shall be used as the "Initial Mobilization Payout". In no instance shall the "Initial Mobilization Payout" exceed the "Total Mobilization Payment" bid item.

Partial payments of the "Initial Mobilization Payout" shall be as follows:

- A. Upon presentation of a paid invoice for the Payment Bond, Performance Bond and/or required insurance, the Contractor will be paid that cost from the amount bid for "Total Mobilization Payment".
- B. The Mobilization of tunnel boring machines, batch plants or other similar facilities, along with supporting materials and equipment, to the work site or to the vicinity of the Work site will be considered as partial Mobilization under this contract. The Contractor shall provide a certified statement of the Contractor's expenditure for the Mobilization and setup of the facility and supporting equipment. Upon approval by the Engineer or designated representative, the certified expenditure will be paid from the amount bid for the Specification Item, "Total Mobilization Payment". In no case shall the combined amount for all of these facilities be more than 10 percent of the Mobilization "Total Mobilization Payment" lump sum bid or one (1) percent of the total contract amount, whichever is less.
- C. When one (1) percent of the adjusted contract amount is earned, 50 percent of the "Initial Mobilization Payout will be paid. Previous payments under this item will be deducted from this amount.

- D. When five (5) percent of the adjusted contract amount is earned, seventy-five (75) of the "Initial Mobilization Payout will be paid. Previous payments under this item will be deducted from this amount.
- E. When ten (10) percent of the adjusted contract amount is earned, one hundred (100) percent of the "Initial Mobilization Payout will be paid. Previous payments under this item will be deducted from this amount.
- F. Payment for the remainder of Pay Item No. 700S-TM, "Total Mobilization Payment" will be made upon receipt of the final pay estimate.

Payment will be made under:

Pay Item No. 700S-TM:	"Total Mobilization Payment"	Lump Sum
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RELATED CROSS REFERENCE MATERIALS	
<u>Specification 700S, "MOBILIZATION"</u>	
<u>City of Austin Standard Contract Documents</u>	
<u>Designation</u>	<u>Description</u>
00020	Invitation for Bids
00100	Instructions To Bidders
00300	Bid Form
00425	Insurance Cost Form
00500	Agreement
00610	Performance Bond
00620	Bid Bond
00650	Certificate of Insurance
00700	General Conditions
00810	Supplemental General Conditions
00820	Modifications to Bidding Requirements & Contract Forms
01010	Summary of Work
01300	Submittals
01500	Temporary Facilities
01550	Public Safety and Convenience
01700	Contract Closeout
01710	Final Cleaning

End

CHEMICAL DOSING SYSTEM PURCHASE

Section SS00500

1.0 PURPOSE

- A. The City of Austin ("City") seeks to establish a contract with a qualified Vendor ("Contractor") that can provide 6 chemical dosing system, including 6 high-density cross-linked polyethylene (XLPE) chemical storage tanks, 9 chemical dosing pumps (Seven (7) APEX20, Two (2) APEX10 or equal), 5 control panels and all accessories including piping. The Contractor shall provide all material necessary and equipment for the delivery and installation of chemical dosing systems detailed in solicitation. Contractor shall also be responsible for installation verification and a brief O&M training.
- B. Any requirements that have been omitted from this specification which are clearly necessary or in conformance with the tanks, shall be considered a requirement although not directly specified or called for in this scope of work. Where there is a conflict, these specifications will govern.

2.0 SCOPE OF WORK

- A. Contractor shall provide 6 XLPE tanks. Tanks will store sodium hypochlorite solution at a concentration of 12.5 trade percent. Four (4) tanks shall have a nominal size of 8,700 US gallons and two (2) tanks shall have a nominal size of 500 US gallons .
- B. These tanks shall be fabricated with integrated secondary containment using a tank within a tank construction.
- C. Contractor shall provide 7 chemical dosing pumps (APEX20 or equal) and 2 chemical dosing pumps (APEX10 or equal) with all drives, motors, valves, supports, control panels, accessories, and appurtenances. The pumps will deliver sodium hypochlorite solution at a concentration of 12.5 trade percent.
- D. Contractor shall provide all interconnecting piping including pipes, fittings, valves, supports and all accessories necessary for pipe installation.
- E. Contractor shall provide concrete pad, 4" equipment pad, stainless steel anchor bolts, and necessary gradings as shown in the contract documents. Contractor shall provide structural and seismic calculations for anchor bolts.
- F. Contractor shall be responsible for the removal of all debris, litter and waste from the job site(s) and/or equipment maintenance area and the restoration of any and all areas affected, directly or indirectly by the construction, transportation of equipment or materials and/or by the acts of neglect or omission by his employees.
- G. Contractor shall disassemble Sodium Hypochlorite Feed Systems and coordinate with City for storage location of equipment.
- H. Contractor shall deliver these systems to the Walnut Creek Wastewater Treatment Plant (WWTP) 7113 FM 969, Austin, TX 78724.

3.0 TECHNICAL REQUIREMENTS

- A. See attached Plans and Project Manual, including Section SS13201 Vertical High Density Cross-linked Polyethylene Storage Tanks and Section SS11540 Dosing Pumps.

4.0 CONTRACTOR RESPONSIBILITIES

- A. The Contractor shall be a manufacturer, authorized dealer/reseller, or supplier of the products offered.

- B. The Contactor shall provide a delivery schedule to the Plant Supervisor within 10 business days after notification of award of the contract.
- C. Sufficient data shall be provided as required during the bidding period to demonstrate that the manufacturer and the proposed equipment conform to the technical requirements.

5.0 SAFETY DATA SHEET (SDS) REQUIREMENTS

- A. Resin SDS

6.0 CITY RESPONSIBILITIES

The plant supervisor or designee will provide updated point of contact information for this contract if any changes of personnel occur during the term of this contract.

7.0 SECURITY

- A. The delivery driver must provide a valid government issued photo ID (any U.S state) to enter the site, no exceptions.

COORDINATION WITH OWNER'S OPERATIONS

Section SS01311

PART 1 -- GENERAL

1.1 DESCRIPTION

- A.** Regulatory requirements for the plant mandate continuous and adequate protection in the event of a chlorine or sulfur dioxide (SO₂) leak. The intent of this Section is to provide CONTRACTOR a sequence to perform the Work in such a manner that continuous, uninterrupted operation and all essential Plant services and facilities are maintained operational throughout the construction period.
- B.** The suggested sequence of operations and sequence of operations restrictions in this Section identifies selected project components only and is not intended to identify all project Work or constraints, interrelationships, or sequentially required Work. The elements shown are intended to outline milestones and certain order-of-precedence relationships for key events.
- C.** The construction Work will require interfaces with existing facilities. Perform all such Work in coordination with the Owner.
- D.** Contract times, as well as liquidated damages for failure to substantially complete the Schedule of Completion specified in this Section, are defined in Division 1 of these Contract Documents.

1.2 RELATED WORK

- A.** General Requirements Section 01010 - Summary of Work
- B.** Special Specification SS11260 – Emergency Chlorine Gas Scrubbing System and Existing Sulfur Dioxide Gas Scrubbing System Improvements, and Temporary Emergency Chlorine Gas Scrubber
- C.** Special Specification SS13390 - Packaged Control Systems
- D.** Special Specifications SS16200 - Wiring (600 Volts and Below)
- E.** Special Specifications SS16250 - Boxes and Cabinets
- F.** Special Specifications SS16300 - Wiring Devices
- G.** Special Specifications SS16600 - Disconnect Switches and Enclosed Circuit Breakers
- H.** Plans and Project Manual for the "Walnut Creek WWTP Gas Scrubber System Renewal" (Project).

1.3 COORDINATION WITH OWNER'S OPERATIONS

- A.** The suggested sequence of operations (below) has been assembled to maintain Plant operations during construction. The operational status of new or existing units other than the designated units shall not be interrupted by CONTRACTOR during the specified time periods. New units may only be used after the specified testing is completed and the units are accepted for use by the Owner, in writing. Work not specifically covered in the sequence may, in general, be done at any time during the Contract period, subject to the operating requirements outlined in this Section. All references to days in this Section are consecutive calendar days.
- B.** Except for the shutdown durations specified in this Section, CONTRACTOR's means and methods shall be implemented such that the existing plant shall remain in continuous satisfactory operation during the entire construction period. Work shall

Special Specifications

be so scheduled and conducted by CONTRACTOR such that it shall not impede any treatment process, create potential hazards to operating equipment and Plant personnel, reduce the quality of the treated water, or cause other nuisances. In performing the Work shown and specified, CONTRACTOR shall plan and schedule the Work to meet both the constraints outlined in this Section and Plant operating requirements.

- C. CONTRACTOR has the option of providing additional temporary facilities that can eliminate a constraint provided it is done without additional cost to the Owner, presents no safety hazards, and provided that all requirements of these Specifications are fulfilled.
- D. CONTRACTOR shall be responsible for coordinating all shutdowns with the Owner. CONTRACTOR shall, whenever possible, combine discrete shutdown procedures identified in this Section or by CONTRACTOR into a single shutdown when the duration of the shutdowns or the Work requirements allow such combining to occur on a unit process or work area. The intent of combining procedures is to minimize the impacts upon Plant operations and processes by limiting the number of shutdowns required.
- E. CONTRACTOR shall not shut off or disconnect any operating system of the plant unless approved by the Owner in writing. All Plant equipment operations and shutdowns shall be executed by the Owner, unless otherwise noted. CONTRACTOR shall seal Owner operated gates and valves to prevent unnecessary leakage. After CONTRACTOR's Work has been completed, CONTRACTOR shall remove the seal to the satisfaction of the Owner.
- F. This Section of the Specifications contains several references to equipment, piping, material, and appurtenances to be removed or reinstalled. CONTRACTOR shall also refer to the Drawings and applicable Specification Sections, for definition of the equipment, piping, material, and appurtenances to be removed, turned over to the Owner and stored onsite, or to become the property of CONTRACTOR and removed from the site.

1.4 GENERAL CONSTRAINTS

- A. Load limits on Access Roads: Existing and new underground facilities, such as electrical duct banks, pipelines, etc., in, under, and crossing plant roads, have been designed for a maximum wheel load of AASHTO H-20. CONTRACTOR shall not exceed this weight limit and shall provide means of protecting the underground facilities.
- B. Access to Plant Site: An unobstructed traffic route through all plant gates shall always be maintained.
- C. Safety Barriers: CONTRACTOR shall place safety barriers around unsafe areas located around operational areas accessible to Plant personnel.
- D. Personnel Access: Treatment Plant personnel shall have access to all areas which remain in operation throughout the construction period.
- E. Potable Water System: The existing potable water system shall be kept in operation at all times.
- F. Plumbing Facilities: Sanitary facilities in the existing structures shall be operational at all times for Plant operating personnel, unless otherwise specified below. All other building plumbing systems, such as roof and floor drains, pumping, etc., shall be maintained for all structures.

Special Specifications

- G.** Storm drainage: Storm drainage on the site shall be operational at all times, unless otherwise specified below.
- H.** Building Heating and Ventilating: In CONTRACTOR's Work areas and areas affected by CONTRACTOR's operations, building heating and ventilating shall be both provided and maintained in structures, including pipe galleries.
- I.** Power, Light and Communication Systems: Electric power, lighting service, and communication systems shall be maintained in uninterrupted operation in all areas.
- J.** Sump Pumps and Sumps: All existing sumps shall be maintained in an operable condition with either existing pumps or temporary pumps provided by CONTRACTOR. CONTRACTOR is required to provide their own sump pumps in the event that additional pumping is needed to maintain the work area. If construction debris causes existing sump pumps to break down, Contractor shall provide and install an equivalent replacement pump. Interim piping, power, and controls shall be provided by CONTRACTOR, as required by the construction sequence and as directed by the Owner.
- K.** Seal and Service Water Piping: A supply of service and seal water and the necessary connections to existing equipment shall be maintained during construction, unless otherwise specified below. Interim piping shall be provided by CONTRACTOR, as required.
- L.** Draining Process Pipes and Conduits
 - 1. Unless otherwise specified, the contents of pipes and conduits undergoing modifications shall be transferred to the plant drain system using hoses, piping, or pumps.
 - 2. If a drain is not available on the pipe to be drained, then a wet tap shall be made by CONTRACTOR using a tapping saddle and valve approved by the Owner. No uncontrolled spillage of a pipe's contents shall be allowed.
 - 3. Any spillage shall be brought to the Owner's attention immediately. CONTRACTOR shall wash down any spillage to floor drains, sumps, and sump pump discharge piping and then flush out by the system to prevent clogging and septic odors. If spillage is not suitable for drainage system as determined by Owner, CONTRACTOR shall remove spillage by other method such as Vactor truck, as approved by the Owner.
- M.** Temporary Partitions and Enclosures: CONTRACTOR shall provide temporary partitions and enclosures necessary to maintain dust-free, heated and ventilated spaces in all areas which are adjacent to this Work and which must be kept operational as required by Plant.
- N.** CONTRACTOR shall schedule all startups for Monday through Thursday. No startups will be allowed on Friday, Saturday, and Sunday.

1.5 SCHEDULED SHUTDOWNS

- A.** A shutdown shall be defined as a portion of the normal operation of a plant unit that has to be suspended or taken out of service in order to perform the specified Work.
- B.** The Work required herein that may interrupt the normal plant operations shall be accomplished at such times that will be convenient to the Owner.
- C.** For each shutdown, CONTRACTOR shall compile an inventory of materials, labor, tools, and equipment required to perform tasks, an estimate of the time required,

Special Specifications

and a written description of steps required to complete all tasks. The inventory, the estimate, and written procedures shall be submitted to the Owner for review 14 calendar days prior to the proposed start date of the shutdown. Prefabrication of all piping and other assemblies shall be completed, to the greatest degree possible, prior to any shutdowns. CONTRACTOR shall then request, in writing from the Owner, schedule approval for each shutdown at least 14 calendar days prior to the proposed shutdown date.

- D. All Work requiring the plant to be out of service shall be performed during the scheduled shutdowns shown. It should be noted Plant staff shall continue to perform administrative, operation, and maintenance functions during shutdowns.
- E. Lockout-Tagout: CONTRACTOR shall lock out and/or tag circuit breakers, switches, or other de-energizing means, operated by the Owner and shall check cables, wires, pipes, etc. to be sure that they are de-energized before Work begins. Submit copy of Lockout – Tagout program to Owner for approval prior to starting Work. Upon completion of the Work, CONTRACTOR shall remove the locks and tags and notify the Owner that the facilities are available for use.
- F. Contractor shall coordinate temporary power wiring, conduit routing and removal with Owner

1.6 UNSCHEDULED SHUTDOWNS

- A. If CONTRACTOR's Work causes an unscheduled shutdown of the facilities, CONTRACTOR shall notify the Owner immediately. CONTRACTOR shall perform Work as directed by the Owner and shall permit Owner's personnel to work with CONTRACTOR's personnel, as required, to re-establish satisfactory operation.
- B. Unscheduled shutdowns and/or interruptions that result in fines levied by the U.S. Environmental Protection Agency or Texas Commission on Environmental Quality shall be the responsibility of CONTRACTOR if it is demonstrated that CONTRACTOR was negligent in his Work or did not exercise proper precautions in the conduct of his Work.

1.7 OVERTIME

- A. All overtime Work by CONTRACTOR necessary to conform to the requirements of this Section and related Sections shall be performed by CONTRACTOR, at no cost to the Owner and shall be performed in accordance with the General Conditions. CONTRACTOR shall make no claims for extra compensation as a result thereof.

1.8 SUGGESTED CONSTRUCTION SEQUENCE

- A. Contractor shall submit a construction sequencing plan demonstrating the erection and installation sequence of project equipment and materials as well as the completion sequence of units, systems or subsystems based on the suggested construction sequence. The construction sequence is developed based on the minimization of interference with engineering, procurement and operations activities and the interface with interdisciplinary activities at the site. The construction sequencing plan should prioritize the items that are required in the event of a SO₂ or chlorine leak.
- B. The following is a suggested sequence of Work. Items are suggested to occur in the order listed and may occur concurrently to optimize the construction quality and schedule. The CONTRACTOR may suggest a different sequence and submit the modified sequence for approval from the Engineer.

Special Specifications

1. Establish the staging area as indicated in the Plans and provide tree protection per Owner standards. Provide silt fence as indicated in the Plans.
2. CONTRACTOR shall procure and install the temporary hypo dosing system in place and tested prior to demolition and installation of Chlorine Gas Scrubbing System.
 - a. Operation of Temporary Hypo Dosing System is permitted ONLY for NINETY (90) calendar days.
3. Chlorine Building

During any work at Chlorine Building either Emergency Chlorine Gas Scrubbing System or Temporary Hypo Dosing System shall be operational.

a. Demolition at Chlorine Building

- 1) Disconnect and remove existing fans EF-1 and EF-2 and associated duct work per Plans.
 - a) Disconnect cable/wire from existing fans EF-1 and EF-2.
 - b) Disconnect conduit/wire per Plans.
 - c) Disconnect and remove motor overload relay (Device 49) heaters/circuit protector/circuit breakers (Completed under MCC OP-MCC-001 section).
 - d) Remove existing fans EF-1 and EF-2.
- 2) Disconnect and remove existing exhaust fans EF-5 and EF-6, and associated duct work in the chlorine feed room per Plans.
 - a) Disconnect cable/wire from existing fans EF-5 and EF-6.
 - b) Disconnect conduit/wire per Plans.
 - c) Remove existing fans EF-5 and EF-6.
- 3) Disconnect and remove existing supply fan O-F-14 and associated ductwork in chlorine feed room per Plans.
 - a) Disconnect cable/wire from existing supply fan O-F-14.
 - b) Disconnect and remove cable/wire per Plans (servicing O-F-1, O-F-14 and UH-1) in the circuit breaker panel O-H-1 and CS01-LP-01 EF-4.
 - c) Remove existing supply fan O-F-14.
- 4) Disconnect and remove existing air handling unit AHU-1 and associated condensing unit OP-DS-CU1.
 - a) Disconnect cable/wire from the existing air handling unit AHU-1 that is to be replaced by the proposed air handling unit OAHU-1 at the Operations Station and disconnect switch (completed under 480V MCC OP-MCC-002A section).
 - b) Disconnect conduit/wire (conduit/wire tagged CS01-CU1-C routing from condensing unit CU-1) from termination box for the existing unit AHU-1. Reconnect conduit/wire with the proposed termination box. Remove the existing unit AHU-1 at the Operations Station. Test and reuse existing intake louver and refrigerant piping.

Special Specifications

- c) Disconnect cable/wire from MCC to the existing condensing unit OP-DS-CU1 that is to be replaced by proposed condensing unit CU-OAHU-1 at the Chlorine Building and disconnect switch (completed under MCC OP-MCC-002A section), and demolish the existing unit (tag to be field verified).
- 5) Disconnect and remove existing unit heater UH-1, thermostat and ductwork. Disconnect conduit/wire to unit heater UH-1 per Plans. Remove device labels on the interior and exterior of the starter bucket. Re-tag the starter bucket as spare. Existing starter shall remain for future use. Disconnect and remove associated control devices and all cable/wire per Plans (completed under the MCC OP-MCC-002A section).
- 6) Disconnect existing unit heater UH-1at the Chlorine Building from existing gas piping. Remove existing unit heaters UH-1; remove associated thermostat and ductwork (Chlorine Feed Room and Chlorine Storage Room).
- 7) Disconnect and remove existing unit heater UH-2, thermostat and ductwork.
 - a) Disconnect conduit/wire to unit heater UH-2 per Plans. Remove device labels on the interior and exterior of the starter bucket. Re-tag the starter bucket as spare. Existing starter shall remain for future use. Disconnect and remove associated control devices and all cable/wire per Plans (completed under the MCC OP-MCC-002A section).
 - b) Disconnect existing unit heater UH-2 (Operations Station) at the Chlorine Building from existing gas piping. Remove existing unit heaters UH-2; remove associated thermostat and ductwork (Chlorine Feed Room and Chlorine Storage Room).
- 8) Demolish conduit/wire from equipment (OF-14, UH-2, AHU-1, OF-1, and OF-2) on the roof of the Operations Building as indicated in the Plans. Demolish and remove OF-14, OF-1, and OF-2.
- 9) Disconnect and remove enclosed circuit breaker at condensing unit CU-AHU-001. Reconnect the conduit/wire from the circuit breaker to motor control center.
- 10) Demolish existing door and frame in the Chlorine Building per Plans.
 - b. Renovation at Chlorine Building**
- 1) Install new exhaust fan OF-1, OF-2, EF-1 and EF-2, and associated FRP ductwork at the Chlorine Building per Plans.
 - a) Furnish and install enclosed circuit breaker DS-EF1, DS-EF2 on wall of the Chlorine Storage Room (EF-1, EF-2). Route conduit/wire to motor control center OP-MCC-001 in ceiling space. Furnish and install conduit sealing fitting as last conduit body prior to entering 480V MCC room.
- 2) Install new outside air unit and condensing unit CU-OAHU-1 at the Chlorine Building per Plans. Include a carbon filter section. Reuse existing refrigerant piping. Provide unit with programmable thermostat

Special Specifications

with day of week and time of day adjustment. Reconnect existing gas line.

a) Furnish and install proposed conduit/wire between proposed CU-OAHU-1 and make all final connections with MCCs OP-MCC-002A and OP-MCC-001. Furnish and install replacement overload heater and motor circuit protector as indicated in the Plans.

3) Install 120V two position isolation damper interlocked with scrubber. Unit to shut down and isolation damper to close when scrubber is engaged. Provide new 120 V damper actuators at the Chlorine Building to be interlocked with the scrubber system. Damper to remain closed during normal operation and open during an event.

4) Install 10-inch FRP duct for scrubbing chlorine feed room and connect to existing 21-inch FRP duct.

5) Install new FRP doors and frame with tempered glass at the Chlorine Building.

6) Install new FRP doors and frames with tempered glass per Plans.

4. Operation Building

a. Demolition at Operations Building Boiler Room

1) Demolish the old hot water piping and pumps in the Operations Building boiler room per Plans.

2) Remove boiler gas piping back to main branch and cap with a blind flange per Plans.

b. Demolition at Operations Building MCCs OP-MCC-002A and OP-MCC-001.

1) Disconnect and remove MCC Starter Bucket, control devices and all control cable/wire per Plans per Plans.

2) Disconnect and remove all exposed conduit, pull/junction/outlet boxes, wiring device, supports, cable/wire, etc. per Plans. Coordinate with mechanical/HVAC contractor for demolition of exhaust fans and unit heaters.

a) Disconnect and remove cable/wires per Plans (the starter buckets serving the existing OF-2 and UH-2). Remove existing tag on face of MCC and replace with tag labelled "spare".

b) Disconnect and remove load (serving the existing EF-1, EF-2, OAHU-1, OP-CU-001) as indicated in the Plans; conduit/wire to remain and be reconnected during renovation activities.

c) Disconnect cable/wire from existing air handling unit OAHU-1 (Operations Station) and disconnect switch (See demolition sequence at Chlorine Building).

d) Disconnect cable/wire from MCC to the existing condensing unit CU-OAHU-1 and disconnect switch.

e) Disconnect conduit/wire to unit heater UH-2 per Plans (OP-MCC-001). Remove device labels on the interior and exterior of the starter bucket. Re-tag the starter bucket as spare. Existing starter

Special Specifications

shall remain for future use. Disconnect and remove associated control devices and all cable/wire per Plans.

- f)** Disconnect cable/wire from existing fans OF-2. Disconnect and remove existing fan OF-2, and conduit/wire per Plans. Disconnect and remove motor overload relay (Device 49) heaters/circuit protector/circuit breakers at the existing 480V motor control center OP-MCC-002A.
- g)** Disconnect and remove enclosed circuit breaker serving the existing condensing unit CU-AHU-001. Conduit/wire to MCC to remain and be reconnected.
- h)** Remove device labels on the interior and exterior of the spare starter buckler.
- i)** Disconnect and remove cable/wire per Plans (serving OF-2, O-F-14, O-F-1, UH-1, EF-4, and DS01-FCP-03) in the circuit breaker panel O-H-1, CS01-LP-01, and DS01-FCP-03.

c. Renovation at Operations Building

- 1)** Furnish and install proposed new supply air fan with filter and gas fired furnace SF-1 per Plans.
 - a)** Provide a new 4-inch concrete housekeeping pad per Plans.
 - b)** Install new supply air fan SF-1 with filter and gas fired furnace at the Boiler Room/Mechanical Room. Install motors, control panel, and associated instrumentation for SF-1.
 - c)** Install new ductwork for SF-1 and connect intake to existing ventilation ductwork, coming up from Boiler Room, ducting into Chlorine Storage Room. Unit SF-1 to shut down when the proposed chlorine gas scrubber is engaged. Isolation damper to close through the on-board controller when unit is shut down.
- 2)** MCCs OP-MCC-002A and OP-MCC-001.
 - a)** Furnish and install proposed conduit/wire between equipment (proposed OF-1, OF-2, OAHU-1, CU-OAHU-1, EF-1, and EF-2) at Chlorine Building and make all final connections with MCCs OP-MCC-002A and OP-MCC-001. Furnish and install replacement overload heater and motor circuit protector as indicated in the Plans.
 - b)** Make modification to MCCs OP-MCC-002A and OP-MCC-001 per Plans.
 - c)** Furnish and install enclosed circuit breaker DS-SF1 on wall of the Mechanical Room (SF-1). Route conduit/wire to motor control center OP-MCC-002A in ceiling space.
 - d)** Furnish and install enclosed circuit breakers DS-OF2 and DS-OF1. Route conduit/wire to MCC OP-MCC-002A in ceiling space. Furnish and install conduit sealing fitting as last conduit body prior to entering 480 V MCC room.
 - e)** Furnish and install proposed conduit/wire from the proposed air filter system PPU-001 at Mechanical Room/Boiler Room and make all final connections with MCC OP-MCC-001. Furnish and install

Special Specifications

replacement overload heater and motor circuit protector as indicated in the Plans.

f) Route conduit/wire to motor control center OP-CP-LPU2 in ceiling space.

3) Install the new pure air chemical filtration system PFU-4000 at the boiler room.

5. Emergency Chlorine Gas Scrubbing System

CONTRACTOR shall demolition the existing scrubber, and install, start-up and commission the new gas scrubber within 90 days permitted operation of Temporary Hypo Dosing System.

a. Conduct preparatory meeting with Owner a minimum of 10 days in advance of the planned scrubber demolition. Coordinate with Owner 20 minimum working days in advance prior to scrubber demolition.

b. Remove all caustic from inside the scrubber and drain all liquids from the existing chlorine scrubber (by Plant staff). Turn off and cap the existing caustic soda line between the existing scrubber and the existing caustic feed equipment. Remove caustic soda lines supports. Remove duct to the existing scrubber. Cap the existing 1-inch chlorine gas relief line as indicated in the Plans.

c. Disconnect and remove existing chlorine scrubber packaged control panel and all associated field conduit/wire, supports, etc. per Plans. Coordinate demolition of control devices associated with the caustic storage and feed systems with process/mechanical.

d. Disconnect and remove existing chlorine scrubber blowers and motors from field instruments conduits and wires. Demolish and remove the existing chlorine emergency web scrubber, fan, pump motor, and duct per Plans.

e. Construct concrete pad extension for the proposed chlorine scrubber as indicated in the Plans.

f. Install the emergency chlorine dry scrubber on the extended concrete pad, including scrubber vessel, blower, motor, packaged control panel DCL-CP-CLSC1, air flow meter, differential pressure gauge, and switch as indicated in the Plans.

1) Furnish and install the packaged control system for proposed emergency chlorine gas scrubber per Plans and Project Manual. Make all final connections per the recommendations and wiring diagrams provided by the equipment manufactures.

2) Size, furnish and install all conduit/wire and all necessary related hardware to interconnect all packaged system sub-components with the proposed control panel per Plans.

3) Install and complete all electrical and instrumentation for proposed chlorine emergency gas scrubber.

Special Specifications

- g.** Provide general electrical and instrumentation integration of new and reinstalled equipment with the Walnut Creek WWTP system.
- h.** Connect the 21-inch chlorine RFP feed line with the proposed Emergency Chlorine Gas Scrubber. Demolish, remove, and relocate excess and unused piping, valves, fittings, conduit that may be in the way of installation.
- i.** Test the Emergency Chlorine Gas Scrubbing System per SS01670 and submit a certified testing report for approval.

6. De-chlorination Building

- a.** Owner will switch to an alternate de-chlorination method using sodium bisulfite prior to work commencing. Contractor coordinates with the Owner prior to the construction at the De-chlorination Building.
 - b.** Demolition at De-chlorination Building
- 1)** Demolition at existing 480V MCCs DS01-MCC-01 and DS01-MCC-02 located in the electrical room of De-chlorination Building. Coordinate with mechanical/HVAC contractor for demolition of exhaust fans and unit heaters.
 - a)** Disconnect and remove MCC starter bucket, control devices, and all control cable/wire per Plans for condensing unit CU-1, exhaust fan EF-3, and Unit Heater UH-3 per Plans.
 - b)** Disconnect and remove all exposed conduit, pull/junction/outlet boxes, wiring device, supports, cable/wire, etc. per Plans.
 - c)** Remove equipment tags/labels from the interior and exterior of the circuit breaker MCC bucket per Plans. Circuit breaker shall be reused during renovation activities.
 - d)** Disconnect cable/wire from circuit breaker. Disconnect and remove all exposed conduit, pull/junction/outlet boxes, wiring devices, supports, etc. per Plans.
 - e)** Disconnect and remove control panel DS01-ECP-01 per Plans. Disconnect and remove all power and control components, power and control wiring, and all associated exposed conduits/raceways and related supports associated with HAVC equipment per Plans.
 - f)** Disconnect conduit/wire to unit heater UH-3 per Plans. Remove device labels on the interior and exterior of the starter bucket. Remove existing tag on face of MCC and replace with tag labelled "spare." Re-tag the starter bucket as spare. Existing starter shall remain for future use. Disconnect and remove associated control devices and all cable/wire per Plans. Coordinate with the equipment demolition at the De-chlorination Building.
 - g)** Disconnect and remove load (serving the existing CU-1 and AHU-1) as indicated in the Plans; conduit/wire to remain and be reconnected during renovation activities.

Special Specifications

- h)** Disconnect and remove cable/wires per Plans (serving the existing EF-3). Remove existing tag on face of MCC, starter bucket to be re-purposed during renovation activities.
 - i)** Disconnect cable/wire between the existing air handling unit AHU-1 and switch per Plans. Disconnect conduit/wire from CU-1. Disconnect cable/wire between the existing condensing unit CU-1 and switch per Plans. Disconnect conduit/wire (tagged DS01-CU1-C routing from condensing unit CU-1) from the existing termination box for AHU-1. Reconnect conduit/wire with the proposed termination box. Coordinate with the equipment demolition at the De-chlorination Building.
 - j)** Disconnect and remove exposed conduit/wire between existing chlorine scrubber control panel and motor control centers per Plans (MCC DS01-MCC-02). Coordinate with work at Emergency Chlorine Gas Scrubbing System.
 - k)** Disconnect conduit/wire from SO₂ scrubber control panel, and the existing cable/wire will be reconnected to the proposed SO₂ scrubber control panel (MCC DS01-MCC-02). Coordinate with work at Existing Emergency Chlorine Gas Scrubbing System.
- 2)** Demolish and remove the existing AHU-1 and CU-1 Per Plans.
 - a)** Remove the existing duct furnace for AHU-1 and disconnect from existing gas line. Test and Reuse existing duct connection and refrigerant piping.
 - b)** Conduit/wire routes from air handler unit AHU-1 to condensing unit CU-1. Disconnect and remove all power and control component power and control wiring, and all associated exposed conduit/raceways and related supports associates with HAVC equipment per Plans.
 - c)** Disconnect and remove enclosed circuit breaker at condensing unit CU-AHU-001. Reconnect the conduit/wire from the circuit breaker to motor control center.
- 3)** Remove two existing exhaust fans EF-3 and EF-4 on the east wall of the De-chlorination Building. Cap existing exhaust fan penetration.
 - a)** EF-3 Conduit/wire continues to motor control enter DS01-MCC-02.
 - b)** Disconnect and remove all power and control components, power and control wiring and all associated exposed conduits/raceways and related supports associated with HAVC equipment per Plans per Plans.
 - c)** Disconnect and remove existing fan EF-3 and conduit/wire per Plans per Plans. Remove device labels on the interior and exterior of the starter bucket. Existing starter shall remain for future use (work completed under MCC DS01-MCC-02).
- 4)** Remove existing unit heater UH-3, gas piping, thermostat, and ductwork.

Special Specifications

- 5) Disconnect and remove motor overload relay (device 49) heaters/circuit protector/circuit breaker at existing 480 V motor control centers DS01-MCC-01 and DS01-MCC-02 (see Plans sheet E-20 for details).
- 6) Demolish and remove existing HVAC equipment EF-2, EF-3, OF-2, CU-AHU-001. Disconnect and remove motor overload relay (device 49) heaters/circuit protector/circuit breaker. Remove exposed conduit and all wire per Plans.
- 7) Remove device labels on the interior and exterior of the starter bucket. Existing starter shall be repurposed as part of the work. Refer to drawing E-19 for additional information.

c. Renovations at De-chlorination Building

- 1) Renovation at MCCs DS01-MCC-01 and DS01-MCC-02
 - a) Furnish and install proposed conduit/wire between equipment (proposed CU-1 and Emergency Chlorine Gas Scrubber) on the east of De-chlorination Building and make all final connections with MCCs DS01-MCC-0 and DS01-MCC-02. Furnish and install replacement overload heater and motor circuit protector as indicated in the Plans.
 - b) Furnish and install panel schedule as indicated in the Plans (Circuit breaker panel schedules O-H-1, DS01-LP-01, and CS01-LP-01).
 - c) Make modifications to MCCs DS01-MCC-01 and DS01-MCC-02 in the Electrical Room of the De-chlorination Building. Modify and re-tag starter buckets as indicated in the Plans.
 - d) Furnish and install proposed conduit/wire between proposed AHU-1, EF-4, and SF-5 at De-chlorination Building and make all final connections with MCCs DS01-MCC-0 and DS01-MCC-02. Furnish and install replacement overload heater and motor circuit protector as indicated in the Plans. Existing starter shall be reused to serve the proposed exhaust fan EF-4. Furnish and install proposed breaker in the existing motor control center to serve proposed supply fan SF-5. Terminate conduit/wire to proposed SO₂ scrubber control panel. Furnish and install receptacle for SF-5. Furnish and install enclosed. Route conduit/wire from SF-5 and EF-4 to MCC DS01-MCC-02 in ceiling space. Route conduit/wire from SF-5 to control panel DS01-LCP-01.
- 2) Install 10-inch FRP duct for scrubbing sulfonation room, and connect to existing 21-inch FRP duct.
- 3) Install new duct furnace as noted in split system schedule, and reconnect to existing gas line.
- 4) Install new split system AHU-1 and CU-1 at the De-chlorination Building. Reuse existing duct connections and refrigerant piping. AHU-1 to be interlocked with SO₂ scrubber system. Isolation damper to close through on-board controller when scrubber is engaged.

Special Specifications

- 5) Install new exhaust fan EF-4 and FRP ductwork, duct down to within 12 inches of the finished floor. Fan to be interlocked with the existing SO₂ scrubber, unit to shut down when scrubber is engaged.
 - 6) Install new supply air fan SF-5 with filter and gas fired furnace at the de-chlorination building as indicated in the Plans. Install new duct furnace as noted in split system schedule. Reconnect to existing gas line. Unit to shut down when scrubber is engaged. Isolation damper to close through the one board controller when unit is shut down. Duct through wall to enlarged existing intake penetration as noted in the Plans.
 - 7) Install new wall penetration and louver within 12 inches of the finished floor at the east side of the de-chlorination building.
 - 8) Furnish and install proposed cable/wire to connect to the existing instruments and relocated existing SO₂ scrubber fan motor.
 - 9) Make modifications to MCCs DS01-MCC-01 and DS01-MCC-02 in the Electrical Room of the De-chlorination Building. Modify and re-tag starter buckets as indicated in the Plans (work completed under MCCs DS01-MCC-01 and DS01-MCC-02 section).
 - 10) Install sulfur dioxide vacuum regular bypass pipes per Plans.
 - 11) Install drip legs for sulfur dioxide cylinder per Plans.
7. Existing Emergency Sulfur Dioxide Gas Scrubbing System
- a. Conduct preparatory meeting with Owner a minimum of 10 days in advance of the planned demolition. Coordinate with Owner minimum 10 days prior to demolition.
 - b. Switch to using liquid sodium bisulfite for de-chlorination (by Others).
 - c. Relocate the existing blower and motor. Install the proposed blower and motor per Plans.
 - d. Disconnect conduit/wire from SO₂ scrubber control panel, and the existing cable/wire will be reconnected to the proposed SO₂ scrubber control panel (completed under MCC DS01-MCC-02). Terminate field wire to existing terminal block control panel DS01-LCP-01. Terminate existing field wire to the electrical control panel of the existing SO₂ scrubber. Disconnect fan motor and remove conduit/wire between motor and control panel. Fan motor to be located during renovation activities. Demolish SO₂ scrubber unit control panel.
 - e. Extend conduit/wiring from SO₂ scrubber unit control panel to the individual component within the scrubber system and make all final connections. Finish and install a conduit body on end of existing conduit system partially removed during demolition. Terminate existing field wire to proposed control panel. Furnish and install proposed cable/wire to connect to existing instruments and relocated fan motor.
 - f. Provide general electrical and instrumentation integration of new and reinstalled equipment with the plant system. Test the

Special Specifications

existing Emergency Sulfur Dioxide Gas Scrubbing System and submit a certified testing report for approval prior to its disconnecting the existing scrubber from the liquid sodium bisulfite supply system.

8. Other items to be addressed:

a. These following items may be implemented as required and in time/order convenient to the CONTRACTOR in the construction sequence. They require interlock with existing logic. The controls interlock shall be such that all wire, conduit, and control equipment is installed first prior to incurring any down time of existing control system. For each item, the down time shall be no greater than 4 hours in interconnecting proposed controls with existing control logic. HVAC units may be down for a duration not to exceed 8 hours. Coordinate all down times with Owner and obtain Owner approval.

- 1) Install and complete electrical and controls for proposed emergency push button control stations.
- 2) Install and complete electrical and controls for proposed louvers.
- 3) Install and complete all electrical and instrumentation for remaining HVAC work.

1.9 CONSTRUCTION SEQUENCE RESTRICTIONS

- A. Electrical and control improvements related to actuator replacement must be installed and tested prior to actuator replacement.
- B. Gas scrubber unit shall be out of service for the minimum amount of time practical for installation and testing of new equipment. Total time of shutdown for scrubber change out shall be limited to 3 days.
- C. Any equipment or process outage shall be requested in writing to the Owner and Engineer for approval at least 14 days in advance.

1.10 MAINTENANCE OF PLANT OPERATIONS SCHEDULE

- A. CONTRACTOR shall develop a detailed description of the complete sequence of construction. The sequence shall be submitted to the Owner and Engineer for review and approval 30 days following the Effective Date of the Agreement.
- B. The procedures contained herein were developed based upon available information. This list does not address all required operations, but only those anticipated to be of significant impact to Plant operations.
- C. CONTRACTOR is required to make all tie-ins, connections, and replacements necessary to perform the Work.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

PART 4 -- MEASUREMENT AND PAYMENT

There is no separate measurement and payment for Work performed under this Section as part of the base bid. Include cost of same in Contract price bid for work of which this is a component part.

END

GENERAL

1.1 SUMMARY

- A.** The Work under this Section defines the minimum scope of services to be provided by the CONTRACTOR during installation, start-up, operating test period, and operator training using factory representatives of the manufacturers of the equipment provided.
- B.** Furnish all labor, materials, tools, equipment, and services for the cleaning up or preparation of all equipment which is required in conjunction with the instruction work to be performed for the OWNER's personnel.
- C.** Perform additional instruction of the OWNER's personnel for any and all items of Work that are incomplete at the time initial instruction sessions are scheduled.
- D.** Although such Work may not be explicitly specifically indicated elsewhere, furnish and install all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation, and to provide instructions upon the functions of that installation.
- E.** Provide instruction for all equipment and systems for which operating and maintenance data is required.
- F.** Instruction sessions may be combined to some extent between several pieces of similar equipment within the same training session, but only if that combination is defined in the CONTRACTOR's instruction program submittal and approved by the Engineer.
- G.** Four instruction sessions for each major type of equipment will be required. The CONTRACTOR shall anticipate that up to ten (10) of the OWNER's employees will participate in any particular instruction session, and shall be prepared to provide the required number of handouts, manuals, and tools for each session.

1.2 QUALIFICATION

- A.** Qualification of the manufacturer's representatives for installation, start-up, and operator training purposes shall be appropriate for the equipment being installed. Manufacturer's representatives shall be subject to the approval of the Engineer. Where equipment has significant process complexity, furnish the services of engineering personnel knowledgeable in the process involved and the function of the equipment.
- B.** References in various equipment sections of the terms "factory representative" or "field representative" shall mean an employee of the equipment manufacturer who is completely knowledgeable of the manufacturing, installation, operation, and maintenance of the equipment. A sales representative does not qualify, unless it is documented that they have been specifically trained by the manufacturer. Any field or factory representative not an active employee of the manufacturer must provide documentation from the manufacturer stating that the individual, by name, has been formally trained in the installation, operation, and maintenance of the equipment and is authorized to make the required certification to perform the required services.

1.3 SUBMITTALS

- A.** No later than thirty (30) days prior to scheduled Substantial Completion of the Work, the CONTRACTOR shall submit a list of proposed instruction sessions for the entire Project. This list shall be organized by Specification Section and its contents will be subject to the approval of the Engineer and OWNER.

Special Specifications

- B.** After approval of the list of the proposed instruction sessions and no later than fifteen (15) days prior to the scheduled Substantial Completion of the Work, submit course outlines and training material for each of the approved instruction sessions. Outlines shall be organized by Specification Section, and their contents shall be subject to the approval of the Engineer.
- C.** After approval of the program content, the CONTRACTOR shall submit a proposed schedule for each of the approved instruction sessions which are to be organized by Specification Section, and the scheduled dates will be subject to the approval of the Engineer.
- D.** Submit a separate instruction request/report (form attached) for each system or type of equipment, subject to the OWNER's approval of availability of personnel.
 - 1. Submit request/report with preliminary information indicated, to the Engineer at least two (2) weeks prior to first instruction period.
 - 2. After each instruction session, submit three copies of the completed report to the Engineer.

1.4 COORDINATION

- A.** Instructions shall begin prior to system commissioning and may be done in conjunction with functional acceptance testing.
- B.** Prior to instruction sessions, assemble instructional aids, tools, test equipment, and any necessary copies of Operations and Maintenance Manuals.
- C.** All instruction sessions shall be planned and scheduled such that the OWNER's participants will utilize copies of the Project Operations and Maintenance Manuals which will have been previously provided. These copies are in addition to the quantities which have to be provided to the OWNER under Section 01730 Operation and Maintenance Data. The use of draft copies of these manuals will be acceptable.
- D.** The CONTRACTOR shall schedule and coordinate the visits of factory representatives during installation, start-up, and operator training in accordance with the requirements of these Specifications.
- E.** The CONTRACTOR shall notify the Engineer 72 hours prior to any impending visit by factory representatives so that the Engineer can be present.

1.5 INSTALLATION, START-UP, AND TESTING SERVICES

- A.** The CONTRACTOR shall furnish the services of a factory representative to provide the Pre-Start-Up Maintenance, Installation, Inspection, Functional Testing, and Operational Testing in accordance with Section SS01670 and the equipment sections of these Specifications.

1.6 OPERATOR TRAINING SERVICES

- A.** Provide all instruction as required to ensure understanding of all operating and maintenance procedures by the OWNER designated personnel.
- B.** Instruct OWNER's personnel in operation and maintenance of equipment and systems. Provide all necessary instruction to the satisfaction of the OWNER.
- C.** Explain use of Operating and Maintenance Manuals.
- D.** Tour building areas involved and identify:
 - 1. Maintenance and access points.
 - 2. Control locations and control equipment.

Special Specifications

- E.** Explain operating sequences:
 - 1. Identify location and show operation of switches, valves, etc., used to start, stop, and adjust systems.
 - 2. Explain use of flow diagrams, operating sequences, diagrams, etc.
 - 3. Demonstrate operation through complete cycle(s) and full range of operation in all modes, including testing and adjusting relevant to operation.
- F.** Explain use of control equipment, including temperature settings, switch modes, available adjustments, reading of gauges, and functions that must be serviced only by authorized factory representative.
- G.** Explain troubleshooting procedures:
 - 1. Demonstrate commonly occurring problems.
 - 2. Note procedures which must be performed by factory personnel.
- H.** Explain maintenance procedures and requirements:
 - 1. Point out items requiring periodic maintenance.
 - 2. Demonstrate typical preventive maintenance procedures and recommend typical maintenance intervals.
 - 3. Demonstrate other commonly occurring maintenance procedures not part of preventive maintenance program.
 - 4. Identify maintenance materials to be used.
- I.** Furnish all tools and/or test equipment required for proper instruction of the OWNER's personnel. Tools and/or test equipment shall be distributed in "sets" with each two participants having a "set" to work with and retain upon completion of the instruction. Each participant shall sign for their tools at the start of the instruction session, and copies of the assignment documents shall be provided to the Engineer by the CONTRACTOR.
- J.** Thirty-day operating period after start-up: The manufacturers' representative for each piece of equipment shall return to the Project site 6 months after successful completion of the operating test to review the equipment performance, correct any equipment problems, and conduct follow-up operation and maintenance classes as required by the OWNER. This follow-up trip is required in addition to the specified services of manufacturer's representative prior to and during equipment start-up. At this time, if there are no equipment problems, each manufacturer shall certify to the OWNER in writing that his equipment is fully operational and capable of meeting operating requirements. If the certification is accepted by the Engineer and OWNER, the warranty period for that piece of equipment shall be considered to have begun as of the start-up date. If the equipment is operating incorrectly, the factory representative will make no certification to the OWNER until the problems are corrected and the equipment demonstrates a successful 30 days operating period.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

- A.** Furnish the services of qualified representatives of the scrubber system manufacturer for inspection, start-up, and instruction of operating personnel for up to two (2) consecutive eight (8)-hour days at the jobsite, with CONTRACTOR present. The CONTRACTOR shall anticipate that up to ten (10) of the OWNER's employees will

Special Specifications

participate in any session and shall be prepared to provide the required number of handouts and manuals for each session.

PART 4 -- MEASUREMENT AND PAYMENT

- A.** There is no separate measurement and payment for work performed under this Section as part of the base bid. Include cost of same in Contract price bid for Work of which this is a component part.

EQUIPMENT AND SYSTEMS INSTRUCTION REPORT

PROJECT: _____

SYSTEM OR EQUIPMENT:

CONTRACTOR NAME: _____ CONTRACT NO. _____

SPECIFICATION SECTION

NOTE: The CONTRACTOR's Representative must maintain and complete this report during instruction.

PRELIMINARY INFORMATION

1. To be completed by the CONTRACTOR:
 - a. Proposed dates for instruction period: From _____ To _____
 - b. Name of Representative Instructor: _____
 - c. Approximate number of hours of training required: _____
2. To be completed by the OWNER:
 - a. OWNER's Designated Personnel to receive instruction: (Identify supervisor, if required).

<ol style="list-style-type: none"> 1) _____ 2) _____ 3) _____ 4) _____ 5) _____ 	<ol style="list-style-type: none"> 6) _____ 7) _____ 8) _____ 9) _____ 10) _____
--	---
 - b. Training Session Location: _____

RECORD INFORMATION (To be Completed after Instruction Session)

Instructor's Signature: _____ Date Instruction Completed: _____

Construction Manager's Signature: _____

OWNER's Signature: _____

SPECIAL CONSIDERATIONS/NOTES:

END

EQUIPMENT TESTING AND FACILITIES STARTUPSection SS01670

PART 1 -- GENERAL**1.1 SUMMARY**

A new emergency chlorine gas scrubber is to be installed on the extended, existing concrete pad at the east side of the de-chlorination building and miscellaneous mechanical and electrical improvements will be constructed at the chlorination and de-chlorination buildings. This performance testing package contains the necessary information and example check sheets to complete the functional and performance testing of the equipment associated with the emergency chlorine gas scrubbing system at Walnut Creek Wastewater Treatment Plant (WCWWTP).

There are various check sheets within this functional and performance test package that are used during the testing and startup and will become a part of the permanent Work Order record.

Provide all testing and documentation in accordance with Section SS01670 – Equipment Testing and Facilities Startup.

A. Scope of WCWWTP Emergency Commissioning Testing Program

1. The required testing and startup for WCWWTP Emergency Chlorine Gas Scrubber Systems Renewal are as follows:
 - a. Preparation and Check Out
 - b. Equipment Functional Test
 - c. Operational Readiness Test (ORT)
 - d. Unit Process Startup

B. Interface with Other Facilities

1. Testing of emergency chlorine gas scrubber requires that the existing leak detection devices in the chlorine storage and feed rooms actuate equipment to isolate the rooms, de-energize the heating and ventilation system in the rooms, and activate the scrubber equipment to scrub the air in the chlorine storage and feed rooms. The scrubber control panel will send and receive analog and discrete signals to interface with chlorination building existing Main Instrument Control Panel MCP and with existing Symax PLC within Control Panel "DS01-LCP-01".
2. Testing of the blower and control panel of the existing emergency sulfur dioxide gas scrubber requires that the existing leak detection devices in the sulfur dioxide storage room and sulfonation room actuate equipment to isolate the rooms, de-energize the heating and ventilation system, and activate the scrubber equipment to scrub the air in the sulfur dioxide storage room and sulfonation room. The scrubber control panel will send and receive analog and discrete signals to interface with de-chlorination building existing Main Instrument Control Panel MCP and with existing Symax PLC within Control Panel "DS01-LCP-01".
3. The Contract Documents contain the available Record Drawing showing the mechanical, electrical, and instrumentation systems as originally designed. As part of the testing and startup, CONTRACTOR must confirm the existing facilities match the provided Record Drawings. In the event the field conditions do not match the Record Drawings, CONTRACTOR shall notify the OWNER.

C. Prerequisite Conditions

1. Prior to initiating the tests listed in this document, verify the following.
 - a. Coordinate testing procedures with the gas scrubber vendors and the OWNER.
 - b. All associated equipment, ductwork, and support apparatus have been successfully leaking tested.
 - c. All electrical and instrumentation wiring and connections to support implementation of the scrubber renewal improvements have been completed and inspected.
 - d. All instruments have been tested and calibrated.
 - e. Verify proper location of equipment and components.
 - f. All safety devices are in place; and
 - g. Instruct construction crews on testing program, barricaded no-go areas, Lockout/tagout (LO/TO) procedures, equipment operational tests, and emergency notification requirements.

D. Reference Drawings and Specifications

1. WCWWTP Gas Scrubber System Renewal Plan Sheets and Project Manual.

E. Test Forms Required

1. Functional Test Check Sheet
2. Operational Test Check Sheet
3. Unit Process Startup Report

F. Document Control

1. Specification 01670 – Equipment Testing and Facilities Startup outlines the submittals required. The forms attached to this specification are for the CONTRACTOR's use and may be modified by the CONTRACTOR to facilitate the specified testing for individual pieces of equipment.
2. CONTRACTOR shall provide the specified submittals for review and approval prior to beginning testing protocols.
3. CONTRACTOR shall provide an Equipment Testing and Facilities Startup plan for review and approval at least five (5) working days prior to the testing and startup.
4. Where appropriate, the inspection and test forms must be filled out and signed by the appropriate personnel and attached to the Final Installation Report document.
5. The Final Installation Report forms are the official record of the testing program and will be turned over to the OWNER for warranty and historical reference at the completion of the project.

1.2 WORK ORDER SPECIFIC TESTING

A. Preparation and Check Out

1. Provide preparation and check out in accordance with Section 01670 and the manufacturer's recommendations.

B. Functional Test

1. Provide Functional Testing in accordance with Section 01670.
2. Alignment: Test complete assemblies for correct rotation, proper alignment and connection, and quiet operation.

C. Operational Readiness Test

1. Provide ORT test in accordance with Section 01670.
2. CONTRACTOR shall verify the electrical and control functions at the unit itself. Problems identified with OWNER equipment shall be brought to the OWNER's attention prior to proceeding with the testing.

D. Unit Process Startup

1. Provide Unit Process Startup in accordance with Section 01670.
2. Unit Process Startup shall use process fluid and demonstrate operation using all of the manual and automatic controls shown.

1.3 COORDINATION

- A.** The CONTRACTOR shall not proceed with any functional test or operating test until the operation and maintenance manuals for the equipment have been submitted and been designated "No Exceptions Taken." The CONTRACTOR shall coordinate all activities required for starting of systems including the visits by the factory representatives, particularly where an equipment item's operation is dependent on the operation of other equipment. Prior to calling the factory representative, the CONTRACTOR shall ensure that all necessary related equipment, structures, piping, and electrical work is complete. Any required revisits to the site by the factory representative shall be provided by the CONTRACTOR.

1.4 PRE START-UP MAINTENANCE

- A.** After installation and prior to start-up, all grease-lubricated joints, shaft couplings, and bearings shall be flushed out and re-greased. All oil reservoirs and sumps shall be completely drained and flushed and refilled with the proper lubricant. All operating fluid and gas reservoirs shall be filled with the proper fluid and gases. Screens and filters shall be checked for contamination and replaced if necessary. Belt drives shall be checked and tension adjusted, as needed. The equipment shall then be tagged, signed, and dated, indicating that the equipment has been properly lubricated and prepared for start-up.

1.5 INSTALLATION INSPECTION

- A.** Prior to energizing any piece of equipment or performing a functional test, a factory representative of the equipment manufacturer shall inspect the installation of the equipment. The factory representative shall determine if the equipment has been installed in accordance with the manufacturer's recommendations, pre-start-up maintenance has been performed, and is ready for start-up and the initiation of the functional test.
- B.** Should the installation inspection indicate that the equipment has been improperly installed or prepared for start-up, the CONTRACTOR shall provide such modifications or adjustments as required for the equipment to operate properly.
- C.** The factory representative shall certify that the equipment has been installed in accordance with the Drawings, Specifications, and the manufacturer's recommendations and that the equipment is ready for start-up and functional testing to be performed.

1.6 FUNCTIONAL TEST

- A.** Should the results of the functional test indicate that the equipment has failed to perform in accordance with the Specifications, the CONTRACTOR shall make, at no additional cost to the OWNER, all modifications or adjustments as required for satisfactory operation, including replacement of any or all components, if necessary. Following the modifications or adjustments, the CONTRACTOR shall repeat the functional test. This procedure shall be repeated until the results of the test indicate that the equipment has satisfied the requirements of the applicable Specification Section.
- B.** After the functional test is completed, each manufacturer shall certify, in writing, that tests were made in accordance with the Specifications and the manufacturer's recommendations, that the functional tests and start-up operation have been satisfactory and that the equipment is fully operational and capable of meeting operating requirements.

1.7 OPERATING TEST PERIOD

- A.** Following the functional test, the CONTRACTOR shall place each system into service and undergo an operational test under normal service conditions. The minimum time for the operating test period for each system shall be 30 consecutive days, excluding time that the equipment is taken out of service.
- B.** Where required in the equipment specifications, process performance testing shall be performed during the operating test period in accordance with the requirements of the equipment specifications. The CONTRACTOR shall provide all materials and labor, including the services of a factory representative, necessary to perform the performance testing.
- C.** The test period shall commence upon the initiation of operation of all systems and shall end after the successful operation of the equipment for the minimum time required.
- D.** The CONTRACTOR shall repair and make all modifications required due to mechanical failure of the equipment during the operating test period. Should the equipment fail to meet the performance testing requirements, a factory representative shall evaluate the equipment and determine the cause of the process failure. The CONTRACTOR shall make all modifications recommended by the manufacturer.

1.8 CERTIFICATION

- A.** Upon completion of start-up, the CONTRACTOR shall provide written Installation and Start-Up Report from all equipment manufacturers' factory representatives. Report shall address the equipment installation's compliance with manufacturer's requirements and note any problems noted that may affect the warranty, operation, or longevity of the equipment. Written certification shall indicate that tests were made in accordance with the manufacturer's recommendations, that the test and start-up operation has been satisfactory completed, and that the equipment is fully operational under design requirements. Written certification shall be filed with the ENGINEER on the manufacturers' stationary.

PART 2 -- PRODUCTS

2.1 PERFORMANCE DATA

EF-1

Airflow (CFM)	Minimum 7,000 SCFM
Supply Fan Type	Fiberglass Centrifugal
Total External SP	1.5 in. wg
Operating Power (hp)	4.37
Required Power (hp)	5.91
Fan RPM	1601
Max Fan RPM	1,803
Elevation (ft)	810
Start-up Temp.(F)	70
Operating Temp.(F)	70
Supply Fan Quantity	1

EF-2

Airflow (CFM)	Minimum 7,000 SCFM
Supply Fan Type	Fiberglass Centrifugal
Total External SP	1.5 in. wg
Operating Power (hp)	4.37
Required Power (hp)	5.91
Fan RPM	1601
Max Fan RPM	1,803
Elevation (ft)	810
Start-up Temp.(F)	70
Operating Temp.(F)	70
Supply Fan Quantity	1

OF-1

Airflow (CFM)	Minimum 1,140 SCFM
External SP	1.0 in. wg
Total SP	1.138 in. wg
RPM	1627
Motor hp	0.82 per motor
Supply Fan Type	Fiberglass Centrifugal
Operating hp	7.8 per motor
Supply Fan Quantity	1

Exhaust Fan EF-3

Airflow (CFM)	Minimum 6,700
Total External SP (in. wg)	1.5
Operating Power (hp)	3.99
Required Power (hp)	5.96
Fan RPM	1548
Max Fan RPM	1,803
Elevation (ft)	810
Start-up Temp.(F)	70
Operating Temp.(F)	70
Supply Fan Type	Fiberglass Centrifugal
Supply Fan Quantity	1

Exhaust Fan EF-4 at the De-Chlorination Building

Volume (CFM)	900
Total External SP (in. wg)	1.5
Operating Power (hp)	0.61
Required Power (hp)	1.02
Fan RPM	1495
Max Fan RPM	2,244
Elevation (ft)	810
Start-up Temp.(F)	70
Operating Temp.(F)	70
Supply Fan Type	Fiberglass Centrifugal
Supply Fan Quantity	1

Supply Fan SF-5 at the De-Chlorination Building

Airflow (CFM)	6,700 SCFM
External SP	0.5 in. wg
Total SP	2.063 in. wg
RPM	1133
Motor RPM	1725
Motor hp	10 per motor
Supply Fan Type	Forward Curve
Operating hp	5.93 per motor
Supply Fan Quantity	1

Supply Fan SF-1 at the Chlorination Building

Airflow (CFM)	15,140 SCFM
External SP	0.5 in. wg
Heating Capacity	800 MBH
Total SP	1.633 in. wg
RPM	1577
Supply Fan Type	Forward Curve
Operating hp	12.23 hp per motor
Motor hp	15 hp per motor
Supply Fan Quantity	1

Air Heating Unit CU-1

Cooling Capacity	128 MBH
Reheat Capacity	57 MBH

Air Heating Unit CU-OAHU-1

Cooling Capacity	86 MBH
Reheat Capacity	24 MBH

Air Heating Unit AHU-1

Airflow (CFM)	Minimum 3,150 SCFM
External SP	0.75 in. wg
Total SP	2.28 in. wg
RPM	1742
Motor hp	8 per motor

Air Heating Unit OAHU-1

Airflow (CFM)	Minimum 1,305 SCFM
External SP	0.75 in. wg

Emergency Chlorine Gas Scrubber

Minimum Scrubber Air Flow Rate at Ambient Conditions	4,000 SCFM
Air Flow Direction	Downward
Maximum Release:	2,850 lbs.
Cl ₂ Processing Rate	400 lbs./min. (for the first minutes.); 80 lbs./min. thereafter
Pressure Drop Through Scrubber Media	As recommended by media vendor
Scrubber Blower Control Method	Manual or Remote
Maximum Discharge Cl ₂ Concentration	5 ppb

Scrubber Blower

Blower Motor Frequency	60 Hz
Blower Motor HP	40 HP (Maximum)
Motor RPM	1800

Electrical Control Panel

Electrical Control Panel Enclosure Type	NEMA 4X
Logic Control Type	Hardwired relay

Differential Pressure Gauge

Gauge Enclosure Type	NEMA 4X Stainless Steel
Range	0-40 in. wg

Differential Pressure Switch

Switch Enclosure Type	NEMA 4X Stainless Steel
Setpoint	Adjustable

PART 3 -- EXECUTION

Form 1. WCWWTP Emergency Gas Scrubber System Renewal							
Preparation and Check Sheet							
Activity	Equipment ID	Verification Check	Comments	Contractor Initials	COA Initials	Engineer Initials	Date
Verify proper installation of differential pressure gauge per manufacturer’s specifications.	TBD	<input type="checkbox"/> Manufacture Installation Manual <input type="checkbox"/> Gauge installed in proper orientation per manufacture installation manual					
Verify proper installation of air flow meter per manufacturer’s specifications.	TBD	<input type="checkbox"/> Manufacture Installation Manual <input type="checkbox"/> Meter installed in proper orientation per manufacture installation manual					
Verify proper installation of FRP duct per Emergency Gas Scrubber System Renewal design drawing.	TBD	<input type="checkbox"/> Duct installed at proper location per design drawing <input type="checkbox"/> Duct supports installed properly per design drawing					
Verify proper installation of ladder climbing system per manufacturer’s specifications.	TBD	<input type="checkbox"/> Manufacture Installation Manual <input type="checkbox"/> System hardware and compatible devices installed in proper orientation per manufacture Installation Instruction <input type="checkbox"/> Installation recorded and kept in the site file <input type="checkbox"/> Safe to Climb Certificate provided by the system installation company					

Form 1. WCWWTP Emergency Gas Scrubber System Renewal							
Preparation and Check Sheet							
Activity	Equipment ID	Verification Check	Comments	Contractor Initials	COA Initials	Engineer Initials	Date
Verify all manufacturers recommended safety devices have been furnished to protect operators.	TBD	<input type="checkbox"/> Completed					
All scrubber control devices are mounted in the scrubber unit control panel.	TBD	<input type="checkbox"/> Manufacture O&M Manual <input type="checkbox"/> Manufacture Installation Manual <input type="checkbox"/> Completed					
Verify proper installation of emergency scrubber per manufacturer's specifications.	TBD	<input type="checkbox"/> Emergency gas scrubber installed in proper direction and orientation per Emergency Gas Scrubber System Renewal Design Drawing <input type="checkbox"/> Media placed into the emergency gas scrubber uniformly distributed per manufacture O&M Manual					
Verify proper control wiring to emergency scrubber per manufacturer's specifications.	TBD	<input type="checkbox"/> Correct wiring					

Form 2. WCWWTP Emergency Gas Scrubber System Renewal

Functional Test Sheet

Activity	Equipment ID	Verification Check	Comments	Contractor Initials	COA Initials	Engineer Initials	Date
Confirm Preparation and Check Out is complete.	TBD	<input type="checkbox"/> Complete					
Verify blower proper rotation, speed, and vibration.	TBD	<input type="checkbox"/> Rotation <input type="checkbox"/> Speed <input type="checkbox"/> Vibration					
Verify blower capable of providing sufficient suction to deliver air from dichlorination building.	TBD	<input type="checkbox"/> Sufficient suction					
Verify the existing chlorine sensors activate the control panel to start.	TBD	<input type="checkbox"/> Complete					
In manual control, the scrubber system operates continuously whenever the H-O-A selector switch for the scrubber fan is in the hand position.	TBD	<input type="checkbox"/> Completed					

Form 2. WCWWTP Emergency Gas Scrubber System Renewal

Functional Test Sheet

Activity	Equipment ID	Verification Check	Comments	Contractor Initials	COA Initials	Engineer Initials	Date
In automatic control, the scrubber system operates continuously when a leak is detected in the chlorine storage room and the scrubber fan is in the auto position.	TBD	<input type="checkbox"/> Completed					
De-chlorination Building exhaust fans are turned off while the Emergency Scrubber is in operation.	TBD	<input type="checkbox"/> Completed					

Form 3. WCWWTP Emergency Gas Scrubber

ORT Sheet

Activity	Equipment ID	Verification Check	Comments	Contractor Initials	COA Initials	Engineer Initials	Date
Confirm Local/Remote control of emergency gas scrubber.	TBD	<input type="checkbox"/> Complete					

Form 4. WCWWTP Emergency Gas Scrubber

Operational Test Sheet

Activity	Equipment ID	Verification Check	Comments	Contractor Initials	COA Initials	Engineer Initials	Date
Confirm air flow rate sufficient for proper operation of Emergency Gas Scrubber.	TBD	<input type="checkbox"/> Adequate flow rate					
Confirm media differential pressure is below the setpoint recommended by manufacture.	TBD	<input type="checkbox"/> Media differential pressure below setpoint					

PART 4 -- MEASUREMENT AND PAYMENT

- A.** There is no separate measurement and payment for work performed under this Section as part of the base bid. Include cost of same in Contract price bid for work of which this is a component part.

END

1. GENERAL

A. SCOPE:

1. This section describes specific warranties required for various pieces of equipment and construction. This section supplements the provisions on the contract's correction period, CONTRACTOR'S general warranty and guarantee, and CONTRACTOR'S warranty of title specified in the general conditions, as may be modified by the supplementary conditions.
2. This section includes general requirements for:
 - a. Supplier's and CONTRACTORS special warranties.
 - b. Supplier's special warranties.
 - c. Commencement and duration of warranties.

B. Related Sections

1. Section SS08120, Fiberglass Reinforced Door and Door Frame Systems.
2. Section SS11260, Emergency Chlorine Gas Scrubbing System and Existing Sulfur Dioxide Gas Scrubbing System Improvements.
3. Section SS13201, High Density Cross-linked Polyethylene Storage Tanks.
4. Section SS14630, Freestanding Workstation Bridge Cranes
5. Section SS17200, Instrumentation and Control Cabinets and Associated Equipment
6. Section SS235416.13 Gas-Fired Furnaces
7. Section SS237433 dedicated Outdoor Air Units
8. Section SS238127 Split-System Air Conditioners

1.2 SUBMITTALS

A. General:

1. For each item of material or equipment where supplier's special (or extended) warranty is required by the contract documents, submit appropriate special warranty that compiles with the Contract Documents.
2. Supplier's warranties shall be specifically endorsed solely to OWNER by the entity issuing such warranty.
3. Submit Suppliers' standard warranties and special warranties as submittals in accordance with Section 01300, Submittals, as accepted by ENGINEER.

1.3 SUPPLIERS' WARRANTIED FOR MATERILS AND EQUIPMENT

A. Warranty Types

1. Required by the General Conditions:
 - a. Warranties specified for materials and equipment shall be in addition to, and run concurrent with, CONTRACTOR'S general warranty and guarantee and requirements for the Contract's correction period.
 - b. Disclaimers and limitations in specific materials and equipment warranties do not limit CONTRACTOR'S general warranty and guarantee, nor does such affect or limit CONTRACTOR'S performance obligations under the correct period.
2. Materials of equipment manufacturer's standard warranty is pre-printed, written warranty published by item's manufacturer and specifically endorsed by manufacturer to OWNER.
3. Special warranty is written warranty that either extends the duration of material or equipment manufacturer's standard warranty of provides other, increased

rights to OWNER. Where the Contract Documents indicate specific requirements for warranties that differ from the manufacturer's standard warranty for that item, special warranty is implied.

- B. Requirements for Special Warranties:
 - 1. Submit written special warranty document that contains appropriate provisions and identification, ready for execution by material or equipment manufacturer and OWNER. Submit draft warranty with submittals required prior to fabrication and shipment of the item from the Supplier's facility.
 - 2. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed by product manufacturer and other entities appropriate.

1.4 COMMENCEMENT AND DURATION OF WARRANTIES

- A. Commencement of Warranties:
 - 1. Contract correction period and CONTRACTOR's general warranty commence as indicated in the General Conditions, as may be modified by the Supplementary Conditions.
 - 2. Suppliers' general warranties and special warranties commence running on the date that the associated item is certified by ENGINEER as substantially complete. In no event shall special warranties commence running prior to ENGINEER's review and acceptance of special warranty submittal for the item.
- B. Duration of Warranties:
 - 1. Duration of correction period is in accordance with the General Conditions, as may be modified by the Supplementary Conditions.
 - 2. Duration of CONTRACTOR's general warranty and guarantee is in accordance with Laws and Regulations.
 - 3. Duration of Supplier's general warranties is in accordance with the applicable general warranty document accepted by ENGINEER.
 - 4. Duration of required Suppliers' special warranties shall be in accordance with the requirements of the Contract Documents for the subject item.

1.5 EXTENDED WARRANTIES

Sections listed below require extended warranty.

- 1. Section SS08120, Fiberglass Reinforced Door and Door Frame Systems.
- 2. Section SS11260, Emergency Chlorine Gas Scrubbing System and Existing Sulfur Dioxide Gas Scrubbing System Improvements.
- 3. Section SS13201, High Density Cross-linked Polyethylene Storage Tanks.
- 4. Section SS14630, Freestanding Workstation Bridge Cranes
- 5. Section SS17200, Instrumentation and Control Cabinets and Associated Equipment
- 6. Section SS235416.13 Gas-Fired Furnaces
- 7. Section SS237433 dedicated Outdoor Air Units
- 8. Section SS238127 Split-System Air Conditioners

1.5 MEASUREMENT AND PAYMENT

- A. No compensation shall be allowed under this section for the work prescribed but shall be included in the unit price of the items for which it is used.

END

FIBERGLASS REINFORCED DOOR AND DOOR FRAME SYSTEMS

Section SS08120

PART 1 -- GENERAL

1.1 SUMMARY

- A.** The CONTRACTOR shall furnish and install fiberglass reinforced door and door frame systems and related items, complete and operable, including all finish hardware and all appurtenant work, all in accordance with the Contract Documents.
- B.** Three (3) FRP doors and frames shall be installed in the chlorination building. Contractor shall verify field dimension and requirement prior to fabrication.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A.** Section 08710 - Finish Hardware

1.3 SECTION INCLUDES

- A.** Fiberglass Reinforced Plastic (FRP) Doors.
- B.** Fiberglass Door Frames.

1.4 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A.** Comply with the reference specifications of the GENERAL REQUIREMENTS.
- B.** Comply with the current provisions of the following Standards.
 - 1. ASTM D 523 – Standard Test Method for Specular Gloss.
 - 2. ASTM D 635 – Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.
 - 3. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 4. ASTM E 152 – Standard Methods of Fire Tests of Door Assemblies. NFPA 252 Standard Methods of Fire Tests of Door Assemblies.
 - 5. SDI-100 – Recommended Specifications for Steel Doors and Frames. UL 10B Standard for Fire Tests of Door Assemblies.
 - 6. UL 305 – Standard for Panic Hardware.

1.5 SYSTEM DESCRIPTION

- A.** Performance Requirements:
 - 1. Door opening assemblies:
 - a.** Maximum flame spread 25 in accordance with ASTM E 84, self-extinguishing in accordance with ASTM D 635.
 - b.** USDA accepted.

1.6 SUBMITTALS

- A.** Submittals shall be made in accordance with the General Requirements.
- B.** Product Data: Manufacturer's printed product data indicating characteristics of products specified in this Section.
- C.** Shop Drawings:

Special Specifications

1. Plans: Indicate location of each door opening assembly in project.
 2. Elevations: Dimensioned elevation of each type door opening assembly in project; indicate sizes and locations of door hardware, and lites and louvers, if specified.
 3. Details: Installation details of each type installation condition in project; indicate installation details of glazing, if specified.
 4. Schedule: Indicate each door opening assembly in project; cross-reference to plans, elevations, and details.
- D.** Selection Samples: Manufacturer's standard color chips.
- E.** Verification Samples: Two (2) samples to verify color match.
- F.** Manufacturer's Instructions: Verify field dimensions prior to fabrication and provide printed installation instructions for door opening assemblies.
- G.** Warranty Documents: Manufacturer's standard warranty documents, executed by manufacturer's representative, countersigned by the CONTRACTOR. Warranty shall commence from Final Acceptance of the Work, or from Beneficial Occupancy of the Work if applicable pursuant to the provisions of "Use Prior to Final Completion" of the General Conditions.
- 1.7 DELIVERY, STORAGE, AND HANDLING**
- A.** Packing, Shipping, Handling and Unloading: Package door opening assemblies in manufacturer's standard containers.
- B.** Store door assemblies in manufacturer's standard containers, on end, to prevent damage to face corners and edges.
- 1.8 WARRANTY**
- A.** Manufacturer's Warranty:
1. Manufacturer's 10-year warranty against failure due to corrosion from specified environment.
 2. The hardware manufacturer's warranty shall be included with the hardware installation.

PART 2 -- PRODUCTS

2.1 MANUFACTURERS

- A.** Acceptable Manufacturers: CORRIM Co., FIB-R-DOR Division of Advance Fiberglass, Inc.; Chem-Pruf Door Company; Lorrin Door Systems; Corrosion Door Systems or equal.
- B.** Requests for substitutions will be considered in accordance with the GENERAL REQUIREMENTS.

2.2 MATERIALS

- A.** Fiberglass Mat: Minimum 1.5 ounces per square foot.
- B.** Resins: Manufacturer's formulation for fabricating units to meet specified requirements.
- C.** Anchors: Manufacturer's standard stainless steel expansion anchors for existing openings.
- D.** Fasteners: Stainless steel.

2.3 MANUFACTURED UNITS

A. Non-rated Fiberglass Reinforced Plastic (FRP) Doors:

1. Thickness: 1-3/4 inches.
2. Thermal Insulating Value: 'R' factor 11.
3. Construction:
 - a. Core: All voids between the door plates shall be completely filled with the equivalent of 4-6 pounds of expanded polyurethane foam, having a flame spread of 25 or less per ASTM E-84. A phenolic-coated kraft honeycomb may be substituted for urethane when approved by the ENGINEER.
 - b. Door Plates: Molded in one continuous piece, resin reinforced with hand-laid glass fiber mat, nominal 1/8 inch thick, minimum 15 mil gel-coated surface.
 - c. Door Edges: Minimum three (3) layers resin-reinforced glass fiber mat, nominal 3/8 inch thick, machine tooled.
4. Sizes: Indicated on drawings.
5. Finish: Minimum 15 mil gel-coated smooth gloss surface with a minimum value 88 in accordance with ASTM D 523.
6. Color: AG-31916 gelcoated.

B. Non-rated Fiberglass Frames:

1. Construction: One-piece pultruded fiberglass reinforced plastic, minimum 1/4 inch wall thickness, jamb-to-head joints mitered and reinforced with FRP clips and stainless steel fasteners; conforming to SDI requirements for performance equivalent to 16 gage steel frames.
2. Frame profile: 5-3/4 inches deep, 2 inches wide face; double rabbeted with 5/8 inch high stop.
3. Sizes: Indicated on drawings.
4. Finish: Minimum 15 mil gel-coated smooth gloss surface with a minimum value 88 in accordance with ASTM D 523.
5. Color: AG-31916 gelcoated.

2.4 FABRICATION

A. Fiberglass Reinforced Plastic (FRP) Doors:

1. Minimum glass fiber to resin ratio: 30 percent.
2. Mortise for lockset, and recess for strike plate in lock stile.
3. Embed stainless steel reinforcement for hinges, door closers, locksets and other specified hardware in fiberglass matrix; provide for hinge leaf recesses in hinge stile.

B. Fiberglass Frames:

1. Mortise for lock strike, and recess for strike plate in lock jamb.
2. Reinforce for hinges and other indicated hardware.

PART 3 -- EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Field verification of openings prior to fabrication.
2. Openings are correctly prepared to receive doors and frames.
3. Openings are correct size and depth in accordance with shop drawings.

B. Installer's Examination:

1. Have installer examine conditions under which construction activities of this section are to be performed and submit written report if conditions are unacceptable.
2. Transmit two copies of installer's report to the ENGINEER within 24 hours of receipt.
3. Beginning construction activities of this section before unacceptable conditions have been corrected is prohibited.
4. Beginning construction activities of this section indicates installer's acceptance of conditions.

3.2 INSTALLATION

A. Install door opening assemblies in accordance with shop drawings, and manufacturer's printed installation instructions, using installation methods and materials specified in installation instructions.

B. Installation of door hardware

1. Specified in Section SS08710 Finish Hardware.
2. All hardware shall be installed at the door manufacturing plant.

C. Install door hardware in accordance with manufacturer's printed instructions, using through-bolts to secure surface applied hardware.

D. Site Tolerances: Maintain plumb and level tolerances specified in manufacturer's printed installation instructions.

3.3 ADJUSTING

A. Adjust doors in accordance with door manufacturer's maintenance instructions to swing open and shut without binding, and to remain in place at any angle without being moved by gravitational influence.

B. Adjust door hardware to operate correctly in accordance with hardware manufacturer's maintenance instructions.

3.4 CLEANING

A. Clean surfaces of door opening assemblies and sight-exposed door hardware in accordance with manufacturer's maintenance instructions.

3.5 PROTECTION OF INSTALLED PRODUCTS

A. Protect door opening assemblies and door hardware from damage by subsequent construction activities until final inspection.

END

PART 1 -- GENERAL

1.1 SUMMARY

- A.** The CONTRACTOR shall furnish all tools, equipment, materials, supplies and manufactured items, and shall perform all labor required to furnish and install, complete, finish 316 stainless steel hardware as indicated on the Drawings and specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A.** Section 08120 Fiberglass Reinforced Door and Door Frame System.

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A.** Comply with the reference specifications of the GENERAL REQUIREMENTS.
- B.** Comply with the current provisions of the following codes and standards.
 - 1. Commercial Standards:
 - 2. Underwriter's Laboratories, Inc. requirements and approvals.
 - a.** Hardware Institute (DHI) Recommended Procedure for Processing Hardware Schedules and Templates and Architectural Hardware Scheduling and Format.
 - b.** BHMA Builders' Hardware Manufacturers' Association
 - 3. Manufacturers' Standards: In addition to the standards listed above, the finish hardware and its installation shall be in accordance with the manufacturers' published recommendations and specifications.

1.4 CONTRACTOR SUBMITTALS

- A.** Submittals shall be made in accordance with the GENERAL REQUIREMENTS.
- B.** The following submittals and specific information shall be provided.
 - 1. Samples: The samples of all items requested by the ENGINEER shall be furnished by the hardware supplier no later than 10 days after said request is received.
 - 2. Manufacturer's information: The CONTRACTOR shall submit a complete detailed hardware list and a schedule along with manufacturer's literature on each item for approval. No hardware shall be delivered until the hardware schedule has been approved by the ENGINEER.
 - 3. The hardware schedule submitted by the CONTRACTOR shall list the actual product series numbers. Manufacturer's catalog requirements for actual size of door closers, brackets, and holders shall be observed. All door sizes shall be noted on the hardware schedule and all hardware shall be in strict accordance with height, width, and thickness requirements.
 - 4. The schedule shall indicate groups, type, manufacturer's name, catalog number, location, and finish of each item to be provided, all in accordance with the DHI "Architectural Hardware Scheduling Sequence and Format."
 - 5. The schedule shall also include a complete template list showing template references and data for each item requiring preparation of metal doors and frames.

1.5 QUALITY ASSURANCE

- A.** Manufacturer's product names, numbers, and models are given herein for the purpose of indicating the requirements for the type, general construction, material and operation of the specific item, not with the intention of limiting the item to the manufacturer's listed product. Substitution of another manufacturer's product that is fully equivalent in all respects may be made subject to the approval of the ENGINEER. It shall be the CONTRACTOR's responsibility to supply detailed and complete data to the ENGINEER as required to facilitate appropriate evaluation of all proposed substitute items.

1.6 DELIVERY, STORAGE, AND HANDLING

- A.** Except where otherwise specified all hardware shall be delivered to the jobsite.
- B.** Each unit of hardware specified herein shall be individually packaged complete with fastenings and all appurtenances. Each package shall be clearly marked on the outside to indicate its contents and its specific location in the work, and shall be identified by its related number from the reviewed hardware list.
- C.** CONTRACTOR shall store hardware in a safe place at the jobsite where directed by the ENGINEER to prevent loss or damage until installation.

PART 2 -- PRODUCTS

2.1 GENERAL

- A.** Manufacturer's product names, numbers and models given herein are for the purpose of indicating the basic requirements for type, construction, material, operation, durability and functional adequacy of the specific item. Substitution of another manufacturer's product that is fully equivalent in all respects will be made subject to the approval of the ENGINEER.
- B.** Provide end products of one manufacturer for each item in order to achieve standardization for appearance, maintenance, and replacement.
- C.** When deemed necessary for product evaluation prior to review, the ENGINEER may require submittal of full-size standard production units for inspection and check. Such samples will be returned to the CONTRACTOR and may be installed on the project if identified for location in conformance with specified requirements.
- D.** CONTRACTOR shall check kinds and quantities of hardware products to determine conditions, completeness, and conformance to the Specifications.
- E.** All parts shall be Type 316 stainless steel.

2.2 PRODUCT TYPES

- A.** Locks and Latches: One per single door. Heavy duty one per active leaf double door. Federal Specification FF-H-106a-161N, level style knob or the entry style handle sets knob. To be lockable where indicated. Locking hardware with outside lever fixed, entrance by key only and inside panic hardware to provide quick exit from the room.
- B.** Locks shall be security type with 6-pin cylinders having 316 stainless steel mechanism for all metal manway doors and FRP exterior doors.
- C.** Lock Uniformity: Except as otherwise specified, CONTRACTOR shall furnish locksets, cylinders, and component parts as hereinbefore specified, by one manufacturer.
- D.** Lock Strikes: Shall be boxed type with curved tip of sufficient length to protect trim and/or jamb. Lock strikes shall be delivered to the jobsite with the locksets.

Special Specifications

- E.** Fasteners: Bolts, screws, fittings, and other fasteners, including soffit plates for door closers, shall be provided for proper and secure attachment with specified hardware. All fasteners shall be Type 316 stainless steel.
- F.** Door Closers shall be full rack and pinion type with adjustable means of regulating closing speed, latching speed, back check, and with reduced spring power and shall be regular parallel arm type with 90 degrees to 180 degrees hold open provisions. One closer shall be installed per each single door. One closer shall be installed per active leaf double door. Door closers shall be LCN4010, Norton 7500, with Type 316 stainless steel cover.
- G.** Door Swings: Door swings indicated on the Contract Drawings are standard door swings. If a door hand is changed during Construction the CONTRACTOR shall make necessary changes in hardware at no additional expense to the DISTRICT, subject to the approval of the ENGINEER.
- H.** Door Butts shall be of proper width to clear trim and other features when door swings to 180 degrees and shall have oil-impregnated ball bearings, finish U.S. 28, McKinney TA3313, Hager No. BB1191, Stanley FBB 199, or equal.
 - 1. Single door 1-3/4-inch thick up to 7-feet 0-inch to have 1-1/2 pair of 4-1/2-inch X 4-1/2- inch butts.
 - 2. Double door 1-3/4-inch thick up to 7-feet 0-inch to have 3 pair of 4-1/2-inch X 4-1/2- inch butts.
 - 3. Exterior doors to have butts with oil-impregnated bearings.
 - 4. Provide template hinges for use on metal door frames.
- I.** Temporary Lock Cylinder: CONTRACTOR shall provide temporary lock cylinders with temporary construction keys for door locks during the construction period.
- J.** Kickplates: 16-gauge stainless steel with edges beveled four (4) sides. Kickplates to be 10-inches high x door width less 1-inch.
- K.** Lock Astragal: Provide astragal for exterior in swinging 1-3/4-inch metal doors, of 9-3/8- inch x 1-1/2-inch size with US 10 finish designed to prevent tampering of lock bolts from the exterior.
- L.** Flush Extension Bolt: Two point concealed automatic type for exit operation only with control knob located on the inside, provided with top and bottom strikes, Underwriters Laboratories (UL) Listed, 316 stainless steel components designed for use on 1-3/4-inch thick FRP doors. Top and bottom of inactive leaf of double doors.
- M.** Door Holders: Each single door and each leaf of double doors. Plunger type, Glynn-Johnson 1153, Sargent and Greenleaf SC 3950, or equal.
- N.** Threshold: Extruded aluminum 3-3/4 x 7/8-inch Brookline 2053, U.S. Aluminum Corporation T-475, or equal.
- O.** Floor Stops: Each door. GlynnJohnson FB 3494 Series, Sargent and Greenleaf SG 3818 or SG 3819, or equal.

2.3 FINISHES

- A.** All finishes hereinafter specified are "BHMA" numbers as specified by the "Building Hardware Manufacturer's Association."
 - 1. 600 - Prime Coat
 - 2. 626 - Dull Chromium

- 3. 629 - Bright Stainless Steel
- 4. 630 - Satin Stainless Steel
- B.** All items not specified herein shall have BHMA 630 finish.
- C.** Locksets and Deadlocks shall have BHMA 630 finish.
- D.** All hinges to have BHMA 630 finish.
- E.** Kickplates, Push and Pulls to have BHMA 630 finish.
- F.** Closer cover plates to have dull bronze lacquer finish.
- G.** Miscellaneous Finishes shall be as specified.

2.4 KEYING

- A.** To ensure full coordination with Owner's keying needs and requirements, all keying will be determined after a conference with the ENGINEER, and such keying shall be designated in the CONTRACTOR'S hardware schedule by appropriate set of numbers opposite the respective doors. Keys shall be positively identified for their respective locks and shall be delivered into the hands of the ENGINEER upon completion of the work.
- B.** All locks and cylinders shall be labeled consecutively with the door number to correspond with change keys. All shipping tags shall be of approximate 2-inch x 3-inch size.
- C.** Keys:
 - 1. All keys shall be nickel-silver large bow, plain both sides, (6 pin) stamped on one side "DO NOT DUPLICATE."
 - 2. CONTRACTOR shall furnish two (2) keys for keyed alike locks; two (2) keys for each keyed different locks, and six (6) grandmaster keys.
 - 3. Lock manufacturer shall ship all keys including grandmaster, master, and change keys, via Registered Mail directly to the ENGINEER. The keys shall be individually tagged and identified by door locations.
 - 4. At the time of changeover from construction lock cylinders to permanent lock cylinders, the INSPECTOR will check the permanent key operation with the in-place permanent lock cylinders to assure proper operation of locks and keys.

2.5 HARDWARE SCHEDULE

- A.** The following hardware schedule is intended to represent the hardware required. Provide the following hardware or their equal:

2.6 TEMPLATES

- A.** All hardware for FRP doors and metal manway doors shall be fabricated to template. Templates, or physical hardware items, shall be furnished sufficiently in advance to avoid any work delay.

PART 3 -- EXECUTION

3.1 GENERAL

- A.** During the construction period, the CONTRACTOR shall employ temporary construction lock cylinders with temporary construction keys on door locks in the project.
- B.** Prior to completion of construction, and after final installation of hardware, the CONTRACTOR shall demonstrate to the ENGINEER that all items of operable hardware function properly, that doors swing smoothly, and that keys lock and unlock their respective doors.
- C.** At the time of completion of the facility, on direction of the ENGINEER, the CONTRACTOR shall replace the construction lock cylinders with the permanent lock cylinders.
- D.** The CONTRACTOR, upon completion of the work herein, shall remove all oil, grease, or other soiling from exposed surfaces of finish hardware and shall remove all cartons, wrappings, and other debris resulting from the work herein, and shall leave the facility in a neat, clean, and acceptable condition subject to approval by the ENGINEER.

3.2 INSTALLATION

- A.** All hardware shall be installed accurately by the door manufacturer and in accordance with the hardware manufacturer's instructions.
- B.** Hardware shall be securely tightened to develop full strength of components and provide for proper operation.
- C.** Make work neat and secure.
- D.** Prevent marring, scratching, or otherwise damaging adjacent finishes during hardware installation.
- E.** Door holders shall be installed on the outside of doors such that they will not cross the threshold when the door is opened.
- F.** Door closers shall be shimmed and with Type 316 stainless steel shims to prevent the attaching arm from touching the doorframe.
- G.** Latchbolts:
 - 1. Install to engage in strikes automatically, whether activated by closers or manually.
 - 2. Additional manual pressure shall not be required to engage latchbolt in strike.
- H.** Stops and Holders: Set to allow doors to open as far as possible.
- I.** Wall Mounted Hardware: Install over solid structural backing or solid blocking in hollow walls.
- J.** Thresholds:
 - 1. Cope ends neatly to profile of jamb.
 - 2. Set in sealant and seal ends to jambs.
- K.** Hardware: Adjust for easy, noise-free operation.
- L.** Replace damaged hardware items.

3.3 PROTECTION

- A.** Cover and protect exposed surfaces of hardware during installation and until substantial completion.

Special Specifications

- B.** Fit, dismantle, and reinstall finish hardware as required for finish painting work.
- C.** Protect and prevent staining of hardware during construction in accordance with manufacturer's recommendations.
- D.** Remove protective measures on permanent lock cylinders installed prior to final cleaning.

END

**EMERGENCY CHLORINE GAS SCRUBBING SYSTEM, EXISTING
SULFUR DIOXIDE GAS SCRUBBING SYSTEM IMPROVEMENTS**

Section SS11260

PART 1 -- GENERAL

1.1 SUMMARY

- A.** Contractor to provide one (1) Emergency Scrubber complete with two (2) blowers and a control panel to neutralize a chlorine gas release, and one (1) blower and one (1) control panel for an existing Emergency Scrubber to neutralize a sulfur dioxide gas release.
- B.** Furnish all labor, materials, equipment, incidentals, and services required to install, test, complete, and make ready for operation a deep bed dry chemical gas scrubbing system suitable for chlorine (referred to as Emergency Chlorine Gas Scrubbing System) specified herein. The Emergency Gas Scrubbing System and media shall be compatible with chlorine gas and all reaction byproducts.
- C.** Furnish all labor, materials, equipment, incidentals, and services required to install, test, complete, and make ready for operation modifications to existing deep bed dry chemical gas scrubbing system used for sulfur dioxide (referred to as Existing Emergency Sulfur Dioxide Gas Scrubbing System). The modifications will include the installation of a second fan assembly and a dual fan control panel with FRP piping assembly.
- D.** Install and test all related appurtenances herein specified.
- E.** All power and control wiring required for a complete operating system, including power and control wiring from each system control panel to the various items of equipment furnished under this Section, shall be furnished and installed under this Section. All electric materials and installation shall conform to all applicable Specification Sections of Division 16 and all other authorities having jurisdiction over the installation. All control of the Emergency Chlorine Gas Scrubbing System shall be by contacts and not PLC based.

1.2 RELATED WORK

- A.** Electrical, see Specification Division 16.
- B.** Special Specification SS13390 - Packaged Control Systems.
- C.** Instrumentation and Control, see Specification Division 17.
- D.** Plans and Project Manual for the "Walnut Creek WWTP Gas Scrubber System Renewal" (Project).

1.3 SUBMITTALS

- A.** Submit to the Engineer copies of all materials required to establish compliance with this Section. Submittals shall include the following and according to Section 01300 Submittals (01/11/19 version) of the Contract Specifications:
 - 1.** Certified performance characteristics for both chemical and air flow performance of the system.
 - 2.** FRP piping resin and interior coating description for equipment interior surfaces.

Special Specifications

3. Certified shop and erection drawings generated in AutoCAD, but provided in PDF format, showing details, sizes, grades, protective coatings, and materials of construction, dimensions, and any anchor bolt locations.
4. Literature and drawings describing the equipment in detail, including but not limited to, parts list, assemblies, operating weights, dimensions, materials, details of construction, air ducting fitting sizes, and complete installation instructions.
5. Manufacturer's catalog data, specifications, performance data, and calibration curves for exhaust fan, and other auxiliary equipment not directly manufactured or constructed by the Emergency Chlorine Gas Scrubbing System manufacturer, hereafter referenced as the scrubber manufacturer.
6. Complete description of instrumentation and electrical equipment including motor data, schematic electrical wiring diagrams, control panel data, conduit and wire (per Division 16), and complete bill of materials list.
7. Detailed calculations, certified by a registered professional engineer licensed in the State of Texas, which demonstrate Emergency Chlorine Gas Scrubbing System equipment meet the design and performance requirements specified herein. These calculations and supplied data shall include:
 - a. Draft in inches water column (W.C.) provided by exhaust fan.
 - b. Volume and wall thickness of scrubber vessels for Emergency Chlorine Gas Scrubbing System.
 - c. Rate and magnitude of temperature rise of media in scrubber vessels for Emergency Chlorine Gas Scrubbing System.
 - d. Showing that the equipment will be capable of meeting minimum system performance design requirements for Emergency Chlorine Gas Scrubbing System.
 - e. The unit media vessels shall be capable of withstanding the load imposed by being filled to the top with media for both for Emergency Chlorine Gas Scrubbing System.
 - f. Emergency Chlorine Gas Scrubbing System both contain a minimum amount of media required to scrub the total design release amount of gas. Calculations shall include ventilation rate, system pressure, gas flow, and weight.
 - g. The maximum (Max.) temperature of the media for Emergency Chlorine Gas Scrubbing System during the design leak event and the capability of the system to handle the developed temperatures.
 - h. The capability of the exhaust fan to handle the minimum required air flow from the storage room including the resistance of all ductwork, fittings, and system components at actual operating temperature during processing of design leak event. Air flow rate, ambient and mixture, including head loss calculations for the duct system.
 - i. Calculations shall include anchor lug attachment, imposed live loads, dead loads, and necessary anchor bolts and restraints.
 - j. Detailed shop drawings and calculations for miscellaneous accessories including, but not limited to the following: aluminum railings, ladder safety climb system, tie-off points, and provisions for anchoring davit arm.
8. Gas Scrubber Packages for Emergency Chlorine Gas Scrubbing System

Special Specifications

- a. Overall Dimensions.
 - b. Net Weight.
 - c. Operating Weight.
 - d. Construction Materials.
 - e. Anchor lug attachment and anchor bolt calculations shall be signed and sealed by professional engineer licensed in the State of Texas.
9. Chemical Media for Emergency Chlorine Gas Scrubbing System
 - a. Name of Manufacturer.
 - b. Type of Material.
 - c. Quantity.
 - d. Media chlorine absorption performance.
 - e. Media Disposal.
 - f. Material Safety Data Sheet (MSDS).
10. Exhaust Fans for Emergency Chlorine Gas Scrubbing System and the existing sulfur dioxide scrubbing system
 - a. Name of Manufacturer.
 - b. Type and Model.
 - c. Rotational Speed.
 - d. Net Weight.
 - e. Overall dimensions.
 - f. Performance curves with Airflow Rate in cubic feet per minute (cfm) and Brake horsepower, Static Pressure and Fan efficiency.
 - g. Construction Materials.
 - h. Sound Power Level.
 - i. Pedestal Base. Provide complete design calculations, dimensions and construction material showing that the base and anchoring system can support the exhaust fan, motor and blower stack and appurtenances and all loads required by International Building Code while operating at full load at full speed without vibration. Design shall be by professional engineer licensed in the state of Texas.
11. Motor for Emergency Chlorine Gas Scrubbing System and the existing sulfur dioxide scrubbing system
 - a. Name of Manufacturer.
 - b. Type and Model.
 - c. Horsepower Rating and Service Factor.
 - d. Full Load Rotating Speed.
 - e. Net Weight.
 - f. Efficiency and Power factor at Rated Load.

Special Specifications

5. ASTM D 695 – Test Method for Compressive Properties of Rigid Plastics.
 6. ASTM D 790 – Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 7. ASTM D 2310 – Standard Classification for Machine-Made "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
 8. ASTM D 2563 – Recommended Practice for Classifying Visual Defects in Glass-Reinforcing Plastic Laminate Parts.
 9. ASTM D 2583 – Test for Indentation Hardness of Rigid Plastics by Means of Barcol Impresser.
 10. ASTM D 2584 – Test for Ignition Loss of Cured Reinforced Resins.
 11. ASTM D 3299 – Standard Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Chemical-Resistant Tanks.
- B. American National Standards Institute (ANSI) B16.9 – Factory-Made Wrought Steel Buttwelding Fittings.
 - C. The International Society for Measurement and Control (ISA) S5.4 – Instrument Loop Diagrams.
 - D. Air Movement and Control Association (AMCA) 210 – Laboratory Methods of Testing Fans for Rating Purposes.
 - E. American Society of Mechanical Engineers (Latest Edition) – Power Test Code for Compressor and Exhauster.
 - F. National Bureau of Standards (NBS) Voluntary Product Standard PS 15-69 – Custom Contact Molded Reinforced Polyester Chemical-Resistant Process Equipment.
 - G. National Fire Protection Associates (NFPA) Code No. 255 – Standard Method of Test for Surface Burning Characteristics of Building Materials. H. National Electrical Manufacturers Association (NEMA).
 - H. Occupational Safety and Health Administration (OSHA).
 - I. American National Standards Institute (ANSI) ASC A 14.3 – American National Standards for Ladders-Fixed-Safety Requirements.
 - J. International Building Code.
 - K. 2018 International Fire Code.
 - L. National Electrical Code, NFPA 70, latest edition.
 - M. This Specification references the latest edition of the publications listed above.
- 1.5 QUALITY ASSURANCE**
- A. The supplied scrubber system shall comply with the 2015 Uniform Fire Code with local amendments, City of Austin Building Code (latest edition), NIOSH guidelines (latest edition), and all other applicable local, state, and federal rules and regulations.
 - B. The scrubber manufacturer for Emergency Chlorine Gas Scrubbing System shall be experienced in the manufacture and installation of packaged scrubbing systems of the type and capacity as specified herein. Scrubber manufacturer shall, upon request of the Engineer provide a list of at least five installations using identical equipment manufactured by the scrubber manufacturer. Suppliers whose main occupation is fiberglass fabrication, but not hazardous gas scrubber system design, shall not be

Special Specifications

acceptable as the system vendor. Manufacturers shall provide verification of experience.

- C.** The scrubber manufacturer for Emergency Chlorine Gas Scrubbing System shall provide performance test data to demonstrate compliance with the 2015 Uniform Fire Code with local amendments using similar equipment. Testing shall have been carried out at independent laboratory facility, with appropriate witnesses. Any test carried out at a manufacturer's facility shall not be considered acceptable. Scrubber suppliers shall provide sufficient test data to demonstrate that they have successfully evaluated their equivalent section of a full-scale system and its ability to neutralize the adverse consequences of an actual one-ton or chlorine spill as well as release rates of 400 lbs/min for 1 minute, followed by 80 lbs/min for the balance of test to a total equivalent full-scale load of 2,850 lb. The test reactor representing the equivalent section of the full scale scrubber shall have the same media bed depth as the full scale scrubber.
- 1.** Test data shall include:
 - a.** Media temperature.
 - b.** Air discharge temperature.
 - c.** Combined Cl₂ and air volume flow rate at scrubber inlet throughout the test run.
 - d.** Continuous recording of scrubber discharge Cl₂ concentration, measured to 100-ppb accuracy.
 - 2.** Test results shall demonstrate a continuous air discharge containing less than 5 ppm Cl₂ concentration throughout the equivalent design load (2,850 lb) portion of the test. Further tests shall verify that the proposed scrubber system will perform, as specified, with media at a start-up temperature as low as -40°F, without the requirement for supplemental heating.
- D.** Services of manufacturer's factory representative for Emergency Chlorine Gas Scrubbing System:
- 1.** A scrubber manufacturer's factory representative who has complete knowledge of proper installation, startup, and operation and maintenance (O&M) shall be provided as noted below.
 - 2.** Man-hour requirements tabulated below are exclusive of travel time and do not relieve the scrubber manufacturer and CONTRACTOR of obligation to provide sufficient service to place equipment in satisfactory operation.

Minimum Time

<i>Services Provided by Factory Representative</i>	<i>Minimum^(a) No. of Trips</i>	<i>On Site Per Trip (hours)</i>
1. Supervise installation	1	16
2. Inspect and approve installation, supervise initial adjustment, supervise and assist in testing, and instruct City in proper startup and O&M ^(b)	1	16

^(a) The manufacturer’s factory representative shall be present at frequent enough intervals to ensure proper installation, testing, and initial operation of the equipment. The scrubber manufacturer’s representative shall be present for the initial filling of the dry chemical media.

^(b) The scrubber manufacturer’s factory representative shall provide to the Engineer a written certification that the system has been installed in accordance with the manufacturer’s recommendation. Instruction may be given upon completion of testing, provided that the test is successful, and the O&M manuals have been submitted to and accepted by the City.

3. The manufacturer shall, after start-up, provide a service to instruct the OWNER in media sampling.
4. Provide a proposal for providing lab analysis every 12 months for 10 years to determine the remaining life cycle of the media. Such service shall be provided at the manufacturer's expense for 10 years and shall be shown in the Warranty.

1.6 CHLORINE SCRUBBING SYSTEM DESCRIPTION FOR EMERGENCY CHLORINE GAS SCRUBBING SYSTEM

- A. Emergency Chlorine Gas Scrubbing System shall be vendor-supplied, packaged scrubber systems including dry scrubber chemical media, vertical FRP vessel, two alternating exhaust fans, and all other equipment and accessories as specified to provide an integrated and complete scrubber system. The configuration shall be arranged so that the air Cl₂ mixture from the gas storage area is drawn to the vessel passing from the top of the vessel through the media and out the bottom of the vessel to the blower. The scrubber system shall comply with all applicable standards of the Chlorine Institute, and requirements specified herein. The scrubber system shall be designed for outdoor installation and shall remain fully operational under all climate conditions.
- B. Emergency Chlorine Gas Scrubbing System shall scrub the chlorine gas from the air with a dry pellet chemical media and discharge the scrubber air into the atmosphere.
- C. Emergency Chlorine Gas Scrubbing System will treat releases from the chlorine storage room and other rooms where leaks can occur. Existing leak detectors located in the rooms will signal the presence of a leak and cause the scrubber to operate and the appropriate motorized dampers on the ducting to close such that the scrubber shall draw contaminated air from the location of the leak. A negative pressure of 0.1-inch W.C. shall be maintained at all times in each protected space.
- D. Emergency Chlorine Gas Scrubbing System shall be designed for the following treatment criteria:

Treatment Criteria	Item or Value
Gas to be Scrubbed	Chlorine
Design Release	2,850 lbs Chlorine

Special Specifications

Release Rate	400 lbs/min (first min.), then 80 lbs/min
Minimum Ventilation Rate	4,000scfm (ambient air)
Max. Discharge Cl ₂ Concentration	5 ppb

- E.** Emergency Chlorine Gas Scrubbing System shall be capable of treating a continuous leak with the release rate as listed and with the concentration of gas in the discharged scrubbed air not exceeding the tabulated values. The scrubber vessel shall be sized so that there is adequate dry chemical media for the chlorine scrubber to treat the design leak without the concentration of gas in the discharged air exceeding the stated limits and without excessive temperature rise of the media.
 - F.** Emergency Chlorine Gas Scrubbing System shall operate with a minimum air flow rate of 4,000 scfm (or as required by supplier) at ambient conditions. The system shall have a sufficient draft for the ductwork system. The scrubber supplier shall review the ductwork design to ensure the scrubbing system has sufficient draft. The supplier shall provide design calculations for head loss for both conditions.
 - G.** Environmental Conditions: Emergency Chlorine Gas Scrubbing System to be designed, fabricated, and constructed to provide satisfactory operation with minimum maintenance under the environmental conditions.
 - 1.** Outdoor Installation:
 - a.** Temperature: 15° to 120°F
 - b.** Full Sunshine
 - c.** Relative Humidity: 30% to 100%
 - d.** Wind: 150 mph
 - H.** Manufacturers shall pickle and passivate all stainless steel Unistrut, junction boxes, and cabinets. All stainless steel cabinets and junction boxes should have a polished 2B finish instead of brushed finish.
 - I.** The color of Emergency Chlorine Gas Scrubbing System shall be determined by the OWNER.
 - J.** All equipment shall be designed for a minimum working pressure of 5 inch W.C. positive and 12 inch W.C. negative pressure.
- 1.7** SYSTEM PERFORMANCE FOR EMERGENCY CHLORINE GAS SCRUBBING SYSTEM
- A.** Refer to 1.6 and 1.13
- 1.8** MAINTENANCE
- A.** One set of special tools, if required for normal operation and maintenance, shall be furnished with Emergency Chlorine Gas Scrubbing System provided.
- 1.9** HANDLING, DELIVERY AND STORAGE
- A.** The manufacturer shall assume responsibility for packing to prevent normal transit and handling damage.
 - B.** Flange faces shall be protected from damage. All openings shall be covered to prevent entrance of dirt, water, and debris.
 - C.** The manufacturer shall provide instructions for unloading and installation of Emergency Chlorine Gas Scrubbing System. The units shall be equipped with the necessary lifting lugs, cleats, etc.

Special Specifications

- D. The manufacturer shall provide instructions for installation of the second fan assembly and the dual fan control panel for Existing Emergency Sulfur Dioxide Gas Scrubbing System. The units shall be equipped with the necessary lifting lugs.

1.10 WARRANTY

- A. All equipment shall be warranted for a period of 2-years from date of substantial completion as defined under the General Conditions, to be free from defects in workmanship, design or material. If the equipment should fail during the warranty period due to a defective part(s), it shall be replaced in the machine and the unit(s) restored to service at no additional expense to the OWNER.
- B. Emergency Chlorine Gas Scrubbing System Media
 - 1. The media shall be warranted by the scrubber supplier for the physical properties and pressure drop characteristics, as specified herein, for a period of 10-years from the installation start-up and air flow acceptance tests or the supplier will supply media free of charge FOB factory enough to replace at each sample port level that media which does not meet at least 95% of the original physical properties and original pressure drop characteristics as documented on the 'Scrubber Monthly Maintenance Check List' supplied by the scrubber supplier.
 - 2. Emergency Chlorine Gas Scrubbing System Dry Media Warranty by Scrubber Supplier:
 - a. Provide a 10-year warranty to OWNER that the absorption capacity of the media will cover a full 2,850 pound chlorine from one overcharged 1-ton container.
 - b. Provide a proposal for one (1) entire replacement charge of media FOB factory in the event that more than half of the media in the scrubber vessel is consumed by a single event release of gas.
 - c. Provide analytical services once per year for the full 10-year term of the media warranty to determine and verify the remaining life cycle of the dry media and provide the report analysis directly to the OWNER.

1.11 ACCEPTABLE MANUFACTURERS

- A. Emergency Gas Scrubbing System and chlorine removing media shall be as manufactured by De Nora Water Technologies, Inc./EST, Colmar PA or Purafil ESD, Doraville, Georgia, or Pure Air Filtration, Atlanta, Georgia.

1.12 MATERIALS AND EQUIPMENT - GENERAL

- A. All of the items specified for Emergency Gas Scrubbing System are intended to be standard equipment of proven ability for use in scrubbing chlorine gas from air. The scrubbers and all appurtenances shall be constructed of materials that will resist corrosion from the specific gases being handled.
- B. Emergency Gas Scrubbing System provided under this Contract shall be the product of a single manufacturer.
- C. The second fan assembly provided for Existing Emergency Sulfur Dioxide Gas Scrubbing System under this Contractor shall be the product of a single manufacturer.
- D. The dual fan control panel provided for Existing Emergency Sulfur Dioxide Gas Scrubbing System under this Contractor shall be the product of a single manufacturer.
- E. Major components of the Emergency Gas Scrubbing System shall include:

Special Specifications

1. FRP vessel with two 36-inch diameter manways, inlet and discharge nozzles. FRP vessel with two 36-in diameter manways, inlets, and discharge nozzles. Set the bottom elevation of the side manway to be lowest as required. Provide hinges to the side manway cover. Provide lifting handles on the top manway cover. Provisions for three (3) tie-off points located around the top manway for personnel to connect lanyards to for confined space entry. Each tie-off shall be capable of withstanding 5,000 lbs of force as prescribed by OSHA.
 - a. The top of the vessel should be rated for Min. 200 lbs/ft² with non-skid surface.
 - b. Provide railings and ladder, conforming to OSHA and International Building Code. Ladder steps shall have manufactured slip protection. Provide 4-in toe board around the base of the guard rail at the top of the scrubber.
 2. Media sample ports on side of vessel with media extraction tool.
 3. Stainless steel 316 Media support structure and support screen.
 4. Minimum 24,750 lbs dry chemical media, or as required by supplier
 5. Two (2) blower-motor assemblies (separate unit). Provide adjustable base plate to ensure proper alignment with the blower duct and allow for corrections. Base plate shall be stiff enough to resist flexing while operating at full speed and shall be suitably supported to hold the weight of the motor, fan, duct, and any accessories.
 6. Chlorine-compatible magnehelic media bed differential pressure gage.
 7. Control and motor starter panel(s).
 - a. The scrubber manufacturer shall provide for all wiring, conduit, fittings, and junction boxes for all equipment including motors and field devices.
- F. Differential Pressure Instrumentation**
1. Provide a flush mounted magnehelic gage to permit local read-out of pressure drop through the media.
 2. The gauge shall be mounted in an NEMA 4X stainless steel enclosure.
 3. Gauge shall be compatible with chlorine gas.
 4. A differential pressure switch (adjustable) shall be provided to notify the control panel in the event of a fan failure (motor energized with no air flow).
 - a. Differential pressure switch should with 316 stainless steel fittings.
 5. All instrument tubing shall be Type 316 stainless steel.
 6. The scale of the differential pressure gage and switch should be ranged from 0" W.C. to 10" W.C.
- G.** Refer to Division 16 for additional requirements for equipment, especially concerning controls, motors, wire, conduit, equipment settings, nameplates, etc.
- H.** All necessary foundation bolts, plates, nuts, and washers shall be furnished; Type 316 Stainless Steel.
- I.** The scrubbers shall be identified by painted letters. Identifications shall be a minimum of 4 inches and be plainly visible. The scrubbers shall be labeled "CHLORINE EMERGENCY SCRUBBER."

1.13 EMERGENCY CHLORINE GAS SCRUBBING SYSTEM

A. Exhaust Fans

- 1.** Fan shall be fiberglass reinforced plastic, centrifugal type with backward inclined blades, industrial fiberglass fan. Fan wheel shall be statically and dynamically balanced. Fiberglass construction shall conform to PS 15-69 product standards. Fan resin shall be suitable for exposure to the specific service conditions. Fan housing shall be constructed of fiberglass and reinforced with rigid bracing to increase structural integrity. Bearing support brackets shall be positioned to directly oppose belt tension forces.
- 2.** Fan housing shall be a curved scroll design with a 1-inch NPT drain connection at the bottom of the fan scroll. Fan intake and outlets shall have flanged nozzles. Fan shaft shall be Type 316 stainless steel. Fan shall have self-aligning grease-packed bearings, with neoprene shaft seals and OSHA approved weatherproof motor/drive cover. Two (2) fans shall be designed for alternation and for the following specifications:
 - a.** Air Flow Rate: 4,000 to 5,000 scfm
 - b.** S.P. up to scrubber inlet: 2.00-inch W.C.
 - c.** Pressure Drop through Scrubber: As required by the supplier
 - d.** Motor HP: Max. 40 HP
- 3.** The fan shall have a 3-phase, 60 Hz, 230/460, TEFC, 1,800 rpm motor with a 1.15 service factor. The fan shall be New York Blower, Hartzell or equal. The fan shall have AMCA seal. Refer to Division 16 for additional requirements.
- 4.** The blower exhaust stack shall be equipped with a rain cap with ½" Type 316 stainless steel bird screen.
- 5.** Provide a chlorine sensor at each scrubber exhaust stack.
- 6.** Each fan shall be supplied with two (2) complete spare set of belts and bearings.

B. Scrubber Vessel

- 1.** The scrubber housing shall be a maximum 10-foot diameter FRP vessel and shall conform to the following structural design criteria:
 - a.** Working pressure, scrubber portion: -12 inches W.C to 5 inches W.C.
 - b.** Live Load: 200 lb/sqft.
- 2.** Air/ chlorine shall enter the top of the vessel and flow downward through the media bed to the blower inlet. Blower shall discharge to atmosphere through a discharge duct.
- 3.** The manufacturer shall provide the scrubber media vessel to meet the minimum values specified for dimension, design, and intent of this specification. Vessel, blower, and media shall function as a system and shall be the end product of the manufacturer to achieve standardization in appearance, operation, maintenance, spare parts and manufacturer's services.
- 4.** The scrubber media vessels shall be manufactured of filament wound fiberglass construction in accordance with ASTM D 3299 – Standard Specifications and PS 15-69 Product Standard.

Special Specifications

5. The resin used shall be suitable for continuous exposure to a wet chlorine /air mixture with max. operating temperature of 200°F. The recommended resins are listed in the following table.

Premium Resins

<i>Manufacturer</i>	<i>Trade Name</i>	<i>Barcol Hardness Minimum</i>
Reichold	Atlac 580	Barcol Hardness shall conform with the resin supplier's minimum value
Dow	Derakane 411	
Ashland	Hetron 922	

6. The corrosion barrier on the inner surface shall be a resin rich layer 10- to 20-mil minimum, not to exceed 10 % plus or minus 5 % "C" glass by weight using Hetron 922 vinyl ester resin inner layer composed of resin reinforced non- continuous glass fiber strands applied in two plies of chopped strand mat equivalent to 3 oz/ft. As an alternative method, two passes of chopped roving, minimum length 1/2 inch to 2 inches shall be applied uniformly by spray up process to an equivalent weight.
7. Filament wound laminates shall have an average glass content of 50 to 55 percent by weight.
8. Hand Layup laminates when used on the vessels and equipment shall be fabricated to meet the physical properties in accordance with PS 15-69 product standard.
9. Press molded or compression molded flanged nozzles are acceptable up to and including 6-in nominal size.
10. All cut-walls shall be reinforced as required by ASTM D 3299 and PS 15-69.
11. The media bed support system shall be stainless steel. If the vessel walls are used in conjunction with the support system, the manufacturer shall design the vessel walls in full accordance with these specifications. The support system shall be removable and may be a system of removable columns, gratings, and angles, or equal. All components of the support system shall be constructed of materials resistant to the service conditions specified for corrosion and exposure to wet chlorine in air at 200°F for the duration of the scrubbing event.
12. Each vessel shall contain 1-1/2-inch side-mounted sample probes, which extend into the media 6 inches minimum. Probes shall be adequate to provide suitable extraction of media samples from the media bed and be non-binding. Probes shall extend outside the vessel wall and be blocked off with a ball valve. Probes and ball valve shall be of CPVC construction.
13. The exterior of the vessel shall be white or a color selected by the Owner during submittal review process. The exterior shall be surface coated with white get coat containing ultraviolet inhibitors.

Special Specifications

14. All connections shall be fabricated of the same material as the vessel wall and shall have the same inner corrosion barrier as the vessel wall. All flanged connections shall be gusseted to the vessel wall with 1/4-in thick flat plate gussets.
15. Provide a minimum of three (3) lifting lugs designed to handle the entire vessel weight including the ladder.
16. Unless otherwise specified, all fasteners and metal attachments shall be Type 316 stainless steel. All gaskets shall be EPDM.
17. The scrubber vessel shall be identified with the health, flammability, and reactivity of hazardous materials as required by NFPA standards.
18. Provisions for mounting of davit arm for confined space entry from top manway. Basis of design for davit arm mounting is Miller Durahoist by Sperian, with floor sleeve. Locate floor sleeve so that davit arm is centered over top manway and floor sleeve is not a tripping hazard. Davit arm has radius of 48 inches. Per hoist manufacturer, platform supporting structure and hardware must be rated to support 90,000 in-lbs moment and 5,000 lbs vertical load. David arm is not included in project.
19. Provisions for three (3) tie-off points located around the manway for personnel to connect lanyards to for confined space entry. Each tie-off shall be capable of withstanding 5,000 lbs or force as prescribed by OSHA.
20. Weatherproof GFCI 120v outlet on top of scrubber.
21. Provide Fiberglass Unistrut on side of scrubber for mounting electrical conduit to service GFCI outlet.
22. Ladder Safety Climb Device.
 - a. Provide complete rigid-rail and locking sleeve fall prevention system such as "Latchways Vertical Ladder Lifeline Kits" by MSA. System shall conform to OSHA requirements and shall be complete with all mounting hardware and accessories furnished in the same metal as the rail unless otherwise noted. Rail material shall be stainless steel.
 - b. Furnish two bronze locking sleeves (MSA), two full body safety harnesses (MSA), and a safety lanyard (MSA). Furnish harness with leg and shoulder straps, and lifting rings attached at shoulders and a large fall arresting ring at the center of the back. Harnesses shall have an ANSI Class III rating. Provide a weather- proof storage box for wall mounting store above devices.

C. Dry Media

1. Provide dry chemically impregnated media to scrub chlorine, Media shall have an alumina oxide substrate and be cylindrical in shape, porous, non-flammable and capable of removing chlorine throughout the full bed depth.
 - a. Quantity: Minimum 24,750 pounds, chemically impregnated to remove chlorine gas
 - b. Moisture Content: 25% (max.)
 - c. Average crush strength: 17# on a representative sized media bead
 - d. Average Bulk Density: 50#/ft³
 - e. Average media diameter: 1/8 to 3/16" (4x6 mesh)

Special Specifications

- f. Media will not dissociate in water
- g. Media containing activated carbon is not acceptable
- h. Media UL Fire Class 1 Non-flammable rating is required
 - 1) Media with carbon in the substrate will not be acceptable.
 - 2) Pressure Drop Characteristics
 - a) Pressure drop of air at 70°F when flowing through a 12-inch deep packed media bed shall not exceed the following limits:

<u>Superficial Velocity (fpm)</u>	<u>Pressure Drop (inch w.c.)</u>
50	0.45
100	1.85

D. Differential Pressure Instrumentation – see 1.12.D.1.

E. Connecting Ductwork

- 1. Fiberglass ductwork between the vessel and blower inlet shall be provided by the scrubber system manufacturer, including flexible connector. Refer to SS23311 for requirements of flexible connector.
- 2. Ductwork assembly and design shall be compatible with the vessel and blower.

F. Accessories

- 1. Air inlet, air outlet, media sample connections, and all miscellaneous connections shall be provided by the manufacturer. Tie down lugs shall be integrally molded into the walls of the sump. Anchor bolts shall be Type 316 stainless and designed for the specified loads. Flanges for liquid service shall be ANSI B16.5 and air connections shall be duct flanges per PS 15-69 Table 2. Access flanges for manways, mist eliminator (if required), and packing access flanges shall be air tight to the pressure equal to or higher than the corresponding fan static pressure and shall be water tight. Interior fasteners shall be of corrosion resistance materials such as PVC or FRP.
- 2. Provide a chlorine leak detector in exhaust stack of each scrubber fan. Leak detector to be supplied by the scrubber manufacturer. Coordinate connections as required.

1.14 OPERATIONAL CONTROL STRATEGY FOR EMERGENCY CHLORINE GAS SCRUBBING SYSTEM AND EXISTING EMERGENCY SULFUR DIOXIDE SCRUBBING SYSTEM

A. Scrubber Blower Control

- 1. EMERGENCY CHLORINE GAS SCRUBBING SYSTEM AND EXISTING EMERGENCY SULFUR DIOXIDE SCRUBBING SYSTEM are controlled in either manual or automatic mode. Operation shall be provided with HAND-OFF-AUTO (HOA) selector switches. In the HAND position, the motor shall operate continuously when its START switch is actuated and automatic interlock. The scrubber system normally operates in automatic mode through the plant's SCADA system. In automatic mode, it would start operation if one of the chlorine gas sensors in the chlorine storage room or chlorine feed room is triggered due to a chlorine leak in one of these two rooms. System operation would start energizing a scrubber blower to start pulling air/chlorine gas from the chlorine storage and feed rooms. As the air passes through the scrubber media the chlorine gas is absorbed before

Special Specifications

the air is discharged to the atmosphere. The system should also have a HOA mode that allows the scrubber system to be operated in Manual Mode, for testing or maintenance purposes.

2. Only one blower will operate at a time with the second blower being furnished only for redundancy in the process system, and both blowers will never operate simultaneously. The scrubber system will receive a single point 480V three phase circuit for the entirety of its electrical power needs. The scrubber control system will contain all of the necessary motor starters, control and other instrumentation equipment needed for the operation of the gas scrubber unit. Only full voltage starters shall be used for the blower motors. No reduced voltage starters shall be allowed.
- B. Scrubber Air Flow Monitoring**
1. The air flow of the proposed emergency gas scrubber should be measured with a 4-20 mA signal to the scrubber unit control panel.
 2. Provide airflow measurement device with remote monitor and CPVC probe.
 3. Provide minimum 3' run at inlet and outlet, or per manufacturer's recommendations.
 4. Materials of construction shall be compatible with chlorine.
- C. Scrubber Media Pressure Monitoring**
1. The pressure difference across the chlorine scrubber media should be measured after the scrubber blower starts.
- D. Scrubber Media Life Cycle Monitoring**
1. The media samples shall be collected manually, and the remaining life cycle of the media will be determined based on the sample analysis. The media sample and life cycle analysis shall be provided by the scrubber manufacturer.
- E. Fresh Air Intake**
1. Provide new 120V damper actuator interlocked with the scrubber systems. Damper to remain closed during normal operation and open during an event.
- 1.15 SCRUBBER CONTROL PANELS FOR EMERGENCY CHLORINE GAS SCRUBBING SYSTEM AND EXISTING EMERGENCY SULFUR DIOXIDE SCRUBBING SYSTEM**
- A.** Control panels shall comply with all Division 16, Division 17, and SS 13390.
- B.** The scrubber manufacturer shall supply a control panel for EMERGENCY CHLORINE GAS SCRUBBING SYSTEM . The control panels shall include all necessary components to start and provide alternation of blowers, and operate and shut down the scrubber upon receipt of either a remote start/stop signal or due to local control at the panel itself.
- C.** Contractor shall supply a control panel EXISTING EMERGENCY SULFUR DIOXIDE SCRUBBING SYSTEM. The control panels shall include all necessary components to start and provide alternation of blowers, and operate and shut down the scrubber upon receipt of either a remote start/stop signal or due to local control at the panel itself.
- D.** The control panels shall be completely factory assembled and wired such that field wiring shall consist only of connection to terminals. All aspects of the panel wiring and construction shall comply with the requirements below and with City of Austin Division 16 requirements.

Special Specifications

- E.** The control panel shall be NEMA 4X, Type 316 stainless steel construction. All resets shall be surface mounted.
- F.** The control panels shall only employ the use of hardwired relay logic. The control panel shall not include the use of programmable logic controllers (PLCs) whatsoever. Additionally, any type of micro-processor based programmable relay, any relay requiring software download, or any other type of similar programmable relay shall not be used
- G.** Control Panel Wiring:
 - 1.** All panel equipment shall be mounted and wired on or within the cabinet. Wiring shall comply with NFPA 70, National Electrical Code and requirements of Specification SS13390 Packaged Control Systems. All wiring shall be identified in compliance with the system used on the wiring/connection diagrams and in compliance with SS16200 Wiring (600Volts and Below). Wiring and connection diagrams shall comply with ISA S5.4 and shall be submitted by the manufacturer as part of the Shop Drawings for review by the Engineer.
 - 2.** Power and low voltage DC signal wiring shall be routed in separate wireways. Crossing of the two system wires shall be at right angles.
 - 3.** Wire color shall be in accordance with SS16200 Wiring (600Volts and Below).
 - 4.** All wiring shall terminate in a master terminal board, rigid type and numbered. The master terminal board shall have a minimum of 25 percent spares.
- H.** At a minimum, the control panels shall include the following switches and indicating lights:
 - 1.** System HAND-OFF-AUTO Switch
 - 2.** System "READY" Status Light (White)
 - 3.** Scrubber Exhaust Fan HAND-OFF-AUTO Switch
 - 4.** Selector switch Fan 1-Auto-Fan 2
 - 5.** Scrubber Fan #1 "Run" Light (Red)
 - 6.** Scrubber Fan #2 "Run" Light (Red)
 - 7.** Scrubber Fan Discharge chlorine reading in ppm
 - 8.** System Summary Alarm (Amber)
 - 9.** System Failure Alarm (Horn and Beacon Light)
 - 10.** Silence and Reset Pushbuttons
- I.** The manufacturer shall provide a complete and fully functional control system to manually or automatically operate the control system as specified herein and in other applicable sections of these specifications. All manufacturers recommended safety devices shall be furnished to protect operators. All control devices, unless specified otherwise, shall be mounted in the Control Panel. In manual control, the scrubber system shall operate continuously whenever the H-O-A selector switch for the scrubber fan is in the hand position. In automatic control, the scrubber system shall operate continuously when a leak is detected in the chlorine storage room and the scrubber fan is in the auto position. The existing chlorine sensor shall activate the control panel to start.
- J.** Control Panel Construction

Special Specifications

- 1.** The control panels shall consist of a main circuit breaker, a motor circuit protector (MCP) and magnetic starter for each motor alternator, and a 120-volt control power transformer (fused on primary and secondary). All control components shall be mounted in one common enclosure. Control switches shall provide means to operate each motor manually or automatically. The motor starters shall be interlocked so that the two alternating fans cannot run simultaneously.
- 2.** The electrical control equipment shall be mounted within a NEMA 4X steel enclosure, constructed of not less than 14 gauge, Type 316 stainless steel.
 - a.** Panel shall be provided with aluminum sunshade to block southern/western sun; Size supports and sunshade in accordance with IBC and NEC. Color to be selected by OWNER.
 - b.** Latches shall be quarter turn quick release type. The enclosure shall be equipped with a door and shall incorporate a removable back panel on which control components shall be mounted. Back panel shall be secured to enclosure with collar studs. Door shall be interlocked with main circuit breaker.
 - c.** All field connected wiring terminations (starters, terminal strips, etc.) shall be provided with a minimum of 8-in clear space to the bottom, sides and top of enclosure where field terminations are to be made.
- 3.** All motor branch circuit breakers, alternator, motor starters and control relays shall be of highest industrial quality, securely fastened to the removable back panels with screws and lock washers. Back panels shall be tapped to accept all mounting screws. Self-tapping screws shall not be used to mount any component.
- 4.** A thermal-magnetic air circuit breaker, Type FIL (200KAIC rated) as manufactured by the Square D Company, or equal, shall be furnished for the main breaker. Line side lugs for the main circuit breaker shall be copper and sized for 1/0 copper conductor. All circuit breakers shall be sealed by the manufacturer after calibration to prevent tampering. Each circuit breaker shall be adequately sized to meet the equipment operating conditions. Motor Circuit Protectors (MCPs) shall only be used for motor starter protection and shall be molded case with adjustable magnetic trip only. MCPs shall be "Mag-Gard" as manufactured by Square D or equal.
- 5.** The main circuit breaker and each MCP shall be equipped with an operating mechanism on the face of the control panel door to allow external on and off operation. The off position shall be able to be locked open by means of a pad lock. A mechanical disconnect mechanism shall be installed on the main circuit breaker to prevent opening of the control panel door when the main circuit breaker is on.
- 6.** Auxiliary contacts shall be provided for remote run indication and indication of each status and alarm condition to Plant SCADA system. Additional controls shall be provided as specified herein and as required by Specification Division 16 and as shown on the Drawings.
- 7.** All operating control and instruments shall be securely mounted on the exterior door. All controls and instruments shall be clearly labeled to indicate function. All exterior mounted equipment shall be NEMA 4X.
- 8.** Mode selector switches shall be Hand-Off-Auto type to permit override of automatic control and manual actuation of shutdown. Switches shall be NEMA4X, full size 30 millimeter, providing three switch positions, each of which shall be

Special Specifications

clearly labeled according to function. Selector switches shall comply with City of Austin Division 16 requirements.

9. Indicator lights shall be NEMA 4X, full size 30 millimeter, LED full voltage push-to-test type. Lamp modules shall be equipped to operate at 120 volt input. Lamps shall be easily replaceable from the front of the control compartment door without removing lamp module from its mounted position. Indicators shall be provided for individual motor run and an indicator for each failure condition. Indicator lights shall comply with City of Austin Division 16 requirements.
10. A six digit, non-reset elapsed time meter shall be connected to each motor starter to indicate the total running time of each pump/motor in "hours" and "tenth of hours". The elapsed time meters shall be Series T50 as manufactured by the ENM Company or equal.
11. A failure alarm with horn and beacon light shall be provided. Silence and reset pushbuttons shall also be furnished. A common failure reset pushbutton shall be provided to reset the alarm conditions (reset shall occur only if fault condition has been cleared). The alarm horn shall be weatherproof rated with gasket (Federal Signal Corporation, Cat. #350 or equal). The alarm beacon shall be NEMA 4X rated, red lens and solid state flasher (Ingam Products Inc. LRX-40).
12. The control panel shall operate on a power supply of 480-volts, 3-Phase, 60Hz.
13. The control diagrams shall be laminated and stored in a metal pocket on the inside of the door. The laminated drawings should include the P&ID, wiring diagrams and any schematics.
14. Print storage pockets shall be provided on the inside of each panel. Pocket shall be of sufficient size as required to hold all prints necessary to service the equipment. A set of reduced drawings shall be provided for each panel, fixed to fit in the storage pocket.
15. A duplex GFCI utility receptacle (circuit breaker protected) providing 120 Volts, single phase, 60 Hz current shall be mounted on the inside of the enclosure. The receptacle shall comply with SS16300 "Wiring Devices".
16. Alternators shall be provided to sequence motors, alternators shall be manufactured by Sta-con, or equal.
17. A phase monitor shall be provided for the control panel, monitors shall be model SUA-440-ASA as manufactured by Diversified Electronics Inc., or equal.
18. All exterior mounted equipment shall be rated NEMA 4X. NEMA 4X stainless steel viewing windows will be permitted where such equipment is not available with a NEMA 4X rating.
19. The control panel shall be provided with lightning and surge protection.
 - a. All control panel wiring shall be numbered at both ends with type written heat-shrinkable wire markers in compliance with SS16300 "Wiring Devices".
 - b. Surge protection shall comply with City of Austin Division 16 and SS13390 requirements.
20. Wiring shall be flexible tinned copper with 41 strands, minimum #14 AWG (except for shielded instrumentation cable), with 600-volt, 90 degree C, Type SIS insulation.

Special Specifications

21. The control panel shall be provided with nameplates identifying each component, selector switches, pilot lights, etc. Nameplates shall be permanently affixed using an epoxy adhesive plus stainless steel machine screws). Nameplates shall be laminated plastic, engraved white letters with a black background.
22. All control panels shall be provided with a master nameplate located on the exterior door.
23. Provide nameplate which reads as follows "CAUTION – THIS PANEL CONTAINS A VOLTAGE FROM AN EXTERNAL SOURCE." Letters shall be black on a high visibility yellow background.
24. Corrosion Inhibitor Emitter: Inclusion of an industrial corrosion inhibitor emitter that shall protect internal components of control panel from corrosion for up to one year. One spare emitter shall be provided for each control panel.
25. All control relays shall comply with City of Austin Division 16 requirements.
26. Terminal blocks shall be 600-volt heavy duty rated, tubular clamp type. Terminal strips shall be Allen Bradley catalog #1492-CA-1 or equal. Each terminal shall be individually labeled.
27. The completed control panel assembly shall be U.L. listed.
28. A copper ground bar with sufficient terminals for all field and panel ground connections shall be provided.
29. Circuit breakers shall be provided for each miscellaneous equipment item powered from the control panel (transmitters, meters, etc).
30. All selector switches shall be furnished with a metal padlock hasp.
31. Dry contacts for "Scrubber Running" and "Scrubber Summary Alarm" shall be provided for inputs to the plant SCADA System.

K. Control Panel Spare Parts

1. The following total number of spare parts shall be furnished for the control panel(s).
 - a. Two Indicator light assembly
 - b. Two control relays for each type furnished
 - c. Five fuses for each type/size furnished
 - d. One selector switch for each type furnished
 - e. One full-voltage non-reversing (FVNR) starter for each size furnished

1.16 EXISTING SULFUR DIOXIDE SCRUBBING SYSTEM

A. Backup Fan Assembly

1. Fan shall be fiberglass reinforced plastic, centrifugal type with backward inclined blades, industrial fiberglass fan. Fan wheel shall be statically and dynamically balanced. Fiberglass construction shall conform to PS 15-69 product standards. Fan resin shall be suitable for exposure to the specific service conditions. Fan housing shall be constructed of fiberglass and reinforced with rigid bracing to increase structural integrity. Bearing support brackets shall be positioned to directly oppose belt tension forces.

Special Specifications

2. Fan housing shall be a curved scroll design with a 1-inch NPT drain connection at the bottom of the fan scroll. Fan intake and outlets shall have flanged nozzles. Fan shaft shall be Type 316 stainless steel. Fan shall have self-aligning grease-packed bearings, with neoprene shaft seals and OSHA approved weatherproof motor/drive cover. Two (2) fans shall be designed for alternation and for the following specifications:
 - a. Air Flow Rate: 4,000 to 5,000 scfm
 - b. S.P. up to scrubber inlet: 2.00-inch W.C.
 - c. Pressure Drop through Scrubber: As required by the supplier
 - d. Motor HP: Max. 40 HP
 3. The fan shall have a 3-phase, 60 Hz, 230/460, TEFC, 1,800 rpm motor with a 1.15 service factor. The fan shall be New York Blower, Hartzell or equal. The fan shall have AMCA seal. Refer to Division 16 for additional requirements.
 4. The blower exhaust stack shall be equipped with a rain cap with ½" Type 316 stainless steel bird screen.
 5. Provide a chlorine sensor at each scrubber exhaust stack.
 6. Fan shall be supplied with two (2) complete spare set of belts and bearings.
- B. Sulfur Dioxide Scrubber Control Panel**
1. Control panel should comply with Division 16, Division 17, and SS 13390.
 2. The control panels shall include all necessary components to start and provide alternation of existing blower and proposed blower, and operate and shut down the scrubber upon receipt of either a remote start/stop signal or due to local control at the panel itself.
 3. Refer to Section 1.15 B – 1.15.I for control panel specification details.
 4. Refer to Section 1.15 for operational control strategy.
- 1.17 ANCHOR BOLTS**
- A. All anchor bolts required for the installation of the equipment shall be furnished by the equipment manufacturer. Anchor bolts shall be Type 316 stainless steel.
- 1.18 SURFACE PREPARATION AND PAINTING**
- A. All painted surfaces shall be prepared and shop painted at the equipment manufacturer's facility.
 - B. The manufacturer shall supply sufficient touch-up paint.
- 1.19 FIELD INSPECTION, TESTING AND CORRECTION OF DEFICIENCIES**
- A. After all the equipment has been completely installed, and installation approved by the manufacturers' representative, and after approval by the City, the equipment shall be tested under the supervision of the scrubber manufacturer's factory representative.
 - B. An air flow acceptance test shall be performed on the scrubber system to verify satisfactory operation of the system and the design performance requirements of the specification. Should the tested gas rate differ from the specified air flow rate, the scrubber manufacturer and/or the CONTRACTOR shall make modifications as necessary to correct the air flow rate.

Special Specifications

- C. Small amounts of chlorine sufficient to activate each new gas leak detector shall be released under controlled conditions by the CONTRACTOR to verify that the scrubber system performs as intended.
- D. Confirm communication of "Scrubber Running" and "Scrubber Summary Alarm" through the SCADA System to the plant main control room.
- E. Furnish the services of qualified representatives of the scrubber system manufacturer for inspection, start-up, and instruction of operating personnel for up to four (4) eight (8)-hour days at the jobsite, with CONTRACTOR present. The CONTRACTOR shall anticipate that up to ten (10) of the OWNER's employees will participate in any session and shall be prepared to provide the required number of handouts and manuals for each session

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

END

PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install chemical dosing pumps, together with all drives, motors, valves, supports, controls, accessories, and appurtenances necessary for feeding chemical solutions in treatment plants, complete and operable, in accordance with the requirements of the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Comply with the applicable reference specifications as specified in the GENERAL REQUIREMENTS.

1.3 CONTRACTOR SUBMITTALS

- A. Submittals shall be made in accordance with the SECTION 01300 SUBMITTALS .

1.4 QUALITY ASSURANCE (NOT USED)

PART 2 -- PRODUCTS

2.1 GENERAL

- A. The pumps shall be of corrosion-resistant construction and peristaltic hose pumps complete with specified appurtenances. Each pump shall be complete with pump base, drive, check valves, back-pressure valve, and electric motor. Size and characteristics of the pumps shall be as specified herein.
- B. The pumps shall be enclosed by a secondary containment. A Spill Containment Dike with minimum height of 3 inch is suffice.

2.2 PUMP CONSTRUCTION

A. Pump

1. General

- a. Horizontal, Positive displacement, peristaltic hose pump using lubricated shoe technology and reinforced hose element. Roller style pumps or non-reinforced tube technologies are not acceptable.
- b. Capable of operating in either direction without flow variation
- c. Capable of running dry without damage to pump or hose
- d. Capable of pulling 95% of full vacuum
- e. Repeatability: $\pm 1\%$ accuracy
- f. Valveless/Glandless design. No seals in contact with the pumped product.

2. Hose and Lubricant

- a. Hose shall be manufactured of three-layer elastomer with an extruded inner wetted layer compatible with the process fluid with two layers of nylon reinforcement, and a Natural Rubber outer layer. Hose outside diameter shall be machined to maintain a wall thickness within ± 0.2 mm. The hose external surface shall have a surface roughness of Ra $7+5$ μ . Hoses must have a smooth extruded internal surface and have tolerance controlled through machining. Hoses that do not meet these minimum requirements are not acceptable.

Special Specifications

- b. Pump hose must be manufactured by the pump manufacturer. Pumps using hoses that are manufactured by a third part are not acceptable.
 - c. Pump hose to be machined with oversized ends to ensure a more secure connection between the hose & insert.
 - d. Minimum Static Burst Pressure rating of 950 psi.
 - e. 51-68 shore A durometer.
 - f. Hose must be replaceable without cover or pump removal.
 - g. Lubricant: NSF-listed food-grade, glycerin based
3. Pump Housing , Rotor, and Internal Bearing Frame
 - a. Pump Housing: Coated cast aluminum
 - b. Cover: Reinforced Copolyester Thermoplastic with threaded drain plug, clear window for viewing rotation, vent cap, and lubricant registration mark for proper indication of lubricant level when pump is stationary.
 - c. Pump rotor: ASTM Class 45B cast iron with two integrally mounted shoes located 180 degrees apart. Pump shall be available with a medium pressure occlusion rotor or low pressure occlusion rotor to maximize pump performance under various conditions of operation. Manufacturer shall supply the rotor applicable for the conditions in the Pump Schedule.
 4. Connectors
 - a. Supply pump with male NPT inlet and outlet connections constructed out of a material that is compatible with the process fluid as indicated in the Process Pump Schedule.
 - b. Connector bracket shall be constructed out of 316 Stainless Steel.
 - c. Pump hose shall extend from the pumping chamber with connectors secured via a single band clamp to allow visual confirmation of leak-free connection.
 5. Frame: Torsion free and constructed of formed hot dipped galvanized steel with a coating thickness of 15 microns.
 6. High lubricant leak detector
 - a. Provide a float type magnetic reed switch located near the top of the pump to detect leakage of pumped product into the pump housing.
 - b. Supply Normally Closed switching, field adjustable to Normally Open
 - c. Pump manufacturer to supply switch only. Contractor is responsible for alarm and relay to turn pump off unless otherwise specified herein.
 - d. Float switch shall be rated to the following maxima:

$$V_{\max} = 240\text{VAC}, I_{\max} = 1 \text{ Amp}, P_{\max} = 50\text{VA}$$

2.3 PUMP DRIVE SYSTEM

A. Direct Coupled Gearmotor with Fully Protected Drive mounting

1. Direct coupled configuration: Rotor must be mounted on, and independently supported by, a sealed bearing hub within the pump housing. Bearing hub shall utilize heavy duty ball bearings, sealed and greased for life, and must be located directly under the rotor's load.
2. Provide gearmotor with Fully Protected Drive direct-coupled mounting to the pump housing.
 - a. The gearmotor shall bolt directly to the pump housing which shall include a buffer zone between the gearing and pumphead to prevent gearmotor contamination from pump fluid or lubricant in the event of a hose lubricant seal failure. The pump's internal bearing hub shall be vented through the rear of the pump housing to allow visual detection in the event of a hose lubricant seal failure.
 - b. Close coupled pump designs which utilize only the gearbox bearing to support the loading associated with continual compressing of the pump hose in a cantilevered fashion and rely on the gearbox to seal the pump housing and expose the gearbox to lubricant or pumpage are not acceptable.
 - c. Long coupled pumps which require external couplings, coupling alignment, and coupling guards are not acceptable.
3. Design gear reduction to match output speed requirement of the pump using two or three-stage gearing and matching torque rating of pumping equipment. Gearing shall be classified for continuous heavy shock duty, 24 hr duty with a minimum of 1.4 service factor.

Special Specifications

4. All gearing to be helical gearing with cast aluminum housing
5. Gearmotor shall be equipped with an integral TEFC motor, Design B, Class F insulation, 1.15 motor service factor, 4 pole, 230/480VAC, 60 Hz, 3-phase, inverter duty. Motor horsepower to be recommended by the pump manufacturer based on the process conditions listed within the Pump Process Schedule.

2.4 PAINTING

- A. Provide pump assembly painted with manufacturer's standard paint specification
1. Single coat of a two component high solid polyurethane coating based on acrylate-isocyanate combination
 2. Dry thickness 60-80 micron
 3. Color- RAL 3011 brown red

2.5 SPARE PARTS

- A. Provide spare parts that are identical to and interchangeable with parts installed. Furnish and deliver the following spare parts for each pump:
1. Two replacement hose elements per pump
 2. One gallon hose lubricant per pump

2.6 CONTROL

- A. The drive speed of each metering pump shall be adjusted manually in order to maintain pre-set dosage.
- B.

2.7 SCHEDULE OF METERING PUMPS

I.D. No.	Chemical	Feed Range (gph)	Min Head (psi)	Max Operating Discharge Pressure (psi)	Min Motor (hp)	Power	Type of Drive
P-01 to P-07	Sodium Hypochlorite	2.3-230	5	115	1	230/460 vac, 3 phase, 60 hz	Direct
P-08 to P-09	Sodium Hypochlorite	0.74-74	5	115	1	230/460 vac, 3 phase, 60 hz	Direct

2.8 PUMP ACCESSORIES

- A. Mounting and Connections: Unless otherwise shown, all metering pumps shall be mounted on concrete pedestals. All pipe connections to feeders must be firmly supported from a floor-mounted, galvanized, structural steel frame, to avoid any stress on the feeder or on the piping system.

2.9 CONTROLS AND INSTRUMENTATION

- A. Provide one (5) integrated NEMA 4X Control Panel, with heat shields suitable for operation up to 135 F degrees outdoor temperature, pre-wired, configured and tested.
- B. Control panel shall include, but not be limited to the following devices:
1. Externally mounted, lockable disconnect switch.
 2. Hand-Off-Automatic (HOA) selector switches for each pump, plus
 3. Pilot device for automatic control.
 4. Emergency E-stop pushbutton.

2.10 SPARE PARTS

Special Specifications

- A. All chemical feeders shall be furnished with a complete set of one year's manufacturer suggested spare parts, such as: packing, gaskets, belts, and any other parts subject to wear. Where applicable, one set of spare bearings shall be furnished with each piece of equipment.

2.11 MANUFACTURER

- A. **Manufacturer's Experience:** The chemical feeding equipment shall be the product of a manufacturer who has designed and manufactured similar equipment and has a record of at least 5 years of successful operation of this type of process. The CONTRACTOR may be required to submit evidence to this effect together with a representative list of installations. The pump manufacturer shall maintain a permanent, local service department and a spare parts department.
- B. **Manufacturers:**
 - 1. Watson-Marlow Pumps Group, APEX 20 and APEX 10
 - 2. Or equal
- C. **Unit Responsibility:** The CONTRACTOR shall assign to a single manufacturer full responsibility for the furnishing and functional operation of the chemical feeder system along with all related tanks, mixers, pumps, piping, valves and controls. The designated single manufacturer, however, need not manufacture more than one part of the system except that the manufacturer of the metering pump shall also manufacture the dry chemical feeders. The designated manufacturer shall coordinate the design, assembly, testing, and erection of the system as specified herein.

PART 3 -- EXECUTION

3.1 INSTALLATION

- A. Pumping equipment shall be installed in accordance with approved procedures submitted with the shop drawings and as shown, unless otherwise approved.

END OF SECTION

HIGH DENSITY CROSS-LINKED POLYETHYLENE STORAGE TANKS

Section SS13201

PART 1-GENERAL

1.01 SCOPE OF WORK

The CONTRACTOR shall furnish, deliver and erect three (3) 8,700 gal and two (2) 500 gal vertical, high density cross-linked polyethylene tanks and foundation and include all accessories in compliance with this section, complete, delivered and installed at the site in accordance with the Contract Documents.

Tank dimensions shall be approximately:

1. 12 ft in diameter and 14-1/2 ft tall overall with a nominal capacity of 8700 gallons for each tank.
2. 6 ft in diameter and 4-3/4 ft tall overall with a nominal capacity of 542 gallons for each tank.

The new tanks will be located outdoors without a canopy or cover to provide shade. Tank service is 12.5 trade % (125 g/L) sodium hypochlorite solution.

1.02 REFERENCES, CODES AND STANDARDS

1. American Society of Testing Materials (ASTM).
 1. D638: Tensile Properties of Plastics
 2. D883: Standard Definitions of Terms Relating to Plastics
 3. D1505: Density of Plastics by the Density-Gradient Technique
 4. D1525: Standard Test Method for Vicat Softening Temperature of Plastics
 5. D1693: Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics
 6. D1998: Standard Specification for Polyethylene Upright Storage Tanks
 7. D5628: Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimens by Means of a Falling Dart
 8. F412: Standard Terminology Relating to Plastic Piping Systems

ANSI Standards: B-16.5, Pipe Flanges and Flanged Fittings

Chlorine Institute: Pamphlet 96 – Sodium Hypochlorite Manual, Edition 5.

1.03 SUBMITTALS

Submit the following with bid documents:

Sufficient data shall be included to show that the proposed equipment conforms to Specification requirements. Provide the following information:

1. Tanks and fittings
 - a. Resin Manufacturer datasheet
 - b. Tank styles
 - c. Fitting materials
 - d. Gasket styles and materials

Special Specifications

- e. Bolting kit materials
- f. All accessory information including relief devices and instruments.
2. Manufacturer's tank unloading procedure
3. Manufacturer's tank installation instructions.
4. List with pricing of recommended spare parts, if any.
5. Manufacturer's Qualifications: For manufacturers not listed under section 2.02, submit a list of 5 installations in the same service to validate manufacturer's qualifications.

A complete description of any deviations from or exceptions to specifications shall be provided. The submittal shall be accompanied by a detailed, written explanation/justification for each deviation.

Submit the following after contract award:

1. Shop drawings, dimensioned and to scale, including accessories and details.
 1. Location and orientation of openings, fittings, accessories, restraints and supports.
 2. Details of manways, flexible connections, and vents.
2. Drawings shall be submitted in electronic format as well as paper copies. A minimum of two paper copies of each drawing shall be submitted. Any resubmitted (and as-built) drawings shall include electronic and hard copies with all changes noted. Shop drawings shall be approved by the Owner prior to beginning tank fabrication.
3. Calculations shall be sealed by an engineer licensed in the State of Texas.
 1. Wall thickness. Hoop stress shall be calculated using 600 psi @ 100 degrees F.
 2. Tank restraint system. Show wind load criteria.
 3. Concrete pad foundation. Show slab depth.

Submit the following to close out the project:

1. Factory Test Report with the following results:
 1. Material, specific gravity rating at 600 psi @ 100 degrees F. design hoop stress.
 2. Wall thickness verification.
 3. Dimensional verification.
 4. Fitting placement verification.
 5. Visual inspection results.
 6. Impact test results.
 7. Gel test results.
 8. Hydrostatic test results.
2. Operation and maintenance manuals including, as a minimum, complete installation, operation and maintenance instructions, troubleshooting guides and copies of all approved shop drawings in an as-built version.
3. A warranty letter indicating date of Owner acceptance and duration of warranty.

1.04 QUALITY ASSURANCE/FACTORY TESTING

1. Tanks furnished under this Section shall be supplied by the listed manufacturers or approved equal that has designed and manufactured chemical storage tanks for at least 10 years.
2. Material Testing
 1. Perform gel and low temperature impact tests in accordance with ASTM D1998 on condition samples cut from each polyethylene chemical storage tank.
 2. Degree of Crosslinking. Use Method C of ASTM D1998 - Section 11.4 to determine the ortho-xylene insoluble fraction of cross-linked polyethylene gel test. Samples shall test at no less than 60 percent.
3. Tank Testing
 1. Dimensional: Take exterior dimensions with tank empty, in the vertical position. Outside diameter tolerance, including out-of-roundness, shall be per ASTM D1998. Fitting placement tolerance shall be +/- 1/2-in vertical and +/- 1 degree radial.
 2. Visual: Inspect for foreign inclusions, air bubbles, pimples, crazing, cracking, and delamination.
 3. Hydrostatic test: Following fabrication, the tanks, including inlet and outlet fittings, shall be hydrostatically tested with potable water by filling to the top sidewall. After a minimum of 1 hour tanks shall be inspected for leaks. Following successful testing, tanks shall be emptied and cleaned prior to shipment.

1.05 WARRANTY

1. Tanks and all accessories shall have 3-year warranty on fabrication labor and materials from date of Owner acceptance.

PART 2 – PRODUCTS

2.01 GENERAL

1. Tanks shall be rotationally-molded, vertical, high density cross-linked polyethylene, one-piece seamless construction, cylindrical in cross-section and with secondary containment using a tank within a tank construction.
2. Tanks shall have flat bottoms and dished roofs.

2.02 MANUFACTURERS

Tanks shall be manufactured by:

- Poly Processing Company;
- Assmann Corp.; or
- Owner approved equal.

2.03 POLYETHYLENE STORAGE TANKS

1. Tanks shall comply with the Chlorine Institute’s Pamphlet 96 recommendations.
2. Tanks shall have integrated secondary containment using a tank (process) within a larger tank (secondary containment) construction.
3. Tanks shall have flat bottoms.

Special Specifications

4. Tank shall have domed or dished roofs. Roofs shall be designed for min. design concentrated location live load of 200 lb. The design uniform live load shall be 40 psf. Roofs shall have manufacturer's chemically compatible, skid resistant coating applied.
5. Tanks shall be manufactured from virgin materials.
6. Tanks shall use the manufacturer's recommended high density cross-linked polyethylene resin containing robust ultraviolet stabilizer(s). Resin and UV stabilizer(s) shall be as recommended by resin manufacturer.
7. Inner tank shall include an additional medium density polyethylene veil specifically formulated for sodium hypochlorite service. Veil shall have additional antioxidant properties as recommended by the resin manufacturer, bonded during fabrication to the interior of the inner tank surface only.
8. Wall thickness for a given hoop stress is to be calculated in accordance with ASTM D1998. Tanks shall be designed using a hoop stress no greater than 600 psi. In no case shall the tank thickness be less than design requirements per ASTM D1998.

- a. The wall thickness of any cylindrical portion at any fluid level shall be determined by the following equation:

$$T = P \times OD/2SD \text{ or } 0.433 \times SG \times H \times OD/2SD$$

Where:

T = wall thickness, inches

P = pressure, psi

SG = specific gravity, (or density, gm/cc)

H = fluid head, ft

OD = outside diameter, ft

SD = hydrostatic design stress, 600 psi

- b. The minimum wall thickness shall be sufficient to support tank weight with all accessories full of service fluid in an upright position without external support. In any case, wall thickness shall not be less than 0.187 inches.
 - c. The top head shall be integrally molded with the cylindrical wall. Its minimum thickness shall be equal to the thickness of the top of the straight sidewall. Flat areas shall be provided for attachment of large fittings on the dome of the tank.
 - d. The bottom head shall be integrally molded with the cylindrical wall. The minimum knuckle radius shall be 1-1/2 inches.
9. Tanks shall have 6 equally spaced galvanized steel lifting lugs. Lugs shall be designed to lift dead weight of tank with all accessories when empty using only 3 lugs.
 10. Tanks shall be opaque to minimize sodium hypochlorite exposure to UV light while tank color shall be white, light gray or beige to minimize solar heat absorption.

2.04 TANK NOZZLES AND CONNECTIONS:

1. Manways shall be a minimum 24-in diameter for 8,700-gal tank. Manways shall be chemically compatible with sodium hypochlorite. Gaskets shall be compatible Viton materials.
2. To accommodate outdoor pneumatic fill by chemical supplier, tanks shall be equipped with an emergency pressure relief device with relief set at 6 inches of water column to prevent tank over-pressurization. Emergency pressure relief devices shall be integrated into tank manways. Gaskets shall be compatible Viton materials.
3. Tank nozzles for 8,700 gal tanks shall be per the following schematics and schedule.

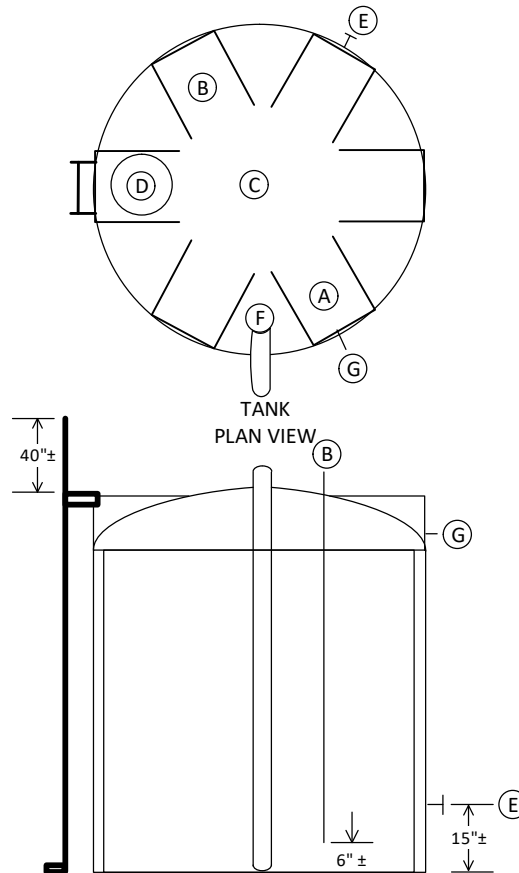
**8,700 GAL TANK
TANK NOZZLE SCHEMATICS AND SCHEDULE**

Sodium Hypochlorite Tank Nozzle Schedule

Tag	Description	Size	Qty	Type
A	FILL	3"	1	BLKHD
B	OUTLET/DRAW	2"	1	BLKHD
C	VENT/LEVEL	6"	1	BLKHD
D	MANWAY/PRV	24"	1	FLG
E	INTERSTITIAL	2"	1	FLG/FNPT
F	FLOAT	3"	1	BLKHD
G	OVERFLOW	3"	1	BLKHD

Notes:

1. Manway shall have integrated, weighted, hinged pressure relief device rated for 6-inches of water pressure.
3. Ladder rails shall extend approximately 40 inches above top rung.



Special Specifications

4. Tank nozzles for 500 gal tanks shall be per plans and details.
5. Nozzle Requirements
 1. Nozzles specified with threaded fittings shall use American Standard Pipe Threads.
 2. Bulkhead fittings shall consist of the body, compatible Viton gasket and locking nut with wrench flats.
 3. Flanged nozzles shall be integrally molded.
 4. Nominal projection for manway flange shall be 4 inches minimum.
 5. Bolted flange fittings shall be constructed of one 150 lb. flange with ANSI bolt pattern, one flange gasket and stud bolts with gaskets. Stud bolts to have chemical resistant polyethylene injection molded heads and gaskets to provide a sealing surface between the bolt head and the interior tank wall. Stud bolt heads are to be color coded for visual ease of identifying the bolt material by onsite operators. Green- Stainless Steel or Black- Titanium. Other bolts and nuts shall be type 304 stainless steel. Gaskets shall be Viton. All materials shall be compatible with sodium hypochlorite.
 6. Draw pipes shall be supported to inner tank wall at maximum 6-ft intervals. Draw pipes shall be CPVC or other material compatible with sodium hypochlorite.
 7. Vent: Each tank must be vented for the inflow and withdrawal rates as well as diurnal barometric pressure fluctuation in addition to the emergency vent requirement. Vent shall comply with OSHA 1910.106(F)(iii)(2)(IV)(9). Vent shall be sized by the tank manufacturer, but shall be 6-inch minimum diameter.
 8. Each flanged connection shall be provided with a bolting kit using Type 304 stainless steel nuts and bolts and Viton gaskets.

2.05 TANK ACCESSORIES

Tank manufacturer shall also supply the following accessories for each and every tank:

1. Ladder:
 1. A fiber reinforced plastic (FRP) access ladder supported from ladder lugs shall be provided with each polyethylene storage tank.
 2. Ladders shall be designed to meet OSHA standard 2206; 1910.27; Fixed Ladders.
 3. Ladders shall be secured to tanks at top and midway, and anchored to concrete below. Anchorage to tanks shall allow for vertical thermal expansion and contraction.
 4. Use corrosion resistant materials when anchoring to tank dome or sidewall.
2. Restraint System:
 1. Tanks shall be installed with 4 equally spaced cable restraints.
3. Float Indicator:
 1. The reverse float level indicator shall be assembled and attached to the tank walls and shall consist of PVC float, indicator, polypropylene rope, perforated

Special Specifications

interior pipe, PVC roller guides, clear UV resistant PVC sight tube, and all necessary pipe supports. The level indicator shall act inversely to tank contents and shall not allow entrance of tank contents into the sight tube at any time. Indicator shall be neon orange color or similar color for visual ease for onsite operators.

4. Ultrasonic Level Indicator:
5. Confined space entry retrieval system davit support bases:
 1. Embed or anchor support base securely to each tank roof in flat section in proximity to manway.
 2. Support base shall hold and support a DBI Sala Davit Arm system for confined space entry/retrieval system.

2.06 SPARE PARTS

1. Provide any spare parts and in quantity recommended by tank manufacturer.

PART 3 - EXECUTION

3.01 DELIVERY, STORAGE, AND HANDLING

1. The tanks shall be appropriately packed and shipped upright or lying down on their sides with blocks and slings to keep them from moving.
2. All fittings shall be installed at the factory, but if necessary, they can be removed for shipping provided adequate packing and instructions are provided.
3. Upon arrival at the destination, inspect the tanks and accessories for damage in transit. If damage has occurred, manufacturer shall be notified immediately.

3.02 INSTALLATION

1. Tanks will be installed by Contractor in accordance with Manufacturer's Tank Installation Manual and shop drawings.
2. Manufacturer's trained technician or representative shall do an onsite inspection of installation. Inspection to verify that connections, venting devices and fittings are properly installed. Inspection shall include review and completion of manufacturer's installation check list. Inspection shall verify chemical application, piping connections, venting, and applicable ancillary equipment such as ladders, restraints, etc. A verification of proper installation certificate will be supplied when equipment passes installation checklist.
3. Manufacturer to provide two 1 hour training sessions to prepare operating and maintenance technicians to service and maintain the tank system. Included in training session shall be 2 training manuals for the tanks.
 1. Tank training manuals shall consist of installation check lists, as-built tank and fitting drawings with nozzle schedule, materials of construction, as well as recommended maintenance procedures and frequencies.

3.03 FIELD TESTING

1. After installation, Owner will leak test all tanks hydrostatically using water for 24 hours prior to Owner acceptance.

END OF SECTION

PACKAGED CONTROL SYSTEMS
SECTION 13390

PART 1 GENERAL**1.01 SUMMARY**

- A. Scope of Work
 - 1. Furnish, install, and place in service the packaged control systems as shown on the PLANS and as specified hereinafter.

1.02 RELATED WORK

- A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
- B. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
- C. Related work as called for on the PLANS, as specified herein or in other Sections of the Specifications.

1.03 QUALIFICATIONS

- A. Panels associated with the Packaged Control System (PCS) shall be designed, constructed, and tested in accordance with the latest applicable requirements of ISA, NEMA, ANSI, UL, and NEC standards. Panels shall be designed, constructed, and tested by a UL508 certified entity.
- B. Assemble panels in equipment manufacturer's factories. Test panels for proper operation prior to shipment from the manufacturer's factory.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Protection
 - 1. The Contractor, and hence the PCS supplier, shall be responsible for safety of the PCS during storage, transporting and handling.
 - 2. The PCS equipment shall be environmentally protected and stored in climate controlled (temperature and humidity, etc.) environment.
 - 3. At all times the PCS equipment shall be housed inside a moisture free, non-porous, extra heavy duty plastic weatherproof housing.
 - 4. Interior and exterior of PCS equipment shall be kept clean at all times.
 - 5. Energize the space heaters within the PCS and energize during storage and installation for humidity control.
- B. Additional project job site storage requirements: Upon delivery to the project site and prior to final installation, protect and store in accordance with the following:

1. Environmentally protected and stored in climate controlled (temperature, humidity, and non-corrosive class) environment at the job site. Size, furnish and install temporary gaseous air scrubbers, air conditioners, and additional environmental control equipment complete with branch circuiting conduit/wire as required to maintain in a controlled environment at the following conditions:
 - a. Ambient Dry Bulb Temperature:
 - 1) Minimum: 68 degrees Fahrenheit.
 - 2) Maximum: 85 degrees Fahrenheit.
 - b. Ambient Relative Humidity: Maximum: 50%.
 - c. Ambient Corrosion Level: International Society of Automation Class: G1
2. Every effort shall be made to provide all necessary electrical power connections ready for immediate connection to equipment upon arrival of equipment on jobsite.
3. Upon arrival of equipment onto job site, the Contractor shall provide proper transition of power to equipment, especially any 120 VAC powered equipment, to ensure all air conditioning, heating, and gaseous air scrubbing equipment are fully operational and that the equipment is in a conditioned space on the day the equipment arrives.
4. Furnish and install replacement air scrubber media, air filters, etc., as required for proper operation of the environmental control equipment.

1.05 SUBMITTALS

- A. Submit shop drawings in accordance with the requirements of Section 01300 of the Contract Specifications. Include:
 1. Dimensioned/scaled top and bottom enclosure views, front enclosure elevations, and internal component/device layouts
 2. One-line diagrams and wiring diagrams, as applicable,
 3. Catalog cut sheets. Include protective device coordination curves and current limiting circuit breaker/fuse peak current let through curves, where applicable. Include color chart for control panel color selection by the OWNER.
- B. Sequence of operation. In addition to the operation of the PCS, include the OWNER's process/mechanical equipment that shall also be monitored/controlled by the PCS, where applicable.
- C. Testing Related Submittals:
 1. Submit ORT test procedures and test results per Section 17100.
 2. Submit PAT test procedures and test results per Section 17100.
- D. Certified Report: Submit a report prepared by PCS Manufacturer's technical representative certifying satisfactory installation, operation, and in service placement of entire PCS.
- E. Submit a physical mock-up of a product/item where a mock-up is noted/required for the product/item in this specification section.

1.06 OPERATION AND MAINTENANCE MANUALS

- A. Furnish Operation and Maintenance Manuals in accordance with the requirements of Section 01730 of the Contract Specifications. Include:
1. Installation and operation manuals.
 2. Renewal parts bulletin.
 3. As built drawings, including approved shop drawings.
 4. Test data
 5. Software program hardcopy (as applicable) for final as-built software.

1.07 TOOLS AND SPARE PARTS

- A. Furnish the following spare parts with the equipment for each PCS in conformance with the specifications:
1. One (1) – Set of fuses (minimum 3) for each type and size used for fuses 110V and greater.
 2. One (1) – Set of starter contacts for every three (3) like starters used (a minimum of 1 for each size used). If contacts are not replaceable a spare starter for each size used shall be supplied.
 3. One (1) - Contactor coil for every NEMA size and type starter installed; a minimum of one coil per size.
 4. One (1) - Spare control relay, complete with all accessories, for each relay type used.
 5. One (1) - Spare timing relay.
 6. One (1) – Sets of overload heaters for each size and type used.
 7. One (1) – Selector switch, complete with 2 auxiliary contacts, of each type used (two position, three position, etc.).
 8. One (1) – Pilot light, complete with auxiliary contact, of each type used.
 9. One (1) - Push button, complete with auxiliary contact, of each type used
 10. Ten percent - terminal blocks, of each type and color used.
 11. One (1) spare power supply of each type of power supply (24VDC, etc.) used.

1.08 SPECIAL MANUFACTURER SERVICES

- A. Furnish the services of a qualified, experienced, factory trained technical (non-sales type) representative to advise the Contractor in the installation of the equipment and assist in all PCS testing and start-up. Include checking alignment of parts, wiring connections, operation of all panels, parts (relays, starters, etc.). Include time to correct and recheck any discrepancies, which are discovered. Also include providing the OWNER with a report certifying that the equipment was installed, properly tested, and set in accordance with the PCS manufacturer's requirements and is in satisfactory operating condition. Format and quantity of reports shall be per the requirements of Section 01300 of the Contract Specifications.
- B. Any problems encountered with the operation of equipment, parts, components, etc. installed within the PCS shall be repaired/remedied by the manufacturer's technical representative.
- C. Prepare an arc-flash study, harmonic study, and a coordination study, complete with short circuit calculations and coordination curves, etc. as required by and in

compliance with Section 16121 of the Specifications "Modifications to Existing 480 Volt Motor Control Centers", paragraph 1.08 "Special Manufacturer's Services.

1. The characteristics of the main PCS protective device that are most suitable for the system in providing proper protection and coordination (i.e., symmetrical short circuit rating, current limiting, electronic trip, etc.) shall be determined per Section 16121 of the Specifications "Modifications to Existing 480 Volt Motor Control Centers", paragraph 1.08 "Special Manufacturer's Services. The Manufacturer shall furnish the protective device of the appropriate characteristics that shall be the most suitable for the proper protection and coordination of the system at No Additional Cost to the OWNER.
2. The Manufacturer shall select, set, and adjust the load side devices served by the main PCS protective device accordingly at No Additional Cost to the OWNER. Manufacturer's technical representative is to set, adjust and test all circuit breakers, relays, motor circuit protectors, etc. in the presence of a representative of the OWNER.
3. Provide the OWNER with a test report certified by the manufacturer. Include a record of all settings. Format and quantity of reports shall be per the requirements of Section 01300 and 01730 of the Contract Specifications.

1.09 MOCK-UPS

- A. Where a mock-up is noted for a product/item specified in this section, provide each mock-up per the following requirements:
 1. The Contractor shall construct/fabricate the mock-up and submit it for review only after shop drawings for the product/item associated with the mock-up have been developed and submitted by the Contractor for review and the review process of the shop drawings by the OWNER and ENGINEER is complete.
 2. Hand the fabricated mock-up to the OWNER. Package the mock-in a cardboard box and/or otherwise protected from the elements during storage and handling.
 3. Each mock-up shall be considered a sample with regard to the submittal procedures for this Work.
 4. The mock-up protective packaging shall have a label that shall include, at a minimum, the following information typed on the label:
 - a. Project title,
 - b. Name of the submitting Contractor and Sub-Contractor, as applicable,
 - c. Name of the intended recipient,
 - d. Physical address of the intended recipient,
 - e. Submittal number, and
 - f. Submittal specification section.
 5. Each mock-up shall be handed to the OWNER with a transfer of materials memorandum hard-copy document. The Contractor shall make a copy of the signed version of the transfer of materials memorandum and include it as part of the mock-up submittal documents. The transfer of materials memorandum shall include, at a minimum, the following information:
 - a. Printed name and signature of the Contractor representative that handed the mock-up to the OWNER,

- b. Printed name and signature of the OWNER representative acknowledging recipient of the mock-up,
 - c. A description of the mock-up submitted,
 - d. The date and time of day the mock-up was handed to the OWNER, and
 - e. The physical address of the location where the mock-up was handed to the OWNER.
6. For each physical mock-up submittal, provide mock-up submittal documents. The mock-up submittal documents shall include, at a minimum, the following:
- a. Standard submittal cover pages per the submittal procedures for this Work.
 - b. A copy of the prior reviewed shop drawing of the mock-up.
 - c. Pictures of the submitted physical mock-up.
 - 1) Six pictures, each enlarged on a letter sized page, one for each of the six (6) sides of the mock-up (top, bottom, right, left, back, and front sides).
 - 2) Additional pictures, with a measuring tape (units of inches showing) placed on the applicable features of the mock-up to illustrate the thickness/gauge and dimensions of materials used to fabricate the mock-up, where such material thicknesses and dimensions are specified for the product/item.
 - 3) Provide additional pictures as required to communicate details of the mock-up.
 - d. A copy of the physical mock-up submittal transfer of materials memorandum.
7. All mock-ups required for this Work shall be in addition to the quantity of products/items to be installed as required per the specifications, the Instrument List and/or as shown on the DRAWINGS.
- a. All mock-ups shall be in addition to any spare parts noted in this section.
 - b. All mock-ups shall remain the property of the OWNER and may not be used/installed by the Contractor as part of the final Work unless specifically authorized in writing by the OWNER or the ENGINEER.
8. For a product for which a mock-up is required, if there is more than one installation of the product/item, and the individual installations have different sizes and/or capacities, unless a specific size/capacity is noted to serve as the basis for the mock-up, the Contractor shall provide a mock-up of the installation having the largest size/capacity required for this Work.
- a. The Contractor shall note on the product shop drawings submitted for review prior to the mock-up submittal which size/capacity of the product shall serve as the basis for the mock-up.

PART 2 PRODUCTS

2.01 GENERAL

- A. Furnish and install all necessary components and wiring for a complete and functional system. Furnish and install additional requirements as follows:
 - 1. Furnish and install the enclosure as hereinafter specified. Mount and wire all components inside of enclosure unless specified otherwise. The enclosure,

with all components mounted and wired, complete with all accessories, shall be referred to hereinafter as the Control Panel.

2. Furnish and install the Control Panel configured for single point electrical feed that terminates on a dedicated main circuit breaker inside of the Control Panel. Refer to the PLANS and also the appropriate Division 11 Specification for which the PCS is provided for voltage and phase requirements. The Control Panel shall contain all necessary means, i.e. , control power transformer with primary and secondary short circuit protection/disconnects, uninterruptible power supply, associated wiring, short circuit protection, etc. to derive and distribute the needed control power at the necessary voltages for the entire PCS.
 3. Furnish and install the control system Type as hereinafter specified.
 4. Furnish and install motor starters/drives as specified herein, by other Sections of the Specifications, and the PLANS. Size, furnish, and install motor starters/drives complete with all accessories as specified.
 5. Furnish and install circuit breakers for branch circuits distributed from Control Panel as hereinafter specified. Coordinate operation of branch circuit breakers with corresponding main circuit breaker for proper circuit isolation and protection. Note, the main circuit breaker for the control panel per paragraph 2.01.A.2 shall not be considered a branch circuit breaker for the purposes of this Specification.
 6. Furnish and install field devices that are fully corrosion resistant, water tight, and resistant to all chemicals associated with the process application. All field devices life cycle, operation, and accuracy shall not be affected by the process application. As a minimum, all field devices shall be U. L. Listed and NEMA 4X rated. The mounting arrangement shall include provisions to enhance operation and maintenance of the system in consideration of the process application.
 7. Where devices are required for the functional operation of the PCS but are not specified under Division 17, furnish and install manufacturer's standard.
 8. Where process taps/connections are located higher than 5 feet above finished floor/grade, furnish and install remote mounted indicating transmitters and extend tubing as required to facilitate mounting transmitters no higher than 5 feet above finished floor/grade.
 9. For additional construction notes and special requirements, refer to the PLANS and the Specifications.
- B. Analog, Control, and Alarm Signaling Requirements
1. Refer to the PLANS and also the appropriate Division 11 Specification for which the PCS is provided for minimum contacts to be connected to the OWNER's Distributed Control System.
 2. All control and alarm circuits shall be 120 volts A.C. Alarm signal contacts shall open to alarm and shall be isolated contacts rated for 5 ampere at 120 volts A.C.
 3. The contact configuration (normally open/closed) required for proper interface to the OWNER's Distributed Control System shall be furnished and installed at No Additional Cost to the OWNER. Under no circumstances shall contacts of pushbuttons and selector switches be connected to the OWNER's Distributed Control System via interposing relays.

4. All analog signals shall be 4 to 20 mA DC. Use "two-wire" type circuits where possible. Furnish and install loop current isolators for each analog signal circuit in which either the field device or Control Panel is located outdoors. Loop current isolators shall be per Section 17200.
 5. All RTD signals shall be 100 ohm platinum type.
- C. Selector Switches, Pilot Devices, Pushbuttons requirements:
1. For NEMA 12 rated enclosures: Furnish and install per Section 17200.
 2. For NEMA 4X rated enclosures: Furnish and install per Section 16540.
 3. Mount on enclosure door.
- D. Wiring: Furnish and install as specified in Section 16200 and 17200. Group conductors and route in wireways as specified in Section 17200. Wire insulation pigmentation for 480 VAC circuits shall be per Section 16200. Field wiring shall be per Section 16200.
- E. Identification: Tag enclosure, terminal blocks, and devices (mounted interior and on the face of the enclosure) as specified in Section 17200. Tag all wiring per the requirements of Section 16200.
- F. Grounding: Furnish and install grounding per Section 17200.
- G. Miscellaneous Accessories:
1. Furnish and install lugs/ power distribution blocks /terminal blocks as required for the connection of the field wiring. Furnish and install terminal blocks per Section 17200. Furnish and install the necessary means for the termination of the field wiring at No Additional Cost to the OWNER.
 2. Furnish and install a Type 2 surge protective device for the 120 VAC package control system control power circuitry. Wire, and mount inside the enclosure.
 3. Furnish and install 24 volts DC power supply and all other power supplies per the PCS manufacturer's requirements where not specified per Section 17200. Wire and mount inside the enclosure.
 4. Where an uninterruptible power supply is needed for the application, furnish and install per Section 17200.
 5. Arrange the enclosure internal components to coordinate with the OWNER's conduit entry requirements at No Additional Cost to the OWNER.
 6. Where junction/pull boxes are required, furnish and install per Section 16250.
- H. All outdoor located PCS enclosures and field indicators/transmitters shall also have a HOOD (Sun-Shield) as follows:
1. Where the term Sun-Shield is used on the PLANS and specifications, it shall imply HOOD as noted herein.
 2. Support the HOOD via channel supports that are separate from and independent of the PCS enclosure support rack. Secure the HOOD to the support channels utilizing 316 Stainless Steel hardware. Provide all mounting hardware necessary for the installation of the Hood Assembly. Refer to the PLANS.
 3. HOOD shall be a fabricated component and shall be fabricated from minimum 0.1" thickness, aluminum alloy 3003-H14 sheet (ASTM B209). All seams or

- joints of HOOD shall be closed by continuous weld except where a mechanical hinge is noted.
4. Orient as described on the PLANS and coordinate with the Owner.
 5. Furnish and install a hinged front door/cover on the face of the HOOD to protect the front (full height and width) of the instrument/field control station/panel inside the HOOD. The door shall extend down to the bottom of the proposed instrument or field control station/panel. The door shall swing out through a minimum 180-degree of rotation in plan view.
 - a. Secure the side of the door to the HOOD with a continuous aluminum piano hinge that is welded via a continuous aluminum weld to the side of the HOOD and a continuous aluminum weld to the front door/cover. The piano hinge shall be constructed of 0.09-inch thick minimum 3003-H14 sheet (ASTM B209) aluminum, having a 2-inch minimum open width, a length equal to the full height of the HOOD door/cover and as manufactured by Monroe of Rochester Hills, Michigan or Engineer approved equal. The width of the door shall equal the finished outside edge-to-edge dimension of the hood to ensure that when the door is in the closed position the door is stopped by and rests onto the side edge of the hood.
 - b. Provide a bolt latch with a surface strike to allow the user to lock the door in the closed position. The bolt latch and surface strike shall each be constructed of Type 304 Stainless Steel as manufactured by Sugatsune, Item Number SSG-85 or Engineer approved equal. Fasten the bolt latch onto the door such that the operable bolt travels in the horizontal direction, towards the surface strike and with the bottom edge of the bolt latch positioned 1-inch above the bottom edge of the door. The surface strike shall be fastened on an aluminum sheet mounting plate having the same material and thickness as the hood and welded onto one the side of the hood. Provide six (6) sets of Type 316 Stainless Steel size #10 minimum diameter bolts, nuts and locking washers and use four (4) of the sets to fasten the latch onto the door and two (2) of the sets to fasten the surface strike onto the extended surface off the side of the hood. Size each bolt such that the threaded length extends no more than 1/4-inch past the nut.
 - c. Refer to the PLANS for additional requirements.
 6. Provide a mock-up of the HOOD (Sun-Shield) as follows for review by the OWNER and ENGINEER:
 - a. Upon completion of the review and comment of the HOOD (Sun-Shield) shop drawing(s) by the OWNER and ENGINEER, fabricate and submit a mock-up of a complete HOOD (Sun-Shield) assembly for additional review and comment by the OWNER and ENGINEER prior to fabricating the required quantity of HOODS (Sun-Shields) to be installed as part of this Work.
 - b. The size of the mock-up shall be based on an instrument or field control station/panel that is 6-inches wide, by 6-inches tall, and by 4-inches deep.
 - c. The HOOD (Sun-Shield) mock-up shall be in addition to the quantity of HOODS (Sun-Shields) to be installed as part of the final Work as required per the specifications, the Instrument List and/or as shown on the PLANS.
 - d. The following elements are not required as part of the mock-up:
 - 1) The instrument and/or control station/panel to be installed inside the HOOD (Sun-Shield).

- 2) The support elements/channels on which the HOOD (Sun-Shield) is fastened as shown on the Drawings.
- e. Refer to the mock-up requirements in this section for additional requirements.
7. Refer to PLANS for additional requirements for construction and mounting of HOOD.

2.02 CONTROL PANEL ENCLOSURE REQUIREMENTS

- A. Enclosure shall be the totally enclosed, dead front, suitable for back-to-wall mounting. Free standing and wall mounted enclosures may be used. Enclosure shall be adequately sized to contain all of devices required for the PCS in addition to facilitating the termination and routing of all associated PCS field interconnect conduit/wire systems.
- B. Unless specifically noted otherwise elsewhere, enclosures shall be rated:
 1. Enclosures located outdoors: NEMA Type 4X, Type 316 Stainless Steel enclosures.
 2. Enclosures located indoors in process/mechanical areas and storage areas that are not environmentally and climate controlled: NEMA Type 4X, Type 316 Stainless Steel enclosures.
 3. Enclosures located indoors in areas that are environmentally and climate controlled: NEMA 12-gasketed, painted steel enclosures per Section 17200.
- C. Enclosure shall have hinged, gasketed doors. Each door shall have an operating handle. At minimum, Furnish and install quarter turn door latch. Furnish and install three point door latch where available for the enclosure. Furnish and install pad locking means for the door/handle.
- D. Enclosures shall have a door mounted variable depth disconnect operating mechanism for operating the main circuit breaker and providing access to the 480V compartment. Provide padlockable disconnect operating handle. Handle shall be mechanically interlocked with the door/barrier to prevent personnel from opening the door and accessing the 480V compartment when the unit disconnect is in the ON position. Furnish and install handle-door interlock defeating (bypass) feature. Disconnect operating mechanism shall be as manufactured by Square D Class 9421 or approved equal. Electric actuated door interlock means will not be accepted.
- E. When sizing the enclosure, consideration shall be given to the enclosure installation location and the environmental aspects associated with the location (indoors, outdoors, etc.). Enclosures shall be sized to adequately dissipate heat generated by the equipment contained therein. Enclosures shall be provided with the necessary climate control devices, i.e. air conditioners, cooling fans, thermostatically controlled heaters, as required, for proper PCS operation.
- F. Furnish and install enclosure manufacturer's factory interior backpanels and sidepanels as required to facilitate interior device mounting. Panels shall be factory painted white.

- G. For all PCS enclosures containing components rated greater than 120 VAC and components rated 120 VAC and less, the enclosure shall consist of two compartments. Each compartment shall have an independently operating door. A barrier shall extend the full height and depth of the enclosure to separate the two compartments and isolate power and control components rated 120 VAC and less from all components rated greater than 120 VAC.
- H. Furnish and install the following additional accessories for each enclosure:
 - 1. For each door:
 - a. Grounding bonding jumper.
 - b. Door stop kit.
 - c. 12-inch door data pocket.
 - 2. For free standing enclosures:
 - a. Furnish and install light fixture per the requirements of Section 17200.
 - b. Furnish and install wire convenience receptacle per the requirements of Section 17200.
 - c. Furnish and install lifting eyes.
 - 3. Furnish and install all additional enclosure accessories, mounting hardware, 19 inch rack accessories, etc., as required for a functional PCS.
 - 4. Additional requirements for indoor enclosures located in areas that are environmentally and climate controlled: Furnish and install enclosure complete with all accessories per Section 17200.
- I. Enclosures shall be as manufactured by:
 - 1. All outdoor enclosures and indoor enclosures located inside process/mechanical areas and storage areas that are not environmentally and climate controlled:
 - a. Wall mounted control panel: Hoffman Concept Stainless Steel 4X Wall Mounted Enclosure Series with CWHPTO Padlock Handle, or approved equal.
 - b. Free Standing control panel: Hoffman Free-Standing Single and Dual Access with 3-Point Latches and Lockable Powerglide® Handles, Type 4X Enclosures, or approved equal.
 - 2. Indoor enclosures located inside environmentally and climate controlled areas: Furnish and install per the requirements of Section 17200.

2.03 PACKAGED CONTROL SYSTEM TYPES

- A. The PCS shall only employ the use of hardwired relay logic. This control system type shall not include the use of PLCs whatsoever. Additionally, any type of micro-processor based programmable relay, any relay requiring software download, or any other type of similar programmable relay shall not be used. As technology advances over time, similar appearing devices are subject to review and approval by the OWNER after Bid Award and the PCS Manufacturer shall incorporate the OWNER's request at No Additional Cost to the OWNER.
- B. Furnish and install control relays and timing relays as specified in Section 17200.

2.04 MAIN AND BRANCH FEEDER CIRCUIT BREAKERS

- A. Furnish and install thermal magnetic molded case circuit breakers. Size per NEC. Circuit breakers shall have U.L. listed minimum RMS symmetrical short circuit current rating equal to or greater than that of the bus serving the equipment, unless noted otherwise on the PLANS or in the Division 11 Specifications. Unless shown otherwise, the minimum RMS symmetrical short circuit current rating shall be 42kA at 480 volts A.C.
- B. Furnish and install where specifically shown on the PLANS or for proper circuit protection/coordination:
 - 1. Current limiting circuit breaker.
 - 2. Electronic trip attachment. Trip unit shall be solid state type with field adjustable long time, short time, ground fault and pick up settings.

2.05 MOTOR STARTERS

- A. Furnish and install per the requirements of Section 16121 Subsection 2.05 "Combination Units" with the following exceptions:
 - 1. General:
 - a. Comply with the control logic requirements of the PCS manufacturer.
 - 2. Circuit breakers:
 - a. Shall have U.L. listed minimum RMS symmetrical short circuit current rating equal to or greater than that of the bus serving the equipment, unless noted otherwise on the PLANS or in the Division 11 Specifications. Unless shown otherwise, the minimum RMS symmetrical short circuit current rating shall be 42kA at 480 volts A.C.
 - 3. Starters:
 - a. Size and configuration (full voltage non-reversing, full voltage reversing, etc.) as required for the application. Size per NEC and provide minimum of NEMA Size 1.
 - 4. Control Power Transformer:
 - a. Dedicated control power transformer for each motor starter is not required. Serve starter control power from PCS control power distribution per the manufacturer's standard.
 - 5. Power Factor Correction Capacitors (PFCCs):
 - a. Furnish and install PFCCs for all constant speed motors sized three horsepower and larger. Exception: Motorized valves and reversing/jogging process applications do not require power factor correction capacitors.
 - b. Connect capacitors between the motor starter and the overload relay.

PART 3 EXECUTION

3.01 FACTORY INSPECTION AND TEST

- A. Each control panel shall be completely assembled, wired, and adjusted at the factory and shall be given the manufacturer's routine shop test and any other

additional operational test to insure the functionality, workability and reliable operation of the equipment.

- B. Size, furnish and install the overload relay heaters based on actual motor nameplate current. Set overload relay settings at maximum values permitted by the NEC 430-32.
- C. Size, furnish and install the motor space heater fuses based on actual motor space heater load current.

3.02 FIELD INSTALLATION (BY CONTRACTOR)

- A. Mount all PCS subcomponents as shown on the PLANS and as recommended by the PCS manufacturer.
- B. All field wiring shall be tagged per the requirements of Section 16200. Secure wiring in control panel with plastic ties. Arrange wiring neatly, remove surplus wire, and install abrasion protection for wiring passing through holes or near edges of sheet metal.
- C. Clean and vacuum all interior of the equipment. Touch-up and restore damaged surfaces to factory finish.

3.03 HOODS (SUN-SHIELDS)

- A. Furnish and install an aluminum HOOD (Sun-Shield) on top of each Enclosure/Panel, Indicator Instrument, Transmitter Instrument, Indicating/Transmitter Instrument, Analyzer Instrument, Controller Instrument, Instrument Element and Field Control Station that is mounted OUTDOORS and/or mounted within/below a vault/structure such that it receives direct sunlight through an opening in the vault/structure.
- B. Refer to the PRODUCTS PART 2 Section of this specification and the PLANS for additional requirements on the construction and installation of each HOOD.

3.04 FIELD TESTING

- A. After field installation of the PCS and prior to energizing any of the process/mechanical equipment controlled by the PCS:
 - 1. Conduct an ORT for the PCS per Section 17100. Submit test results for review and approval. Prior to conducting the ORT, meet all prerequisites associated with conducting the ORT as described in Section 17100. The OWNER may elect to witness the ORT. Coordinate with the OWNER accordingly.
 - 2. Conduct a PAT for the PCS per Section 17100. Submit test results for review and approval. Prior to conducting the PAT, meet all prerequisites associated with conducting the PAT as described in Section 17100. Exception: As the application software for the PCS is provided by the PCS manufacturer, the PCS manufacturer shall lead the PAT software test activity.

END OF SECTION

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PART 1 -- GENERAL

1.1 SCOPE

- A.** Product should be designed for complex workstation applications and include freestanding support structure, two runways, bridge moving perpendicular to runways, and equipped with enclosed track, end trucks, hoist trolley, festooning systems, bumpers, and other accessories.
- B.** General Design Standards: Product shall be designed in conformance with the following applicable standards:
 - 1.** AISC Steel Construction Manual, OSHA 1910.179, ANSI B30.11, AWS D1.1/D1.6, and MMA MH27.2.
- C.** Standard Equipment Specifications:
 - 1.** Capacity: 2,000 lbs
 - 2.** Runway Length: Runways are supported on a maximum of 22-foot support center.
 - 3.** Maximum Overall Width: 17'-4".
 - 4.** Overall Height: per Plans.
 - 5.** Trolley Clevis Height: trolley clevis height be as low as possible, with practical consideration given to minimum headroom requirements. Height is measured from the floor to the trolley clevis from which the hoist is suspended.
 - 6.** Hoist
 - a.** capacity: 2,000 lbs
 - b.** Lift: 20'
 - c.** Lifting Speed: 16 Feet per Minute
 - d.** Power: 460 V- 3 Phase-60 Hz
 - e.** Includes Chain Container
 - 7.** Construction: Fabricated using ASTM A36 steel sections with finished ends and surfaces.

1.2 REFERENCES

- A.** American Institute of Steel Construction (AISC): Manual of Steel Construction, Part 5, Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts
- B.** American National Standards Institute (ANSI): ANSI B30.11 – Monorails and Underhung Cranes
- C.** American Society for Testing and Materials (ASTM) A36: Carbon Structural Steel
- D.** American Society for Testing and Materials (ASTM) A325: Structural Bolts, Steel, Heat Treated, 120/150 ksi Minimum Tensile Strength
- E.** American Society for Testing and Materials (ASTM) A490: Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength

Special Specifications

- F. American Society for Testing and Materials (ASTM) B221: Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube
- G. American Welding Society (AWS) D1.1: Structural Welding Code
- H. American Welding Society (AWS): Certified Shop
- I. Occupational Safety and Health Administration (OSHA) – Specification 1910.179: Overhead and Gantry Cranes
- J. CMAA Specifications 70 and 74: Traveling Bridge Cranes
- K. MMA Specification MH27.2: Enclosed Track Under-hung Cranes and Monorail Systems
- L. American Recovery and Reinvestment Act (ARRA): Buy American Clause of May 2009

1.3 PERFORMANCE REQUIREMENTS

- A. Coverage: Crane shall provide coverage of rectangular area of size indicated on drawings and consist of:
 - 1. Support structure requiring only primary structural support without longitudinal or lateral bracing.
 - 2. Two rigid, parallel runways; cranes with more than two runways or with articulating runways are not acceptable.
 - 3. Rigid, single or double girder bridge moving perpendicular to runways or monorail.
- B. Modular, Pre-engineered Design: Crane system shall be capable of expansion, disassembly, relocation, and the addition of multiple mixed capacity bridges.
- C. Productivity Ratio: Crane shall be designed to manually move load with maximum force of 1/100 load weight.
- D. Deflection Guidelines: All Workstation Bridge Crane models are designed with maximum deflection of 1/450.
- E. Crane Operating Temperature: 5 to 200 degrees F (-15 to 93 C)
- F. Structural Design: The crane's structural design is based on live load capacity plus 15 percent for hoist and trolley weight and 25 percent for impact. Crane shall be designed to withstand:
 - 1. Crane and hoist dead load.
 - 2. Live load capacity equal to net rated hook load.
 - 3. Inertia forces from crane and load movement.

1.4 SUBMITTALS

- A. Submittal Procedures
 - 1. Product data is included for crane and all accessories. Product data provides capacities, performance, standard operation, and applied forces to foundation.
 - 2. Shop drawings, which outline crane configuration, dimensions, construction, and installation details.
 - 3. Structural design shall be certified by a licensed professional structural engineer.
 - 4. Manufacturer's Warranty.
 - 5. Manufacturer's Installation Instructions.

6. Manufacturer's Operation and Maintenance Manual.

1.5 QUALITY ASSURANCE

- A.** Standard cranes shall be designed, fabricated, and installed in accordance with ANSI B30.11, MH27.2, OSHA 1910.179, and IBC. Contractor shall assure the safety and quality of all systems when installed and maintained according to their Installation and Maintenance Manual. The Workstation Bridge Cranes are designed to withstand the worst seismic condition in the U.S. or as defined by the IBC.
 - 1.** Applications where cranes will be used in potentially hazardous environments or explosive environments require special consideration. As per the International Building Code, these special conditions must be disclosed prior to placing an order.
 - 2.** Application where cranes will be used in essential facilities like fire departments, military buildings, or communications buildings, or at locations closer than 15km to known seismic sources require special consideration. As per the International Building Code, these special conditions must be disclosed prior to placing an order.
 - 3.** Custom cranes may need modification to conform to Seismic 4 Uniform Building Code due to the customized and non-standard nature of these designs.
- B.** If different specifications are required, alternate specifications need to be requested before the order is placed. Crane modifications may be required at additional cost to conform to specifications other than IBC and ASNI MH27.2.
- C.** Manufacturer's Qualifications: A company with more than 30 years of experience successfully designing and manufacturing cranes and material handling solutions for numerous industries.
- D.** Installer's Qualification: A company that is acceptable to the crane manufacturer and with 5 years of experience assembling and installing cranes for multiple applications. Installer should be able to:
 - 1.** Perform welding using certified operators in accordance with AWS D14.1.
 - 2.** Bolt connections in accordance with torque tightening procedures specified in AISC Manual, Part 5.
 - 3.** Clearly label crane with rated load capacity with label visible from floor level and loading position.
 - 4.** Perform OSHA Load Test Certification.

1.6 WARRANTY

- A.** Manufacturer's Warranty: Included on manufacturer's standard form and outlines the manufacturer's agreement to repair or replace assemblies and components that fail in materials and/or execution within warranty period from date of substantial completion.
 - 1.** Warranty covers ten (10) years or 20 thousand (20,000) hours for manual push-pull workstation bridge crane products to cover defects in materials and execution.
 - 2.** Warranty covers two (2) years or four thousand (4,000) hours for motorized tractor products.

1.7 CONDITIONS/ DELIVERY, STORAGE, HANDLING

- A.** Project Conditions
 - 1.** Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results.

Special Specifications

2. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Delivery, Storage, and Handling**
1. Store products in manufacturer's packaging until ready for installation.
 2. Store and dispose of solvent-based materials in accordance with requirements of local authorities.

PART 2 -- PRODUCT

2.1 ACCEPTABLE MANUFACTURERS

- A. Spanco, Inc. or approved equal**

2.2 FREESTANDING WORKSTATION STEEL BRIDGE CRANE

- A. Construction:** Fabricated from ASTM A36 steel sections with finished ends and surfaces.
- B. Design Factors:** The product should have a design factor of 15 percent of the allowable capacity for hoist weight and 25 percent of the allowable capacity for impact. This design provides a margin to allow for variations in material properties, operating conditions, and design assumptions. No crane should ever be loaded beyond its rated capacity.
- C. Service Factor:** The product should be designed for frequent usage (Class C Normal/ Industrial service) as defined:
1. System or equipment is used where operational time is less than 50 percent of the work period and lifted load is greater than 50 percent of rated capacity.
- D. Support Structure:** Support crane runways with frames consisting of two columns and horizontal header.
1. Columns: Square tubes with full bottom base plate (weld on angles not permitted) and top header plate.
 2. Header: Fabricated from singlewide flange beam. Includes clamp plates, minimum grade 5 bolts, lock washers, and hex nuts for attaching header to column.
 3. Hanger Assemblies: Includes each support frame with pair of hanger assemblies that provide a rigid connection for suspending runways. Assembly to consist of clamp angles, clamp plates, minimum grade 5 bolts, lock washers, and hex nuts. Use of threaded rods in flush hanger assemblies not permitted.
- E. Runways:** Vertical truss fabricated from square steel tubes and enclosed steel track.
1. Track: Enclosed, cold formed, steel box track that serves as bottom cord of runway and permits end trucks and festoon carriers to ride on lower inside flanges. Fabricate lower running flanges with flat surface for higher durability and wheel contact. Sloped flanges not permitted.
 2. Splice Joint: Includes truss splice plates, channel-shaped track splice joints, bolts, lock washers, and nuts for joining runway sections. Splice joints must be located within four feet of a support point.
 3. Runway Cantilevers: Up to 4 feet (1219 mm) of cantilever is allowed from a hanger location to the end of the runway for trussed track. Up to 2 feet (609 mm) of cantilever is allowed from a hanger location to the end of the runway for plain track.

Special Specifications

4. Festoon stack section: Includes enclosed track extension to allow for stacking festoon carriers at end of runway.
- F. Bridge, Enclosed: Cold formed steel box track that permits hoist trolleys and festoon carriers to ride along track's lower inside flanges. Fabricate lower running flanges with flat surfaces. Sloped flanges not permitted.
- G. Bridge, Extruded Aluminum: Enclosed track reinforced with extruded aluminum beam.
 1. Included as either single piece extrusion or with separate beam welded to track. Bolted reinforcing not permitted.
 2. Track: Enclosed box track designed for trolleys and festoon carriers to ride on lower inside flanges. Fabricate lower running flanges with flat surfaces. Sloped flanges not permitted.
- H. End Trucks: Rigid frame end truck designed to ride inside enclosed runway track and connect to and suspend bridge.
 1. Construction: Stamped steel fabrication with both vertical and horizontal wheels to prevent binding in runway.
 2. Wheels: Removable, self-centering wheels with sealed lifetime lubricated bearings. Vertical wheels shall be flat to match track profile. Non-removable or non-tapered wheels are not acceptable. Polyamide wheel material is provided by Manufacturer. Steel wheels are optional.
 3. Drop Lugs: Included on both sides of truck to limit truck drop in the event of wheel or axle failure.
 4. Connection to the Bridge: Includes a sliding or flexible connection between bridge and end truck. Rigid connections or articulating connections with threaded hardware are not acceptable.
- I. Hoist Trolley: Rigid-body trolley designed to ride inside enclosed track of bridge and to carry hoist and load. Articulating trolleys are not acceptable.
 1. Construction: Two-piece stamped steel body with two wheels on each side and tapered clevis positioning hoist hook at center of trolley so load weight is evenly distributed to trolley wheels. Includes removable clevis pin (type and size determined by manufacturer for specified capacity). Trolleys with non-removable clevis pins are not acceptable. Holes provided in body for mechanical connections.
 2. Wheels: Removable, self-centering wheels with sealed lifetime lubricated bearings. Vertical wheels shall be flat to match track profile. Non-removable or tapered wheels are not acceptable. Polyamide wheel material provided by Manufacturer. Steel wheels are optional.
 3. Drop Lugs: Included on both sides of trolley to limit trolley in the event of wheel, axle, or load bar failure.
 4. Designed for hook attachment of hoist.
- J. End Stops: Molded composite, resilient bumper installed in runway and bridge tracks to prevent end trucks, hoist trolley, and festoon carriers from rolling out of track. Bolt stops without energy absorbing bumper are not acceptable.

2.3 SYSTEM OPTIONS

The following options should be included for Manufacturer Freestanding Workstation Bridge Cranes.

A. Tractor Drives

1. Bridge and hoist trolley should be motorized.
2. Power Bridge or trolley and hoist trolley on straight 600, 700, or 900 series track (1,000 to 4,000 pound capacities) runways or monorails.
3. 208 to 575 volts, three phase, 60 hertz, electric operation, air driven also available.
4. Standard speeds from 34 F.P.M. to 75 F.P.M. Other speeds available.

B. Festoon Assemblies

1. Includes length of cable and/or air hose to supply lifting device. Supply shall be festooned along boom.
2. Festoon Trolleys: Four wheeled trolleys with pivoting saddle and applicable attachment to support service run on boom and allowing festooning as hoist trolley travels. Festoon gliders are not acceptable.
3. Festoon Clamp: Steel clamp assembly attached to track to prevent festoon trolleys and gliders from exiting track.

2.4 SYSTEM COMPONENTS

A. End Stop Bumper for Enclosed Track System

1. End stops are equipped with resilient rubber bumpers to increase impact resistance and are through bolted to the enclosed track.
2. Standard on all enclosed track bridge crane systems.

B. Cable/Hose Trolley for Enclosed Track System

1. Standard on all workstation bridge crane kits.
2. Utilized for conveying the power supply flat cable or round air hose.
3. Four wheels ensure easy movement.
4. Pivoting clevis provides swiveling action for air hose.
5. Maximum 3/8-inch air hose on standard trolley.

C. Festoon Section for Enclosed Track System

1. Furnished for end of one runway to allow stack-up of cable/hose trolleys.
2. Through-bolted to runway track profile. Festoon trolleys pass under through-bolt into festoon section.
3. Standard on all Workstation Bridge Crane systems.

D. End Truck for Enclosed Track System (End trucks provide smooth running connection between enclosed track workstation bridge crane and runway track.)

1. Standard wheels are large diameter polyamide, equipped with anti-friction ball bearings (steel wheels optional).
2. Bronze wheels and guide rollers are available for "spark resistant" applications.
3. Placement of horizontal steel guide rollers on either end of the truck guards against "crabbing" of workstation bridge crane.
4. Zinc chromate plated finish.

Special Specifications

- E. Hoist Trolley for Enclosed Track System**
 - 1. Fabricated from precision cut steel plate.
 - 2. Equipped with large diameter polyamide wheels with anti-friction ball bearings to ensure smooth and easy movement (steel wheels optional).
 - 3. Bronze wheels and rollers are available for "spark proof" applications.
 - 4. Zinc chromate plated finish.
 - F. Cable/Hose Clamps for Enclosed Track System**
 - 1. Fitted at one end of runway and bridge to hold cable or hose.
 - 2. Flat cable 4 wire #14 A.W.G. supplied standard on all systems.
 - 3. 3/8-inch air hose optional.
 - G. Vacuum Hose Trolley for Enclosed Track System**
 - 1. Special free moving trolleys with kick-up rollers and Velcro straps are provided to festoon vacuum hose on vacuum lifter applications.
 - H. Hanger Assembly for Enclosed Track System**
 - 1. All Freestanding Workstation Bridge Cranes are provided with flush type hanger assemblies, which allow for adjustment in both lateral and longitudinal directions.
 - 2. Hangers are of appropriate size and numbers for selected system.
 - I. Flat Cable Festooning Systems (four wires #14 A.W.G.) for Enclosed Track**
 - 1. Supplied with all bridge crane systems.
 - 2. Optional, various sized air hoses available.
 - 3. Festoon loops are 18 inches for bridges and 36 inches for runways.
 - J. Track Splice Assemblies for Enclosed Track System**
 - 1. Slide over track profile to ensure proper alignment.
 - 2. Trussed track splice assembly bolts through top chord to prevent joints from separating.
 - K. Universal Bumper (optional) for Enclosed Track System**
 - 1. Frictionally clamped to track opening to buffer between multiple bridges.
 - 2. Do not use as end stop.
 - L. Enclosed Track for Runway and Bridge Beams**
 - 1. Trussed track available in four profiles and 15 standard trusses with capacities ranging from 250 to 4,000 pounds.
 - 2. Standard maximum support centers of 20, 25, or 30 feet.
- 2.5 SHOP FINISHING**
- A. Standard Coating and Paint Colors:**
 - 1. All runways, structural supports, and bridges should be ArmorPoxy Epoxy coated with yellow finish for outdoor use.
 - B. Surface Preparation and Painting Procedures:**

Special Specifications

1. Manufacturer adheres to the standards of the Society for Protective Coatings (SSPC) for all product surface preparation.
2. Manufacturer Crane components are deburred and descaled using power tools equipped with sanding discs and wire wheels prior to painting.
3. Components are washed with high-pressure/ high temperature biodegradable degreaser solution.
4. All components are coated with quick drying, semi-gloss enamel, applied to a minimum dry-film thickness of two to three mils.
5. A finishing coat is applied with a hot, airless, electrostatic spray paint system.
6. Painted components are cured at air temperature.

PART 3 -- EXECUTION

3.1 PREPARATION

- A. DO NOT start installation until support structures are properly prepared.
- B. Inventory:
 1. Check materials to ensure all parts are present.
 2. Anchor bolts for support columns are not included. Four, 13/16-inch diameter holes are provided for anchor bolts.
 3. Sway bracing is recommended.
- C. Motorized tractor drive:
 1. Check electrical supply, conduit, wiring, disconnect switch, and other electrical components.
- D. Foundation
 1. Check concrete footings, slabs, or other foundations to ensure sufficient system support.
 2. Ensure accurate anchor bolt patterns are provided for foundation design.

3.2 INSTALLATION

- A. Units and accessories should be installed in accordance with manufacturer's instructions and shop drawings.
- B. Do not modify crane components without manufacturer's approval.
- C. Clearances for moving crane components:
 1. Minimum vertical clearance: Three inches (76 mm) from any overhead obstruction.
 2. Minimum horizontal clearances: Two inches (51 mm) from any lateral obstruction.
 3. Prior to applying proper torque to the bolts, ensure runways are:
 - a. Level to within plus or minus 1/8 inch in 20 feet (3 mm in 6.1 m).
 - b. Parallel with opposite runway to within plus or minus 1/8 inch in 20 feet (3 mm in 6.1 m).
- D. Column and Header Installation

Special Specifications

1. Arrange installation area, position columns, and verify orientation. Bolt columns to floor and attach header beam to columns with 5/8-inch fasteners. Torque fasteners to 108 foot-pounds.
 2. Follow the same procedure for subsequent sets of columns and headers.
- E. Runway Installation**
1. Raise runway track into position and clamp it to header beams with 5/8-inch fasteners. Torque fasteners to 108 foot-pounds.
 2. Do not cantilever ends of runway tracks more than 18 inches beyond support centers.
 3. Center of runway is located approximately 14 inches from inside edge of support column.
 4. OSHA regulations require a minimum clearance of two inches from end of bridge track to face of support columns or other obstructions.
- F. Splice Installation**
1. For systems with more than one section of runway track, additional section is installed in the same manner, with the addition of splice joint assembly.
 2. The track splice joint is made using a sleeve with eight setscrews threaded into top and sides. Slide sleeve over end of first runway track, and butt second runway track against first. Center sleeve over joint. Tighten all top setscrews and side setscrews for correct track alignment. Do not over tighten screws.
 3. Trussed runway splice joints include two splice plates and four 1/2-inch bolts with nuts. Install splice plates to connect ends of truss top tubes with four through bolts. Torque through bolts to 50 foot-pounds.
 4. Trussed Runway: Splice joints should be within 48 inches of support hanger.
- G. Bridge End Truck Installation**
1. Insert bridge track into end truck sleeves. Locate center of end trucks approximately 12 inches from ends of bridge. One end truck is secured to bridge track with setscrews and one end truck is allowed to slide freely on bridge track.
 2. Install bridge crane by inserting end trucks of runway tracks at one end of runway. Adjust and tighten bridge end truck setscrews to provide a minimum clearance of two inches between ends of bridge and support columns.
- H. Runway End Stop Installation**
1. Secure end stop assemblies, end stop bolts, and lock nuts at both ends of runway tracks, except for end of festoon storage area, where applicable.
- I. Festoon Track Extension Installation**
1. Place festoon track extension on end of runway as close as possible to power junction box. Align festoon track extension prior to tightening bolts. Adjust bolts on side of festoon track extension to ensure alignment of bottom flanges of track. Clamp festoon track extension firmly into a straight level position prior to tightening top of extension. Check to ensure all surfaces of track ends and festoon track extension are in contact.
 2. Tighten top bolt to:

Special Specifications

- a. 400 Series 12 foot-pounds
 - b. 500-900 Series 17 foot-pounds
 3. 400 Series Track: Install bolt in top of festoon track extension. Place flat washer and lock nut on bolt and tighten. Do not place end stop at this location. Using end stop supplied with system, install in end of festoon track extension.
 4. 500-900 Series Track: Install bolt through side of festoon track extension. Place lock nut on through bolt and tighten. Do not place end stop or end stop bumper at this location. Using end stop supplied with system, install in end of festoon track extension.
 5. All end stop bolts must have rubber bumper to ensure festoon trolleys remain in track.
 6. Ensure all end stop warning labels are in place.
 7. Install festoon end clamp to secure festoon cable at end of festoon track extension.
 8. Ensure trolleys slide across runway and festoon track extension joint smoothly.
 9. Ensure all trolleys stack properly in festoon track extension area, clear through bolts, and contact end stop.
- J. Runway Festoon Installation**
1. Install festoon trolleys into storage area of runway track if system includes festooning.
 2. Secure end stop bolts and rubber bumpers. Locate and secure festoon end clamps. Install festoon cable on festoon trolleys at equal spacing, approximately six feet, seven inches apart for 36-inch loops. Festooning can be located on any end of runway.
- K. Hoist Trolley and Bridge Festoon Installation**
1. Install hoist trolley and festoon trolleys on bridge track. Secure end stop bolts and rubber bumpers. Install festoon cable on festoon trolleys at equal spacing, approximately three feet four inches for 18-inch loops. Festoon storage area is within bridge length.
 2. Once installation is complete, bridge and runways should be leveled. Check tightness for all bolts and nuts.
- L. Hoist Installation**
1. Attach hoist to hoist-trolley. Use washers on hoist mounting pin to center hoist inside hoist trolley. Reinstall washers on outside of hoist trolley (both sides) before installing or reinstalling cotter pins to secure hoist-mounting pin. Replace cotter pin(s) if worn or broken. Bend cotter pin around mounting pin.
 2. Do not operate hoist or crane if cotter pins are not in place and properly bent over on both sides of hoist trolley. Check regularly that cotter pins are in place and securing hoist on hoist trolley.
- 3.3 FIELD QUALITY CONTROL**
- *Perform field quality control testing as recommended by manufacturer.
- A. Inspection**
1. Verify all bolts are tight and lock washers fully compressed.

Special Specifications

B. Field Test

1. Ensure crane operates properly (movement is smooth and consistent).
2. Verify motorized operation and controls function properly.
3. Make adjustments as needed, and correct inadequacies.

C. Acceptance Test

1. After the enclosed track crane system has been installed, OSHA requires an acceptance test before operating and also after any modifications. An authorized dealer or installer should perform acceptance tests.

D. Maintenance

1. A system inspection should be performed 30 days after installation. All nuts, bolts, and screws should be checked for tightness. All end stops, cotter pins, and hoist trolleys should be checked for abnormal wear or breakage. Check track splices for alignment, and verify that end trucks and festoon trolleys travel smoothly through joints. Check that festoon cables and/ or hoses are securely clamped to festoon trolleys and end clamps.
2. A complete inspection of all fasteners and connections should be performed annually or every two thousand (2,000) hours. Heavy conditions of use may require more frequent inspections.
3. Operators should visually inspect the system before each use to note any unusual or abnormal system operations.

E. Clean Surfaces

1. Touch up scratches and blemishes with matching paint from manufacturer.
2. Keep surfaces clean and clear of build-up and residue.

F. Protect Crane

1. Protect installed products until completion of project.
2. Touch up, repair, or replace damaged products before substantial completion.

G. Quality Standards

1. Manufacturer is an ISO 9001-2008 Registered Corporation.
2. Manufacturer Cranes are manufactured to standards ensuring safety, reliability, and the highest quality.

Special Specifications

- 3.** Manufacturer products are manufactured in the United States of America at facilities located in Morgantown, Pennsylvania and Las Vegas, Nevada.
- 4.** Manufacturer certifies that all goods are in full compliance with the Buy American Clause of the American Recovery and Reinvestment Act (ARRA) of May 2009.

END

CHLORINATED POLYVINYL CHLORIDE (CPVC) PIPE, FITTINGS, AND VALVES

Section SS15650

PART 1 -- GENERAL

1.1 SCOPE

- A.** The CONTRACTOR shall furnish all tools, equipment, materials, and supplies and shall perform all labor required to complete the work as indicated on the Drawings and specified herein.
- B.** This Section covers furnishing and installing double walled chlorinated polyvinyl chloride (CPVC) pipeline, fittings, flanges, and valves, complete, in place, in accordance with the requirements of the Contract Documents.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A.** Section 00700 General Conditions.

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A.** Section 01300 Submittals.
- B.** Codes and Standards.

ASTM D1784	Standard Specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds
ASTM F1970	Standard Specification for Special Engineered Fittings, Appurtenances or Valves for Use in Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Systems
ASTM F439	Standard Specification for Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe Fittings, Schedules 80.
ASTM F441	Standard Specification for Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe, Schedules 40 and 80

1.4 DEFINITIONS

Product Pipe --- Inside Pipe/Carrier Pipe
Containment Pipe --- Outside Pipe

1.5 SYSTEM DESCRIPTION

- A.** System shall be a double-containment piping system of uniform materials.

1.6 CONTRACTOR SUBMITTALS

- A.** Submittals shall be made in accordance with the Section 01300.
- B.** Shop Drawings: The CONTRACTOR shall submit shop drawings of pipe, fittings, flanges, valves, and appurtenances.
- C.** Certifications: The CONTRACTOR shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications, as specified in the referenced standards and the following supplemental requirements:
 - 1. Hydrostatic proof test reports.
 - 2. Sustained pressure test reports.
 - 3. Burst strength test reports.
- D.** All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR.

1.7 QUALITY ASSURANCE

- A.** Tests: Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of this Section of the Specifications, as specified in the referenced standards, as applicable.
- B.** The CONTRACTOR shall perform said material tests in accordance with the requirements of the Contract Documents. The INSPECTOR shall have the right to witness all testing conducted by the CONTRACTOR provided that the CONTRACTOR's schedule is not delayed for the convenience of the INSPECTOR.
- C.** In addition to those tests specifically required, the INSPECTOR may request additional samples of any material for testing by the ENGINEER. The additional samples shall be furnished at no additional cost to the OWNER.

PART 2 -- PRODUCTS

2.1 PIPE

- A.** Product Pipe shall be CPVC pipe made from all new rigid unplasticized chlorinated polyvinyl chloride, Class 23447-B, and shall be Schedule 80 conforming to ASTM F441.
- B.** CPVC piping systems shall have design pressure limit of 100 psig and temperature limit of 150 degree F, unless otherwise noted.
- C.** Containment Pipe: shall be CPVC pipe made from all new rigid unplasticized chlorinated polyvinyl chloride, Class 23447-B, and shall be Schedule 80 conforming to ASTM F441.

Special Specifications

- D. Containment pipe shall be at least 2 sizes larger than Product Pipe. Consult Manufacturer for recommendations when using Pull Cable.

2.2 FITTINGS

- A. CPVC fittings shall be solvent-welded fittings of the same material as the pipe, unless otherwise shown, and shall be Schedule 80 conforming to ASTM F439.

- A. Solvent Cement :

1. Unless otherwise specified, all CPVC piping shall be of solvent-welded construction.
2. Primer shall be per ASTM F656.
3. Solvent cement shall be per ASTM D 2564, CPVC / PVC for Sodium Hypochlorite.
4. Manufacturers:
 - a. Weld-on 724 IPS;
 - b. Or equal.

2.3 PIPE FLANGES

- A. Flanges

1. Class 150 Flat Face CPVC Schedule 80 ASTM D439, Socket 150 # ANSI.

- B. Blinds Flanges

1. Class 150 Flat Face CPVC Schedule 80, ASTM D439, Socket 150 # ANSI.

- C. Gaskets

1. Teflon, Class 150 ANSI Full Face.

- D. Bolts

1. Studs: 316 Stainless Steel ASTM 193 Grade B8M.
2. Nuts: 316 Stainless steel ASTM 194 Grade 8M.
3. Washers: 316 Stainless Steel ANSI B18.22.1.
4. Assemble with anti-seize compound.

2.4 VALVES

- A. Fasteners: All bolts, nuts, and washers shall be made of Type 316 stainless steel, unless otherwise noted.

- B. Ball Valves

1. Sizes [**1/2" - 4"**]:

Special Specifications

- a. Class: 150 psi, true union
- b. Ends: ½"-2" Socket, 3"-4" Flanged
- c. Body: CPVC
- d. Ball: CPVC, Full-ported
- e. Seat: Teflon (PTFE).
- f. O-rings: EPDM
- g. Stem: CPVC
- h. Operator: Manual
- i. Manufacturers:
 - (1) Asahi;
 - (2) Spears;
 - (3) Or equal

C. Check Valves

1. Sizes [**1/2" - 2"**]:

- a. Class: 150 psi, socket true union.
- b. Type: Ball Check.
- c. Body: CPVC.
- d. Ball: CPVC.
- e. Seat: Teflon (PTFE).
- f. Manufacturers:
 - (1) Asahi;
 - (2) Spears;
 - (3) Or equal

D. Unlisted Components

Any special fittings, not supplied as part of the normal product offering, shall be classified as unlisted components. Products falling into this category shall be supplied by the manufacturer of the Double Containment System Only.

E. Double Contained Flanges

All double contained flange connection shall consist of a double o-ring flange and a flat- faced flange. The flange design shall provide adequate flow of fluid through the annular space. All flanges shall be of the same resin as the pipe. Consult factory for availability on Double Contained Flanges

F. Pipe Supports

Supports, guides, etc. for product pipe shall be provided of same resin as product pipe. Supports shall be placed in a manner that a maximum of 0.1" deflection is allowed between supports. Supports shall allow axial movement of product pipe within containment pipe. Supports shall maintain a concentric relationship between product pipe and containment pipe. Supports shall be designed to allow the pulling of Leak Detection Cable through the pipe.

PART 3 -- EXECUTION

3.1 GENERAL

- A.** All laying, jointing, testing for defects and for leakage shall be performed in the presence of the INSPECTOR, and shall be subject to his approval before acceptance. All material found during the progress to have defects will be rejected and the CONTRACTOR shall promptly remove such defective materials from the site of the work.
- B.** CPVC pipe joints shall be solvent-welded in accordance with the manufacturer's instructions and with the following procedure:
 - 1.** Pipefitters making CPVC joints shall have been certified, within the previous six months of making the joints, by the solvent cement manufacturer.
 - 2.** Inspect pipe for a square, deburred cut and a 10⁰-15⁰ beveled end. Lightly sand the outer surface of the pipe and the fitting mating surface with 100 grit sandpaper to break the oxide layer. Remove all sanding debris from the mating surfaces with a clean rag wetted with isopropyl alcohol followed by a clean dry rag. Check the dry fit for 1/4-3/4 of the socket.
 - 3.** Dissolve the inside socket of the fitting with an appropriate tinted primer by repeated strokes of a well-wetted applicator.
 - 4.** Dissolve the surface area of pipe in similar manner.
 - 5.** Apply a second application of tinted primer to the inside socket of fitting; then immediately apply a generous amount of cement to the outside of the pipe. CPVC solvent shall be a clear-bodied cement with no fillers. Cement applications to both pipe and fitting should be made while the primer is still wet.
 - 6.** Apply cement to the inside of the fitting. Caution should be taken on the amount applied, since any excess will puddle inside the system and may cause a weakness.
 - 7.** Immediately apply a second application of cement of the pipe, and while both surfaces are still liquid, bottom the pipe into the fitting, rotating the pipe 90⁰ if possible, and hold until the pipe will not "push out," normally less than 30 seconds.
 - 8.** Wipe any excess cement from the pipe and observe the set time and cure time charts given by the cement manufacturer. Never test the system with air pressure.

3.2 HANDLING AND STORAGE

- A.** Handling: Pipe, fittings and accessories shall be carefully inspected before and after installation and those found defective shall be rejected. Pipe and fittings shall be free from fins and burrs. Before being placed in position, pipe, fittings, and accessories shall be cleaned, and shall be maintained in a clean condition.
- B.** Storage: Pipe should be stored, if possible, at the job site in unit packages provided by the manufacturer. Caution should be exercised to avoid compression damage or

Special Specifications

deformation to bell ends of the pipe. Pipe should be stored in such a way as to prevent sagging or bending and protected from exposure to direct sunlight by covering with an opaque material while permitting adequate air circulation above and around the pipe. Gaskets should be stored in a cool, dark place out of the direct rays of the sun, preferably in original cartons.

END OF SECTION

**MODIFICATIONS TO EXISTING
480 VOLT MOTOR CONTROL CENTERS
SECTION 16121**

PART 1 GENERAL

1.01 SUMMARY

- A. Scope of Work
 - 1. The Contractor shall furnish and install the modifications required to the Owner's existing motor control centers as specified herein and as shown on the PLANS.
 - 2. The existing motor control centers are vital to the Owner's waste-water treatment plant process system. Therefore, required interruptions to the plant process shall be minimized and carefully coordinated with the Owner. Regarding interruptions, refer to and comply with the General Notes shown on the Electrical PLANS.
 - 3. The arrangement and dimensions of the existing motor control centers are based on the data available and information provided by the Owner and based on site investigations. The Contractor shall also field verify all available data/information prior to commencement of the improvements required under this project. Should any deviation be found between the PLANS and the Contractor's site findings, it shall be brought to the attention of the Owner prior to Bid. Otherwise, it shall be assumed that conditions are as is and no additional, less, and/or departure of work is expected from what is shown on the PLANS and Specified herein.

1.02 RELATED WORK NOT INCLUDED

- A. The PLANS designate the type, number, size and rating of devices included in the Motor Control Centers (MCCs)
- B. Related work as called for on the PLANS, as specified herein or in other Sections of the Specifications.

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with the requirements of Section 01300 of the Contract Specifications. Include:
 - 1. Dimensioned/scaled top and bottom views, front elevations, and internal component/device layouts
 - 2. One-line diagrams and wiring diagrams,
 - 3. Catalog cut sheets. Include protective device coordination curves and current limiting circuit breaker/fuse peak current let through curves, where applicable.
 - 4. Key interlock scheme drawing and sequence of operations, where applicable.

1.04 OPERATION AND MAINTENANCE MANUALS

- A. Furnish Operation and Maintenance Manuals in accordance with the requirements of Section 01730 of the Contract Specifications. Include:
 - 1. Installation and operation manuals.
 - 2. Renewal parts bulletin.
 - 3. As built drawings, including approved shop drawings.
 - 4. Test data.
 - 5. Sealed and signed arc flash hazard analysis, harmonic study, motor starting, short circuit, and coordination study report. Report to include all final setpoints used.
- B. Additional information as required by subsection 1.08, this section of the Specifications.

1.05 QUALITY ASSURANCE

- A. All parts and distribution and control equipment required to modify the existing motor control centers shall be the product of Eaton Corporation and/or as recommended/authorized/approved in writing by Eaton Corporation for use in the existing Motor Control Centers, and as also called for on the PLANS and in compliance with this Section of the Specifications.
- B. Modifications to the motor control centers shall be performed and tested in accordance with the latest applicable requirements of NEMA, ANSI, UL, and NEC standards. Modifications to the motor control centers shall be performed by qualified, experienced, manufacturer trained technical (non-sales type) representative, or Engineering Services Group trained technical (non-sales type) representative, or Original Equipment Manufacturer's trained technical (non-sales type) representative, by Siemens, Allen Bradley, Square-D Company, Asea Brown Boveri, Eaton Corporation, or approved equal.
- C. In addition to these Specifications, refer to the PLANS for specific requirements on the Motor Control Centers.

1.06 STORAGE AND HANDLING

- A. Protection
 - 1. The Contractor, and hence the MCC supplier, shall be responsible for safety of the MCC during storage, transporting and handling.
 - 2. Deliver, store, protect, and handle products in conformance with manufacturer's recommended practices as outlined in applicable Installation and Maintenance Manuals.
 - 3. Products shall be environmentally protected and stored in climate controlled (temperature and humidity, etc.) environment.
 - 4. At all times, store products inside a moisture free, non-porous, extra heavy duty plastic weatherproof housing.
 - 5. Interior and exterior of MCC shall be kept clean at all times.

1.07 TOOLS AND SPARE PARTS

- A. Furnish the following spare parts with the equipment for each MCC in conformance with the specifications:
1. One (1) – Set of fuses (minimum 3) for each type and size used.
 2. One (1) – Set of starter contacts for every three (3) like starters used (a minimum of 1 for each size used). If contacts are not replaceable a spare starter for each size used shall be supplied.
 3. Two (2) - Contactor coils for every NEMA size and type starter installed, a minimum of one coil per size.
 4. Two (2) - Spare control relays for each type used. Control relay shall be furnished complete with relay coils, Four (4) Normally Open (N.O.) contacts, Four (4) Normally Closed (N.C.) contacts, and shall be furnished with Relay Manufacturer's Transient Voltage Suppression Module.
 5. One (1) - Spare timing relay.
 6. Two (2) – Sets of overload heaters for each size and type used.
 7. One (1) quart of manufacturer's standard touch-up paint.
 8. One (1) - Spare elapsed time meter for each motor control center in which an elapsed time meter is used.

1.08 SPECIAL MANUFACTURER SERVICES

- A. Prepare an arc-flash hazard analysis study and a coordination study, complete with short circuit calculations and coordination curves reflecting calculated fault values and recommended and/or proposed fuse type/ratings and equipment/device settings (as applicable) from the 12470V level (with close coordination with the Owner's upstream 12470V protective devices) through the 208/120V subsystem level equipment and devices of the Dechlorination Building and Operations Building. Thevenin equivalent system characteristics for the existing 12470V system serving the existing 12470V:480V transformers "DS01-XFMR-MCC1", "DS01-XFMR-MCC2", "OP-XFMR-01A", "OP-XFMR-01B", "OP-XFMR-02A" and "OP-XFMR-02B" will be provided by the Owner after Bid Award to facilitate the Contractor's system study effort. Coordination with the Owner is required. Additional details concerning the implementation of the short circuit, coordination and arc flash studies such as main-tie-tie-main circuit breaker states to be assumed, etc., will be provided after Bid Award. Information associated with existing loads to be included in the system studies such as motor speed-torque curves, blower speed-torque curves, blower inertia, etc., shall be provided by the Owner after Bid Award. Exception: existing protective device (circuit breaker, fuse, etc.) performance curves, cable damage curves, and other data commonly available via system analysis software packages will not be provided by the Owner.
- B. The study should also include adjustments/recommendations in the proposed/new protective relaying devices to better coordinate with the existing upstream protective devices in lieu of replacing any of the existing protective devices. The study shall also include any adjustments, recommendations, and requirements of the Owner and be fully coordinated with the Owner and the Owner's requirements. Coordinate with the Owner as required and submit documentation as required to meet the Owner's requirements at no additional cost to the Owner. The manufacturer's services should also include setting/re-adjusting and testing/calibration of the proposed protective devices and protective relaying, etc. (Referenced below).

- C. Perform the arc flash hazard analysis in conjunction with the short circuit and coordination analysis previously described herein and also in compliance with IEEE 1584 and NFPA 70E standards. The flash protection boundary and incident energy shall be calculated at all points in the distribution system (transformers, motor control centers, panelboards, etc.) where work could be performed on energized parts. The following additional requirements apply for the arc flash hazard analysis:
 - 1. Perform arc flash hazard studies assuming one main 480V utility service is energized, the tie circuit breakers are closed, and the second 480V main utility service is de-energized.
 - 2. Repeat studies for each electrical service.
 - 3. Calculations to address worst case (maximum) hazard analysis. Describe scenario employed in submittals.
 - 4. Perform analysis for one (1) additional configuration of main-tie-main switch/breaker positions that will be explained by the Owner after bid-award.

- D. The arc flash hazard analysis effort shall also include:
 - 1. Reporting incident energy values based upon recommended protective device settings for all equipment.
 - 2. Reporting recommendations to reduce AFIE levels and enhance worker safety.
 - 3. Furnish and install label(s) for all equipment included in the study indicating the following, at minimum:
 - a. System voltage
 - b. Shock and Flash protection boundaries
 - c. Personal protective equipment requirements for each electrical task based upon hazard category (including flame resistant clothing requirements).
 - d. Arc flash incident energy value (cal/cm²)
 - e. Limited and restricted approach boundaries
 - f. Study report number and issue date
 - g. Additional information required by the applicable NFPA and IEEE standards.
 - h. Labels shall be manufacturer's standard labels with quantity and mounting location per manufacturer's standard.

- E. THE ARC-FLASH STUDIES, THE SHORT CIRCUIT CALCULATIONS AND ANALYSIS, AND THE COORDINATION STUDY SHALL BE PERFORMED:
 - 1. UTILIZING SKM SOFTWARE, LATEST RELEASE – MICROSOFT WINDOWS VERSION. In addition to the hard copy submittal, an electronic copy of the FINAL VERSION of the short circuit analysis/calculations and the protective device setting curves (time-current curves) and summary setting tables, etc. shall be submitted on a Universal Serial Bus (USB) external flash drive.
 - 2. By a State of Texas Licensed Professional Electrical Engineer. The final version of the studies shall be signed and sealed by a Professional Engineer who is licensed in the State of Texas as an electrical engineer.

- F. Furnish the services of a qualified, experienced, factory trained technical (non-sales type) representative to assist in the installation of the equipment. Include checking alignment of parts, wiring connections, operation of all parts (relays, starters, monitoring relays, etc.). Include time to correct and recheck any discrepancies which are discovered. Also include providing the OWNER with a report certifying

that the equipment was installed, adjusted, properly tested, and set in accordance with the manufacturer's recommendations and is in satisfactory operating condition. Format and quantity of reports shall be per the requirements of Section 01300 of the Contract Specifications.

- G. Manufacturer's technical representative is to set, adjust and test all protective relays, etc. in the presence of a representative of the Owner. The settings will be based on coordination and short circuit studies performed in compliance with Section 16121 of the Specifications "Modifications to Existing 480 Volt Motor Control Centers", paragraph 1.08 "Special Manufacturer's Services". Provide the Owner with test report certified by the manufacturer. Include a record of all settings. Format and quantity of reports shall be per the requirements of Section 01300 of the Specifications. The Manufacturer shall furnish the protective device of the appropriate characteristics that shall be the most suitable for the proper protection and coordination of the system at No Additional Cost to the Owner.
- H. Any problems encountered with the operation of equipment, parts, components, etc. installed within the MCC line-up shall be repaired/remedied by the manufacturer's technical representative.

PART 2 PRODUCTS

2.01 GENERAL

- A. For additional construction notes and special requirements, refer to the PLANS. Also refer and adhere to the requirements of the PLANS.
- B. Motor Control Center shall not exceed the dimensions shown on the PLANS. Compartment/component arrangement shall be as shown on the elevation drawings. Provide for incoming feeder entering from below or above, and for outgoing circuits exiting from above and below, as shown on the PLANS.
- C. The requirements described herein and as shown on the PLANS apply to any modification work to the MCCs including the relocating and/or modification of existing breaker/combo starter compartments, addition of combination starter compartments, addition of breaker only compartments, etc.

2.02 CONSTRUCTION

- A. Structure
 - 1. Enclosures shall be NEMA Type 1, Gasketed. Enclosure shall be the totally enclosed, dead front, free standing type suitable for back-to-wall mounting.
 - 2. MCC shall consist of required number of vertical sections bolted together to form a rigid self supporting assembly. Each vertical section shall be nominally 90 inches high. Each vertical section shall be subdivided into compartments (units). Refer to the PLANS for additional dimensional requirements.
 - 3. The MCC shall contain a top horizontal wireway and a bottom horizontal wireway running the full width of the MCC. The bottom horizontal wireway shall be covered by hinged doors. Each vertical section shall include a top plate and a bottom plate; plates shall be removable.

4. Each vertical section containing a plug-in unit shall also contain a vertical wireway that interconnects the top and bottom horizontal wireways. The vertical wireway shall be covered by a hinged door.
5. Each unit within each vertical section shall have a hinged door. Each unit shall have a padlockable disconnect operating handle. Include provisions for up to three padlocks. Handle shall be mechanically interlocked with the door to prevent personnel from opening the door when the unit disconnect is in the ON position. Provide handle-door interlock defeating (bypass) feature. Provide non-defeatable interlock to prevent the installation of a plug-in unit unless the unit disconnect is in the OFF position.
6. Unused unit spaces in each vertical section shall be covered by hinged blank doors and equipped to accept future units.
7. All combination starter and feeder units of plug-in construction shall utilize mechanical guides to insure positive alignment of the unit stabs to the section vertical bus. For each unit, shutters shall be provided to cover bus access openings when unit is removed. Unused structure openings shall have plugs or covers to prevent entry of foreign objects into the bus area.
8. Structure finish shall be primed and painted using the manufacturer's standard finishing process. Finish shall be applied at the manufacturing plant. Color shall be manufacturer's standard.
9. Provide each vertical section with an accessible space heater wired to terminal blocks in the respective section. Size the space heater per manufacturer's standard.
10. Structure shall include field removable lifting means.
11. Where an incoming line section is required by the PLANS, the Incoming Line Section shall include lugs for the connection of the field wiring shown on the PLANS.

B. Wiring

1. Unless otherwise noted, the MCC shall be wired Class II, type B construction with terminal blocks for each cubicle.
2. All control wiring shall be tin-plated stranded copper not smaller than #14.
3. All wiring shall be neatly bounded with tie-wraps and supported to wire ways supports.
4. Wiring shall be terminated to split-type terminal blocks.

C. Identification

1. All component and control identification labels shall include the device name and number exactly as it appears on the PLANS. Refer to the PLANS.
2. All control wires shall be tagged and coded with an identification number. Tagging type and wire coding shall be per manufacturer's standard.
3. All terminal blocks shall be identified.
4. Properly label the devices mounted inside each section using manufacturer's standard laminated labels installed in accordance with the manufacturer's standard method.
5. Nameplates:
 - a. Type: 3-ply, 1/8" thick, rigid thermoset phenolic resin laminated cellulose paper base engraving stock per ASTM D-709, Type I. Nameplates shall be ASTM Grade ES-1, ES-2, or ES-3 as applicable for the face and lettering colors specified hereinafter. Flexible or acrylic tags will be not be accepted.

- b. Color: White-Black-White
 - c. Lettering: Engraved through the face layer to the melamine middle layer. Nameplates located on the face of each section/compartments of each MCC shall be legible at a distance of six feet from the nameplate.
 - d. Accessories: Provide holes for mechanical fastening
 - e. Attachment Means: Secured with two Stainless Steel screws/bolts per manufacturer's standard; use of adhesives shall not be accepted.
6. Furnish and install nameplates for:
- a. Each equipment/device/etc. installed/mounted on the face of the MCC.
 - b. Each exterior section/compartments of each MCC.
 - c. Overall entire lineup of MCC, i.e. a master nameplate. In addition to manufacturer's standard information for master nameplates, Master nameplate shall include, at minimum, the tag of the MCC as shown on the PLANS and all information required by the NEC.

2.03 MAIN AND TIE CIRCUIT BREAKERS

- A. Rating: Circuit breaker shall be three pole, 600V with a maximum continuous current carrying capacity shown on the PLANS and a U.L. listed minimum RMS symmetrical short circuit current rating equal to or greater than 42,000 amperes at 480V A.C. Breaker shall be U.L. listed and comply with NEMA Standard No. AB1-1975 and Federal Specification W-C-3758/GEN 21a. Circuit breaker shall be fully rated and not require rating for ambient temperatures 40 degrees Celsius or less.
- B. Circuit breaker shall be furnished with solid state type electronic trip attachment. The attachment shall have the following minimum features:
- 1. Alpha-numeric display
 - 2. Circuit breaker test receptacle
 - 3. Field adjustable settings:
 - a. Long time pickup
 - b. Long time delay
 - c. Short time pickup
 - d. Short time delay
 - e. Instantaneous pickup
 - f. Ground fault pickup
 - g. Ground fault delay
 - 4. Where available from the manufacturer, coat all printed circuit assemblies with a UL 746 recognized conformal coating.
- C. Circuit breaker shall be fixed mounted power operated. The breaker shall be operated by an electric motor operator, remotely operated from the Distributed Control System, and in an emergency by a manual handle. The breaker shall include a provision for padlocking open to prevent manual or electric closing. The padlocking shall also secure the breaker in the connected test, or disconnect position by preventing levering. The circuit breaker shall be manufactured by "Siemens" model "ND Series" or approved equal.
- D. The circuit breakers shall be furnished with the following accessories and options:
- 1. Alarm switch to energize an Owner furnished warning device. Alarm switch contact shall close when the circuit breaker trips open. Wire alarm contact to terminal blocks for Owner use as shown on the PLANS.

2. Auxiliary switch equipped with one normally open contact and one normally closed contact to provide remote ON or OFF indication. The auxiliary switch shall activate when the circuit breaker trips open. Wire both contacts to terminal blocks for Owner use as shown on the PLANS.
3. Electric motor operator designed to open, close and reset the circuit breaker by remote control. The electric motor operator shall have the following minimum features:
 - a. Compatible with Siemens Type ND breaker frame
 - b. Operating Voltage: 120 VAC
 - c. Operating Current:
 - 1) 13.2 Amperes Running
 - 2) 30.2 Amperes In-Rush
 - d. Operating Time:
 - 1) On: 240 msec.
 - 2) Off: 210 msec.
 - e. Manufacturer: Electric motor operator shall be Telemand[®] Motor Operator catalog number EMOPL120MN as manufactured by Siemens, or approved equal.
- E. The 120VAC source for each MAIN and TIE circuit breaker shall be supplied from a dedicated control power transformer internal to the MCC assembly and connected to the line side of the circuit breaker terminals. The control power transformer(s) shall be provided with fused primary windings and fused secondary windings as specified hereinafter. The Manufacturer shall size the control power transformer, fuses and related interconnect wiring.
- F. Provide each circuit breaker with the components required to comply with the Main and Tie Circuit Breaker Control Wiring Schematics shown on the PLANS.
- G. Terminations: Breakers shall have removable lugs, U.L. listed for copper and aluminum conductors and U.L. listed for installation of mechanical screw type lugs.
 1. Lugs shall be able to accept the quantity of parallel conductors per phase and the size conductor shown on the PLANS. Refer to the PLANS.

2.04 BRANCH FEEDER CIRCUIT BREAKERS

- A. Provide thermal magnetic molded case circuit breakers with the following minimum requirements:
 1. U.L. listed minimum RMS symmetrical short circuit current rating equal to or greater than that of the main bus.
 2. Circuit breaker shall be three pole, 600 volt with a maximum continuous current carrying capacity shown on the PLANS.
 3. Breakers shall operate continuously when operating/running current is equal to 80% of the long time trip setting (or frame rating, as applicable) of the breakers.
 4. Breakers shall have an overcenter, toggle handle-operated, trip free mechanism with quick make, quick break action independent of the speed of the toggle handle operation. The design shall provide common tripping of all poles. Breakers shall be suitable for reverse feeding.
 5. Provide complete with rating plug and other accessories as required for proper operation of circuit breaker.

6. Provide mechanical padlock attachment for each circuit breaker.
 7. Furnish lugs for feeders where required to facilitate field wiring termination, sizes shall be as required by the PLANS.
 8. All circuit breakers shall be unit mounted
- B. Provide where specifically shown on the PLANS:
1. Current limiting circuit breaker.
 2. Electronic trip attachment. Trip unit shall be solid state type with field adjustable long time, short time, ground fault and pick up settings. Where available from the manufacturer, coat all printed circuit assemblies with a UL 746 recognized conformal coating.
 3. Auxiliary contacts rated for 120 volts A.C. Contacts shall satisfy the requirements of the PLANS.

2.05 COMBINATION UNITS

- A. Each combination motor controller and feeder unit shall have the following characteristics:
1. Molded case circuit breakers for branch circuit protection. Circuit breakers shall have the following characteristics:
 - a. U.L. listed minimum RMS symmetrical short circuit current rating equal to or greater than that of the main bus.
 - b. Three pole, 600 volt, type and maximum continuous current carrying capacity as shown on the PLANS.
 2. Starters shall have the following characteristics:
 - a. Starters shall be magnetic type, NEMA rated, with 120 volts A.C. operating coils. International type starters (IEC rated), will not be accepted, even if the starters were to show equivalent NEMA ratings.
 - b. Size and configuration (full voltage non-reversing, full voltage reversing, reduced voltage solid state, etc.) as shown on the PLANS.
 - c. Provide each starter coil with the manufacturer's standard transient voltage surge suppression module.
 - d. Provide auxiliary contacts as required by the PLANS. Contacts shall be rated for 120 volts A.C and shall satisfy the requirements of the PLANS. Provide each starter with one (1) normally open auxiliary contact wired to terminal blocks over the number of contacts required by the PLANS.
 3. Provide Overload relays where required by the PLANS. Overload relays shall have the following characteristics:
 - a. Standard class 20, ambient compensated,
 - b. Manually reset by push-button located on front of the compartment door.
 - c. Provide with auxiliary contact rated for 120 volts A.C. Contact shall satisfy the requirements of the PLANS.
 - d. The overload relay heaters will be selected by the Contractor after delivery of the MCC. Include all necessary delivery, packaging, and administrative costs associated with the delivery of overload heaters.
 4. Control Power Transformer. The transformer shall have the following characteristics:
 - a. Adequately sized to serve all loads shown on the PLANS. Minimum size shall be as follows unless noted otherwise on the PLANS:
 - 1) NEMA Size 4 and larger starters: 750 VA
 - 2) All other starters, 200VA

- b. Connect as shown on the PLANS.
5. Provide one single pole fuse block with fuse for each motor space heater.
6. Where required by the PLANS, provide three phase power factor correction capacitor (PFCC) banks. Furnish and install additional requirements as follows:
 - a. Manufacturer's standard overload protection for PFCC banks.
 - b. Each PFCC bank is dedicated to correct the power factor of a specific pumping unit. The kVAR size/rating shown on the PLANS is a minimum requirement for bidding purposes. The manufacturer shall properly select the kVAR size/rating of the capacitor bank based upon the actual motor load data to ensure an improved operating power factor of greater than or equal to 95 percent (lagging) when the associated distribution pump motor load is in full operating condition. The PFCC banks shall be 480 volt rated PFCC banks.
 - c. Connect as shown on the PLANS.
 - d. Provide for auxiliary contacts as required by the PLANS. Contacts shall be rated for 120 volts A.C and shall satisfy the requirements of the PLANS.
7. Provide additional requirements as shown on the PLANS.

2.06 MISCELLANEOUS ACCESSORIES

- A. Pilot Lights:
 1. Type: Transformer Type Light Emitting Diode (LED),
 2. Style: Push-to-test
 3. Lens Color: Furnish and install the colors as shown on the PLANS.
 4. Rating: NEMA 4/13, oil tight and water tight, Heavy Duty
 5. Size: NEMA Style full size 30-millimeter (30mm),
 6. Contacts: 10 ampere minimum at 120 volts A.C. Provide number of contacts to satisfy the requirements of the PLANS.
 7. Legend Plate: Furnish and install per manufacturer's standard with inscription as shown on the PLANS.
 8. Manufacturer: Allen Bradley Bulletin 800T, or approved equal.
- B. Control relays shall have the following characteristics:
 1. 600 volts, standard NEMA Size, AC Heavy-Duty industrial type with 120 volt AC coils.
 2. Minimum contact rating of 10A, continuous, at 120 volts AC.
 3. Furnish each relay with one additional Normally Open (N.O.) and one additional Normally Closed (N.C.) contacts over the number required by the PLANS.
 4. Provide each relay with Relay Manufacturer's Transient Suppression Module.
 5. Relays shall be "Allen Bradley Bulletin 700", Type-700P, or approved equal relays of the MCC manufacturer.
- C. Timing Relays shall have the following characteristics:
 1. Solid state, multi-time, and multi-function type relay
 2. Both timing ranges and timing modes shall be field selectable. Each relay shall be capable of the following timing modes:
 - a. On Delay
 - b. Off Delay

- c. One Shot
 - d. Repeat Cycle
 - e. Interval
 - 3. Minimum relay contact rating shall be 10 amps, continuous, at 120 VAC.
 - 4. Timing relays shall be Square D Class 9050 model No. JCK70 complete with Type NR61 Socket, or approved equal.
- D. Elapsed Time Meters shall be the non-resettable type, and shall have cyclometric type reading at least to 9999.9 hours and at least to the nearest one-tenth of an hour. Elapsed time meters shall be as manufactured by Eagle Signal/Danaher Controls series HK410. Mount to the front of the MCC.
- E. MCC Space Heater Control Power Transformer for the MCC, where required by the PLANS, shall have the following characteristics:
- 1. Minimum size as shown on the PLANS. Adjust size as needed to serve the space heater loads.
 - 2. 120 volt AC grounded secondary
 - 3. Connect as shown on the PLANS.
 - 4. The space heater of each vertical section of the MCC shall be individually protected with a fuse mounted in the control power transformer compartment.
 - 5. The space heater circuitry shall be thermostatically controlled by centrally located thermostat(s). Provide the quantity of thermostats necessary to serve the load of the space heater circuitry.
- F. Provide control power transformer, fuses, power supplies, etc., and associated interconnect wiring as required to provide functional control power service to the circuit breaker trip circuitry for proper operation of circuitry, per manufacturer's standard.
- G. Provide key interlocks where required by the PLANS.

PART 3 EXECUTION

3.01 FACTORY INSPECTION AND TEST

- A. Standard factory tests shall be performed on the equipment specified in this section. All tests shall be in accordance with the latest version of ANSI and NEMA standards. The manufacturer shall provide certified copies of factory test reports prior to shipment of the equipment to the project site. Format and quantities of the test report shall be in accordance to Section 01300 and Section 01730 of the Contract Specifications.

3.02 FIELD INSTALLATION (BY CONTRACTOR)

- A. Perform Motor Control Center modifications in accordance with manufacturer's written guidelines, the NEC, and local codes.
- B. Refinish all painted steel work that was damaged during Motor Control Center modification activities. Finish shall match the existing Motor Control Center.

- C. Install all required safety labels.
- D. Perform manufacturer's field services as previously specified.
- E. Size, furnish and install the overload relay heaters based on actual motor nameplate current. Set overload relay settings at maximum values permitted by the NEC 430-32.
- F. Size, furnish and install the motor space heater fuses based on actual motor space heater load current.

3.03 FIELD TEST AND CHECKS

- A. Verify proper rotation of all motor loads
- B. Verify motor space heater circuits are operational..
- C. The following minimum test and checks shall be made before energizing the MCCs. These tests shall be performed by a Factory Trained Field Technician (non sales type):
 - 1. Thoroughly inspect the MCC.
 - 2. Test for proper phasing of power connections.
 - 3. Set, adjust, and test all protective relays based on the results of the coordination study, refer to sub-section 1.08, this Section of the Specifications.
 - 4. Megger terminals and buses for grounds, test per manufacturer's recommendations.
 - 5. Verify MCC enclosure space heater circuits are operational.
 - 6. Test key interlock system functionality
- D. Submit documentation of all tests outlined above.
- E. Submit manufacturer's certification report per sub-section 1.08, this Section of the Specifications.

3.04 EQUIPMENT PROTECTION AND RESTORATION

- A. Clean and vacuum all interior of the equipment.
- B. Touch-up and restore damaged surfaces to factory finish.
- C. Energize the space heaters within the MCC and energize during storage and installation for humidity control.

END OF SECTION

**RACEWAYS, FITTINGS AND SUPPORTS
SECTION 16150**

PART 1 GENERAL**1.01 SUMMARY**

- A. This section specifies raceways, fittings, and supports for all cables, conductors and electrical equipment. The Contractor shall furnish and install complete raceway systems in accordance with the following specifications and as also shown on the PLANS.
- B. Refer to the conduit/wire schedule shown on the PLANS for a listing of proposed raceways and other requirements. The conduit/wire schedule shown on the PLANS is not inclusive of all equipment required by this Contract. Refer to Part 2 of this section for additional requirements.

1.02 RELATED REQUIREMENTS

- A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
- B. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors. Suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
- C. Related work as called for on the PLANS, as specified herein or in other Sections of the Specifications.

1.03 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The Publications are references in the text by designation only.
- B. This section contains references to codes and standards. They are a part of this section as specified. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail. All raceways, fittings and supports are to be U.L. listed and certified and shall conform to ANSI and NEMA standards.

1.04 SUBMITTALS

- A. The Contractor shall submit manufacturer's catalog data for all material provided under this section and in accordance with the requirements of Section 01300 and 01730 of the Specifications. The Contractor shall submit certified notification from the Manufacturer that the rigid aluminum conduit system and all related materials, as described within this specification, is 99.0 percent copper-free.
 - 1. Submit certifications of training associated with proper installation the PVC coated rigid galvanized conduit and Fiberglass conduit.
 - 2. Submit Material Safety Data sheets for all sealants, solvents, etc.

PART 2 PRODUCT**2.01 EXPOSED CONDUIT SYSTEM INDOOR, AND EXPOSED-OUTDOOR ABOVE GROUND LEVEL**

- A. General: All components shall be 99.0 percent copper free rigid aluminum, unless otherwise noted.
- B. Rigid Metal Conduit System
1. Conduit run above ground shall be rigid aluminum in all areas except for INDOOR above ground conduit runs inside the CHLORINE SUPPLY ROOM and the CHLORINE FEED ROOM located in the existing CHLORINE STORAGE BUILDING, unless specifically specified otherwise hereinafter in subsection 3.02, this Section of the Specifications.
 2. Rigid Aluminum Conduit shall meet the following requirements
 - a. U.L. listed
 - b. Comply with ANSI C80.5 and U.L.6.
 3. Bending Requirements: Furnish factory bends. 90-degree bends of conduit sizes equal to or greater than 4-inches in diameter shall have a minimum bending radius of 48-inches unless otherwise noted on the PLANS. 90-degree factory bends of conduit sizes less than 4-inches in diameter, shall be per manufacturers standard unless otherwise noted on the PLANS.
 4. Minimum conduit size for all work shall be 3/4 inches.
 5. Manufacturer: VAW of America Inc., or approved equal.
- C. Rigid Nonmetallic Conduit System (PVC)
1. Conduit run above ground inside the CHLORINE SUPPLY ROOM and the CHLORINE FEED ROOM located in the existing CHLORINE STORAGE BUILDING shall be rigid nonmetallic PVC.
 2. Rigid Nonmetallic PVC Conduit System shall meet the following requirements:
 - a. Schedule 80 PVC, heavy wall
 - b. U.L. rated, No. 651, conforming to NEMA standard TC-2-75 and listed in conformity with Article 352 of the latest edition of the National Electrical Code (NEC).
 - c. All 11-1/4°, 22-1/2°, 30°, 45°, and 90° conduit bends shall be factory made bends.
 - d. Furnish factory long radius of curvature bends for changes in direction for all conduits of trade sizes equal to or greater than 4-inches in diameter. Additionally, 90-degree factory bends of conduit sizes equal to or greater than 4-inches in diameter, shall have a minimum bending radius of 48-inches.
 - e. Minimum conduit size for all work shall be 3/4 inches
 - f. Manufacturer: "Carlon", or approved equal.
 3. Solvent weld: Shall be a type approved by the conduit manufacturer.
- D. Conduit Hubs:
1. Provide grounding type with integral threaded insulated throat, and with solderless grounding lugs, complete with rubber gasket.
 2. Manufacturer: by "Myers", or approved equal.
- E. Grounding Bushings:

1. Provide with integral threaded insulated throat, and with solderless grounding lugs
 2. Manufacturer: "O.Z. Gedney" type ABLG with specified options, or approved equal.
- F. Conduit Bodies
1. Conduit body covers shall be of the bolt-on type and shall have Type 316-Stainless Steel screws/hardware.
 2. Manufacturer: "Crouse-Hinds" Form-7, or approved equal..
- G. Conduit Unions: Threaded, as manufactured by "Crouse-Hinds" type UNF or UNY, or approved equal
- H. Conduit Reducers:
1. Threaded.
 2. Shall be used for final conduit system connection to equipment where shown on the PLANS
 3. Manufacturer: "Crouse-Hinds" type RE and type REA, or approved equal.
- I. Cord and Cable Fittings:
1. Provide threaded gland nut, straight threaded body, and also a neoprene sealing cable bushing.
 2. Furnished with a Type 316 Stainless Steel wire mesh grip
 3. Shall be used only where specifically shown on the PLANS.
 4. Manufacturer: "Crouse-Hinds" type CGB, complete with all specified accessories, or approved equal.
- J. Expansion Fittings:
1. Furnished with oversized sleeve and insulated bushing
 2. Furnished with tinned copper braided bonding jumper
 3. Manufacturer: O.Z./Gedney Type EXPB-A, or approved equal
- K. Sealing Fittings:
1. Furnish with drain
 2. Manufacturer: Crouse Hinds, Type EYD, or approved equal
 3. Sealing Compound:
 - a. Where conduit seals are installed in compliance with NEC Class-I and Class-II requirements, the sealing compound shall be as manufactured by "Crouse-Hinds" type Chico-AP, or approved equal.
 - b. Where conduit seals are not required for NEC Class-I and Class-II installations but are shown to be installed on the PLANS to block the migration of corrosive gases into the conduit system and conduit bodies, the conduit seals Sealing Compound shall be Scotchcast Reenterable Electrical Insulating Resin 2123 as manufactured by "3M", or approved equal.
 - c. Coordinate application with the Owner.
 - d. For vertical seals use mineral wool packing material to form a dam in the annular space around the conductors and hold the sealing compound in place while it cures. Packing material shall be as manufactured by "Crouse-Hinds" type Chico-X, or approved equal.
- L. Miscellaneous Requirements:
1. Conduit nipples shall have two independent sets of threads.

2.02 UNDERGROUND CONDUIT IN DUCT BANK SYSTEM

- A. General:
1. Type: All components shall be non-metallic, except where noted herein and specifically shown otherwise on the PLANS. Refer to the PLANS.
 2. Bending Requirements: Furnish factory bends. 90-degree factory bends of conduit sizes equal to or greater than 4-inches in diameter shall have a minimum bending radius of 48-inches. Also, all 90-degree, 45-degree, and 30-degree conduit bends shall be factory made bends.
 3. Minimum conduit size for all work shall be 1 inch.
- B. Rigid Nonmetallic Conduit System
1. All components shall be schedule 40 PVC, heavy wall, U.L. rated, No. 651, conforming to NEMA standard TC-2-75 and listed in conformity with Article 352 of the latest edition of the National Electrical Code (NEC).
 2. Solvent weld: Shall be a type approved by the conduit manufacturer.
 3. Manufacturer: Conduit shall be as manufactured by "Prime Conduit", or approved equal.
- C. PVC Coated Rigid Galvanized Steel Conduit System
1. Material: Steel per UL 6 and ANSI C80.1, hot-dipped galvanized inside and out after the threads are cut.
 2. Exterior Coatings:
 - a. After galvanizing, the conduit/fittings shall be uniformly and consistently coated with a gray PVC coating of minimal 40 mil thickness. Exception: The threads shall be coated with urethane in lieu of PVC.
 - b. The PVC coating adhesion performance shall be ETL verified to the Intertek ETL SEMKO, High Temperature H₂O PVC Coating Adhesion, Test Procedure for 200 hours.
 3. Interior Coating:
 - a. After galvanizing, the interior of conduit and fittings shall be uniformly and consistently coated with a urethane coating of nominal 2 mil thickness.
 4. Accessories: Threads shall be furnished with plastic thread protector caps.
 5. Manufacturer: Robroy Industries, Perma-Cote, Plasti-Bond REDH₂OT, or approved equal.
- D. Reinforced Thermosetting Resin Conduit (RTRC) Conduit System
1. General:
 - a. May be used only where specifically permitted by subsection 3.02.C.8, this Section of the Specifications.
 - b. Shall comply with NEC Article 355.
 2. Material:
 - a. Fiberglass, Reinforced Thermosetting Resin Conduit. Resin system shall be epoxy based, with no fillers, using an anhydride curing agent. The fiberglass shall consist of continuous E-glass Grade "A" roving. Conduit shall be low-halogen per UL 2515.
 - b. Manufactured using the single circuit filament winding process. Oven cured. Nominal winding angle of 54.75 degrees.
 - c. Carbon black shall be used as ultra violet inhibitor.
 - d. Internal walls shall be smooth with all fibers embedded in epoxy.

3. Certifications: NEMA TC14, UL 2420 and 2515.
4. Suitable for installation exposed outdoors and encased in concrete
5. Fittings:
 - a. The following fittings shall be provided. Example part numbers shown hereinafter apply to the raceway system manufacturer specified hereinafter. All part numbers required for this project are not shown. Contractor to coordinate necessary part numbers with the manufacturer for a complete installation.
 - b. 90 degree bends with factory installed 2 deep socket PVC coupling and 1 fiberglass coupling bonded to elbow:
 - 1) For conduit sized 1" – 1 ½", provide type IPS. Example part number for 1": 10C-XW-90-2DF
 - 2) For conduit sized 2" – 6", use type ID. Example part number for 2": 20D-XW-90-2DF
 - c. Sleeve couplings:
 - 1) For conduit sized 1" – 1 ½", use type IPS. Example part number for 1": 10C-XW-42
 - 2) For conduit sized 2" – 6", use type ID. Example part number for 2": 20D-XW-42
 - d. Female Terminal Adapters:
 - 1) For conduit sized 1" – 1 ½", use type IPS. Example part number for 1": 10C-XW-32
 - 2) For conduit sized 2" – 6", use type ID. Example part number for 2": 20D-XW-32
 - e. Straight Socket Conduit:
 - 1) For conduit sized 1" – 1 ½", use type IPS. Example part number for 1": 10C-XW-10S
 - 2) For conduit sized 2" – 6", use type ID. Example part number for 2": 20D-XW-20-S
6. Mix Epoxy Adhesive:
 - a. For ambient temperatures 40 - 70 degree F, provide type CM-2040-SFG
 - b. For ambient temperatures 70 degree F and above, provide type CM-2070-SFG.
7. Mix Epoxy Adhesive Mixing Tip and Gun:
 - a. Mixing Tip: CM-MT
 - b. Mixing Gun: CM-AG
8. Accessories: Provide with adhesive couplings, spigots, adapters, and other adhesive fittings as required to connect to the other specified raceways as shown on the PLANS.
9. Manufacturer: Champion Fiberglass "Haz Duct XW".

2.03 LIQUID TIGHT FLEXIBLE CONDUIT

- A. Sizes: - Greater than or equal to ¾ inch and smaller than or equal to 2 inch Flexible Conduit:
 1. Conduit Type: Non-metallic type liquid tight conduit, formed from PVC plastic
 2. Conduit Installation Temperature Range: –20 degrees Celsius to + 60 degrees Celsius (suitable for use outdoors and indoors)
 3. Conduit Manufacturer: ELECTRI-FLEX series NM type B-PVC, or approved equal.
 4. Fittings Type: Non-metallic PVC fittings
 5. Fittings Manufacturer: CARFLEX, or approved equal.

- B. Sizes:- Greater than 2 inch Flexible Conduit:
 - 1. Conduit Type: PVC-COATED metallic liquid tight conduit, formed from PVC plastic
 - 2. Conduit Temperature Range: -20 degrees Celsius to + 60 degrees Celsius (suitable for use outdoors and indoors)
 - 3. Conduit Manufacturer: SEALTITE, or approved equal.
 - 4. Fittings Type: 99.0 percent Copper-Free-Aluminum
 - 5. Fittings Manufacturer: Appleton, Crouse-Hinds, or approved equal.
- C. Minimum liquid-tight flexible conduit size for all work shall be ¾-inch unless specifically noted otherwise on the PLANS. Exception: ½” non-metallic conduit may be used for the final conduit connection to device with ½” threaded opening with prior Owner approval.

2.04 MISCELLANEOUS

- A. Polyurethane foam duct sealant: FST-250 and FST-MINI Duct Sealant as manufactured by “Polywater”, or approved equal
- B. Pipe Tape: 20 mil, 3M company No.51, or approved equal
- C. Conduit Sleeves
 - 1. Conduit sleeves shall be schedule 80 PVC, heavy wall, U.L. rated, No. 651, conforming to NEMA standard TC-2-75 and listed in conformity with Article 352 of the National Electrical Code (NEC).
- D. Conduit Hole Seals
 - 1. Hole seals shall be stainless steel, U.L. listed as NEMA 4X oil-tight, complete with oil-resistant gasketing, backplate, stud and wing nut. Hole seals shall be manufactured by Hoffman, Rittal, Cooper B-Line, or approved equal.

2.05 ELECTRICAL EQUIPMENT AND RACEWAY SYSTEM SUPPORT CHANNELS

- A. In all areas except for inside the CHLORINE SUPPLY ROOM and the CHLORINE FEED ROOM located in the existing CHLORINE STORAGE BUILDING:
 - 1. Channels shall be as follows:
 - a. Type: Type 316-Stainless Steel
 - b. Manufacturer: “Unistrut Corporation” series P-1000ST and P-1001ST, or approved equal.
 - 2. All fastening hardware, fittings, supports, post bases, conduit clamps, beam clamps channel nuts, threaded rod, framing system, etc. shall be as follows:
 - a. Type 316 stainless steel
 - b. Manufacturer: “Unistrut Corporation”, or approved equal.
 - c. Additionally, the following designations correspond to the following “Unistrut Corporation” series numbers as used in the details shown on the PLANS:
 - 1) Items located in all areas:
 - a) Beam clamps: “Unistrut Corporation” series P-2785ST and P-2786ST, or approved equal.
 - b) Swivel fittings: “Unistrut Corporation” series M-2137ST, or approved equal.
 - c) Post bases: “Unistrut Corporation” series P-2072AST and series P-2073AST, or approved equal.

- d) Hanger clevis fittings: "Unistrut Corporation" series P-2682ST, or approved equal.
- B. Inside the CHLORINE SUPPLY ROOM and the CHLORINE FEED ROOM located in the existing CHLORINE STORAGE BUILDING:
 - 1. Channels shall be as follows:
 - a. Type: Fiberglass Material with Vinyl Ester Resin
 - b. Manufacturer: "Unistrut Corporation" series F-1001VE, or approved equal.
 - 2. All fastening hardware, fittings, supports, post bases, conduit clamps, beam clamps channel nuts, threaded rod, framing system, etc. shall be as follows:
 - a. Type: Fiberglass
 - b. Manufacturer: "Unistrut Corporation", or approved equal.
- C. Expansion anchors shall be installed per the manufacturer's recommendations and shall be as follows:
 - 1. Anchors located in all areas:
 - a. Type 316-Stainless Steel.
 - 2. Also refer to the PLANS.

PART 3 EXECUTION

3.01 GENERAL

- A. Install electrical equipment and conduit raceway system in accordance with the recommendations of the manufacturer, the requirements of the latest edition of the National Electrical Code, and the PLANS. All cables/wiring shall be installed in a raceway system.
- B. Contractor shall be trained and certified by the PVC coated rigid galvanized steel conduit manufacturer in the proper installation of the PVC coated rigid galvanized conduit.
- C. Contractor shall be trained and certified by the Fiberglass conduit manufacturer in the proper installation of the Fiberglass conduit.

3.02 CONDUIT SYSTEM

- A. General:
 - 1. Run conduits continuous from outlet to outlet, from outlets to cabinets, pull or junction boxes, etc.
 - 2. Install all conduits as a complete system before wiring is pulled in. Conduits shall be reamed, thoroughly cleaned of debris, and swabbed immediately before wire is pulled.
 - 3. Furnish and install expansion fitting for each conduit across structural expansion joints. Coordinate locations of expansion joints with the PLANS. Additionally, furnish and install additional appropriate fittings such as conduit unions, adapters, etc. as required for a complete installation.
 - 4. Conduit shall contain no more than the equivalent of three (3) 90-degree bends between outlets or pull points.
 - 5. Maintain a minimum 6-inch clearance between conduit and piping and a minimum 12-inch clearance between conduit and heat sources.

6. Protect all coated conduit from accidental coating damage during storage and installation. Repair all damaged conduits in accordance with manufacturer's recommendations at no additional cost to the OWNER.
 7. Furnish and install temporary conduit closures during construction activities to prevent foreign matter from entering raceways.
 8. Furnish and install conduit measuring tape in each empty spare conduit as manufactured by Ideal Industries Incorporated or approved equal.
- B. Exposed Conduit System Indoor, and Exposed-Outdoor Above Ground Level:
1. Rigid conduit joints shall be cut square, threaded, reamed smooth and drawn up tight. Make field bends or offsets with an approved bender or hickey or hub type conduit fittings.
 2. Run conduit parallel or at right angles to building lines and such to avoid moisture traps.
 3. Arrange conduits to maintain headroom and present a neat appearance.
 4. Support conduit using support channels as shown on the PLANS and as specified herein.
 5. Coat all conduit threads with Penetrox or Noalox prior to assembly.
 6. Secure conduit runs firmly to specified support channels by conduit straps or by hangers, as required, and as shown on the PLANS.
- C. Underground Conduit in Duct Bank System
1. Install all underground conduit in concrete encased and steel reinforced duct banks.
 2. Concrete shall be Class 'A' per Section 403S "Concrete for Structures". A red admixture shall be added to the concrete a rate of 12 pounds per cubic yard of concrete and per the requirements of Section 403S. Red admixture shall meet the requirements of ASTM C-979-82. Red admixture shall be as manufactured by ChemSystems, Inc. series HBS #120 Conduit Red, or approved equal. Also, refer to conduit/duct bank reinforcement and concrete encasement details shown on the PLANS.
 3. Provide a minimum of 3-inches separation between conduits installed in concrete construction except at panelboards, pull or junction boxes and/or other locations where the conduits are grouped. Furnish and install plastic spacers as shown on the PLANS.
 4. Underground system conduits shall be installed with a minimum depth below finished grade of 24" to top of concrete envelope of duct bank and shall slope 3-inches per 100 feet from high points toward pull boxes and handholes/manholes, at minimum. Increase the minimum duct bank depths below finished grade as shown on the PLANS. Additionally, underground duct bank system shall be routed per the PLANS and coordinated with the depths of Civil/Structural foundations, beams, etc. No conduit shall be routed through grade beam slab of a building floor slab.
 5. All underground conduit joints shall be watertight in accordance with the manufacturer's recommendations.
 6. Transition from underground (underground work in duct bank) to above ground conduit as shown on the PLANS.
 7. Where a duct bank penetrates a concrete structure, dowel between the duct bank and the structure at the point of penetration and tie the steel reinforcing rebar system of the underground duct bank system to the concrete structure and steel reinforcing rebar system of the concrete structure. Refer to the Civil/Structural Specifications and PLANS for additional requirements.

8. Where PVC coated rigid galvanized steel conduit is shown on the PLANS, Contractor may employ RTRC conduit in lieu of the PVC coated rigid galvanized steel conduit.
 9. Where factory bends/elbows (11-1/4°, 22-1/2°, 30°, 45°, and 90°), as specified in Part 2.2 A 2 of this Specification, are not manufactured and field bends become necessary, field bends may be performed using a heat box type electric PVC conduit heater. The use of open flame to heat the PVC conduit is NOT permitted. Utilize a PVC conduit plug set to plug the ends of the conduit throughout the heating process and trap the air inside the conduit to help keep the PVC conduit from collapsing while forming the bend.
- D. Conduit Penetrations:
1. Install sleeves for conduit penetrations of walls and floors unless shown otherwise on the PLANS. Install sleeves during erection of concrete and masonry walls. Exception: Sleeves are not required for conduits stub-ups through floor slab from underground duct bank.
 2. Where aluminum conduit penetrates a wall/floor-slab and/or walls/floors of dissimilar material (other than Stainless Steel) or is in contact with dissimilar material, wrap the aluminum conduit with Pipe Tape using a 50 percent overlap throughout the entire distance/length of the penetration and an additional 6-inches of distance beyond either side of the penetration/contacted region.
 3. Install pitch pans on conduits which penetrate through roofs.
 4. Also refer to the conduit penetration details shown on the PLANS.
- E. Miscellaneous:
1. Seal empty spare conduits (at above ground stub-ups) with an aluminum screw in plug sized to the trade size of the conduits.
 2. Seal and pack/fill ends of each conduit with polyurethane foam duct sealant.
 3. In all sealing fittings, utilize sealing compound to seal around and between each conductor and associated sealing fitting body.
- F. Requirements for cables inside of Manholes, Handholes, etc.:
1. Arrange cables so that there is a minimum of crossing. Provide slack in each cable.
 2. Secure cables in handholes/manholes on support channel system as specified herein and as shown on the PLANS.
- G. Connections to Equipment:
1. Liquid tight flexible conduit shall be used for connections to motors, field instruments, etc., and any equipment subject to vibration, and where shown on the PLANS. Length of conduit shall not exceed 36-inches, unless specifically noted otherwise on the PLANS or approved by the Owner.

3.03 INSTALLATION OF SUPPORT CHANNELS

- A. Utilize support channels and mounting hardware as previously specified to install raceways, and any other surface mounted electrical, instrumentation and control equipment. Refer to details shown on the PLANS. Use 316 stainless steel split ring lock washers with mounting hardware when installing support channels.

3.04 HOUSEKEEPING CONCRETE PAD FOR EQUIPMENT

- A. Provide housekeeping concrete pad for all outdoor equipment whether it is free-standing or surface mounted. All housekeeping pad edges shall be chamfered. Outdoor electrical equipment pads shall be as detailed on the PLANS.
- B. Provide housekeeping concrete pad for indoor all free-standing equipment. Indoor electrical equipment pads shall be as detailed on the PLANS.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish and install the field wiring as specified herein and as shown on the PLANS.
- B. Furnish and install all wiring required to make the electrical system completely and satisfactorily operable. Comply with the National Electrical Code and all applicable federal, state, and local codes, regulations and ordinances.

1.02 RELATED REQUIREMENTS

- A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
- B. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
- C. The PLANS designate the type, number, and size of field wiring.
- D. Related work as called for on the PLANS, as specified herein or in other Sections of the Specifications.

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with Section 01300 of the Contract Specifications.
- B. Submit Operations and Maintenance Manuals (O&M) in accordance with Section 01730 of the Contract Specifications. O&M Manuals shall include copies of the approved shop drawings, factory and on-site/field test data.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. All wire and cable on this project shall be new, unused, in good condition and shall be delivered in standard coils, packages or reels. Submit wire samples when requested by the OWNER. Final acceptance of wire shall be made by the OWNER or its representative.

2.02 SINGLE CONDUCTOR - GENERAL ELECTRICAL POWER SYSTEM AND AUXILIARY ELECTRICAL SYSTEM WIRING

- A. All wire shall be 98% conductivity copper, stranded, single conductor Type XHHW-2. This wire shall have moisture resistant insulation and clean stripping

characteristics. Wire shall be marked at minimum distance of every ten feet (10') with the size, type and voltage of the wires as well as the manufacturer's name and measurement markers. All neutral and ground wires shall be insulated and identified and marked.

B. The pigmentation of the wire insulation shall conform to the color table listed below:

Phase	277/480 Volts	120/208 Volts AC	24 Volts DC
ΦA	Brown	Red	-----
ΦB	Yellow	Black	-----
ΦC	Purple	Blue	-----
Neutral	Gray	White	-----
Ground	Green	Green	Green
Motor Space Heater (H)	-----	Black	-----
DC (+)	-----	-----	Blue
DC (-)	-----	-----	Brown

- C. Any interlock wiring installed in one device with power from another device shall be properly marked.
- D. The minimum wire size shall be No.10 for all wiring unless shown otherwise on the PLANS.
- E. Departures from the sizes shown shall be made only in those cases in which the National Electric Code requires the use of larger conductors.
- F. General Electrical Power System and Auxiliary Electrical System Wiring shall be as manufactured by General Cable Company, The Okonite Company, or approved equal.

2.03 SIGNAL WIRING

- A. 4-20 Milliamp Signal wiring:
 - 1. Number of Pairs: One
 - 2. Wire Size: #16 AWG
 - 3. Type of Conductors: Stranded copper conductors, twisted
 - 4. Individual Conductor Insulation: PVC
 - 5. Individual Conductor Insulation Color: Positive (+) is Black, Negative (-) is White.
 - 6. Drain Wire: Tinned copper
 - 7. Overall Shield: Aluminum-mylar shield.
 - 8. Overall Jacket: PVC
 - 9. Overall Jacket Color: Black.
 - 10. Manufacturer: Samuel Moore and Company, Dekoron Division, Cat. No. 1852 or approved equal.
- B. Multi-Conductor RTD Temperature Signal Wiring:

1. Number of Triads: One
2. Wire Size: #16 AWG
3. Type of Conductors: Stranded copper conductors, twisted
4. Individual Conductor Insulation: PVC
5. Individual Conductor Insulation Color: Positive (+) is Black, Negative (-) is White, Sense (S) is Red.
6. Drain Wire: Tinned copper
7. Overall Shield: Aluminum-mylar shield.
8. Overall Jacket: PVC
9. Overall Jacket Color: Black.
10. Manufacturer: Samuel Moore and Company, Dekoron Division, Cat. No. 1862 or approved equal.

2.04 SINGLE CONDUCTOR CONTROL WIRING

- A. Single conductor control wiring shall be 98% conductivity copper, stranded, single conductor Type XHHW-2. This wire shall have moisture resistant insulation and clean stripping characteristics. Wire shall be marked at minimum distance of every ten feet (10') with the size, type and voltage of the wires as well as the manufacturer's name and measurement markers.
- B. Conductors shall have a minimum size of #14 AWG, unless shown otherwise on the PLANS. The color of the wire shall be RED.
- C. Single Conductor Control Wiring shall be as manufactured by General Cable Company, The Okonite Company, or approved equal.

2.05 WIRE TAGGING

- A. Wire Tags:
 1. Rating: Flame-Retardant,
 2. Style: Heavy-Duty Industrial Grade
 3. Type: Heat Shrinkable type.
 4. Character Height: 1/8 inch.
 5. Maximum Length: 2 inches.
 6. Text Type: Typed with indelible marking process. Handwritten shall not be accepted.
 7. Color: White.
 - a. Exception: Use Yellow for instrumentation/control circuits as described in Section 17200.
 8. Manufacturer: "Raychem type Heavy-Duty Industrial Grade ShrinkMark Heat-Shrinkable Marking Sleeves", or approved equal. Utilize "Raychem" Portable-Marking-System" complete with wire tag cartridges, or approved equal.

2.06 MISCELLANEOUS

- A. Wire Pulling Lubricant: Ideal ClearGlide, or approved equal
- B. Vertical cable supports (in conduit): O.Z. Gedney Type "S", or approved equal.
- C. Multi-Cable Connector Blocks:

1. Use only for power wiring termination for motors rated 600V and below
 2. 600V rated
 3. Insulated with UV rated chemical resistant plastisol compound that will not support combustion
 4. Suitable for use with fine stranded extra-flexible wiring
 5. Suitable for use with aluminum and copper conductors
 6. U. L. 486A Listed
 7. Pre-filled with an oxide inhibitor.
 8. Manufacturer: "Polaris Connectors" Series Polaris Grey, or approved equal.
- D. Submersible Splice Connectors
1. Use only where indicated on the PLANS for submersible applications of 600V and below power and control wiring terminations.
 2. 600V rated
 3. Manufactured from high strength 6061-T6 aluminum alloy
 4. Encapsulated in rubber with a nominal thickness of 125 mils. And high dielectric strength.
 5. Suitable for use with aluminum and copper conductors
 6. U.L. 486D Listed
 7. Manufacturer: "Polaris Connectors" Series ISPBS Submersible Splice Connectors and Series ISPB2/0 and ISPBO2/0 Submersible Streetlight Connectors, or approved equal.
- E. Corrosion Resistant and Moisture Repelling Electrical Coating/Spray:
1. Color: Clear. Coordinate spray color with the Owner. Furnish and install the color requested by the Owner at No Additional Cost to the Owner.
 2. Type: Corrosion resistant and moisture repellent fast drying spray coating sealant
 3. Manufacturer: "3M" 1601 Clear-Color Fast Drying Sealer and Insulator, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Before wire is pulled into any conduit, thoroughly swab the conduit to remove all foreign material and to permit the wire to be pulled into a clean, dry conduit. Use wire pulling lubricant in pulling any wire. Pull all conductors into their respective conduits by hand except where written permission of the OWNER is secured to the contrary.
- B. Furnish and install the previously specified vertical cable supports in conduit were required by the NEC.
- C. No wire splices shall be accepted except as permitted below:
1. SPLICING OF 208/120 VOLT LIGHTING AND RECEPTACLE CIRCUITING:
 - a. General: Perform all splicing in splice/junction boxes dedicated for this purpose.
 - b. For splices where wiring is:

- 1) #10 AWG and smaller: Utilize 600 volts WeatherProof Wire-Nut Wire Connectors. The WeatherProof Wire-Nut Wire Connectors shall be twist-on type and shall be pre-filled (factory- filled) with Silicone-Based Sealant for maximum protection against Moisture and Corrosion. The WeatherProof Wire-Nut Wire Connectors shall be as manufactured by IDEAL Model 61, 62, or 63 WeatherProof Wire-Nut Wire Connectors, or approved equal.
 - 2) All other sizes: Use the Multi-Cable Connector Blocks as Specified in 2.06.C, this Section of the Specifications.
- D. For wiring termination to motors rated 600 volt and below, use the Multi-Cable Connector Blocks as Specified in 2.06.C, this Section of the Specifications.
- E. All wiring connections must be insulated with 600 volt insulation system
- F. Tagging:
1. Tag all power, Instrumentation and Controls, Fiber Optic Cables, and all other types of auxiliary electrical wiring and cables at both ends with the specified heat shrinkable tags and heat shrink tags.
 2. Tag per Subsection 3.03 of this Section of the Specifications and per the OWNER's cable and wire tagging standards.
 3. Tag each wire in a Multi-Conductor cable in addition to the overall cable itself.
 4. Group wiring routed in pullboxes that are routed in common conduits and tag each wiring group inside each pullbox with nameplates as follows:
 - a. Type: 3-ply, 1/8" thick, rigid thermoset phenolic resin laminated cellulose paper base engraving stock per ASTM D-709, Type I. Nameplates shall be ASTM Grade ES-1, ES-2, or ES-3 as applicable for the face and lettering colors specified hereinafter. Flexible or acrylic tags will be not be accepted.
 - b. Color: White-Black-White.
 - c. Lettering: 1/4 inch height, minimum, engraved through the face layer to the melamine middle layer.
 - d. Accessories: Provide holes for mechanical fastening.
 5. Secure each phenolic tag (where required) with a minimum of two nylon cable ties, one at each end of the tag.
- G. Ground shielded instrument cables at one point only, i.e.; at the final destination in the associated instrument and control cabinets.
- H. Terminate stranded wiring by use of lugs, clamps or pressure type terminals.
- I. After all wiring connections have been made, the Contractor shall apply the Corrosion Resistant and Moisture Repelling Electrical Coating/Spray to all wiring connections. Coordinate application with the Owner prior to application, the Owner has the discretion to limit application. For bidding purposes, the minimum extent of spray application is further clarified as follows:
1. Spray shall be applied for all terminations of the following types of connections at a minimum:
 - a. termination points, terminals, terminal blocks, ground bar, neutral bar/bus,
 - b. lugs of circuit breakers, buses, doors, etc.
 - c. exposed/stripped ends of each conductor, etc.

- d. bolt-on connections, split-bolt connections, ring lugs, etc.
 - e. submersible splice connectors, compression connectors, multi-cable connector blocks, etc.
 - f. all other connection types not listed above
2. Spray shall be applied for all terminations at the following types of equipment at a minimum:
- a. Local and main control panels, field instruments, junction boxes, field control stations, control relays, signal isolators, selector switches, pushbuttons, etc.,
 - b. Panelboards, transformers, motor control centers, manual motor starters, contactors, light switches, light fixtures, etc.
 - c. Motor termination enclosures, valve actuators, cathodic protection system, package control panels of process equipment, etc.
 - d. Security system devices, cameras, roadway gate operators, etc.
 - e. Convenience receptacles, scada receptacles, etc.
 - f. All other types of equipment not listed above.

3.02 TESTS

- A. Perform all tests as outlined in Section 16800 and all other tests which are necessary to determine that the electrical wiring system is in satisfactory operating condition. Wiring shall be tested end-to-end after it is pulled in the conduit system.

3.03 WIRE TAGGING METHODOLOGY

- A. Single Conductor Wire Tagging Scheme:
 - 1. All single conductor control and power wiring shall be tagged utilizing the source and destination method. In general, as minimum each tag shall be comprised of various fields which are:
 - a. Device Identifiers,
 - b. Terminal Numbers and,
 - c. Equipment Identification name
 - 2. The following is the format that shall be used for each control power single conductor wire tag:

XXXX	-	XX	(XXXX-XXXX-XXXX	/	XXXX	-	XX)
Device Identifier		Terminal Number	Equipment Identification Name		Device Identifier		Terminal Number

- a. The tag information to the left refers to the point of termination. Tag information in parenthesis refers to the point of origination. Note: For wiring within the boundaries of a piece of equipment, The Equipment identification name shall not be required, only the Device Identifier and the Terminal Number from the point of origination. Examples to this exception would be, wiring from one terminal strip to another within the same control panel, etc.

3. The following provides a brief description to each of the fields required within a single wire tag:

FIELD	DESCRIPTION
Device Identifier:	A four (4) alphanumeric character field that shall uniquely identify a device within a piece of equipment. Examples are: TB1, for Terminal Block Number 1, and CR02 for Control Relay #02, etc.
Terminal Number:	A two (2) alphanumeric character field that shall identify which specific point on the Device the wire must be terminated to. Refer to manufacturer's labeling or record drawings for Device Terminal Numbers.
Equipment Identification Name:	A twelve (12) alphanumeric character field that shall be the same as the physical Equipment Identification Nameplate attached to the equipment.

B. Single Conductor Wire Tagging Scheme in a Multi-conductor Cable:

1. All single conductor control and instrument wiring (in Multi-conductor Instrument or Control Cables) shall be tagged utilizing the source and destination method. In general, each tag shall be comprised of various fields which are 1) Device Identifiers, 2) Terminal Numbers, and 3) Equipment Identification Name, as minimum.
2. The following is the format that shall be used for each single conductor wire tag in a multi-conductor cable (Instrumentation or Control wiring Cables):

XXXX	-	XX	(XXXX	/	XX)
Device Identifier		Terminal Number	Cable ID		Conductor Number

- a. The tag information to the left refers to the point of termination. Tag information in parenthesis refers to the point of origination.
3. The following provides a brief description to each of the fields required within a single tag (in a Multi-conductor Cable):

FIELD	DESCRIPTION
Device Identifier:	A four (4) alphanumeric character field that shall uniquely identify a device within a piece of equipment. Examples are: TB1, for Terminal Block Number 1, and CR02 for Control Relay #02, etc.
Terminal Number:	A two (2) alphanumeric character field that shall identify which specific point on the Device the wire must be terminated to. Refer to manufacturer's labeling or record drawings for Device Terminal Numbers.
Cable Identification (Cable ID):	A five (5) alphanumeric character field that shall

FIELD	DESCRIPTION
	uniquely identify a cable within the facility. The first character shall identify the cable type as follows: C - for Control Cables I - for Instrumentation Cables P - for Power Cables The remaining four (4) alphanumeric characters shall make-up a unique number for a given cable type within the facility.

C. Overall Cable Tag of a Multi-conductor Cable:

1. In addition to tagging each single conductor in a multi-conductor cable (as described in 3.03 B, above), the overall jacket of each multi-conductor cable shall also be tagged to uniquely identify each cable within the facility. In general, each cable tag shall be comprised of various fields which are 1) Cable Identification (Cable ID), and 2) Equipment Identification Name, as minimum.
2. The following is the format that shall be used for overall cable tag of each multi-conductor cable:

XXXX	(XXXX-XXXX-XXXX	/	XXXX-XXXX-XXXX)
Cable ID	Source Equipment Identification Name.		Destination Equipment Identification Name

- a. The tag information to the left refers to the actual cable Identification (name). Tag information in parenthesis refers to the Identification Name of the Equipment at point of origination (source), followed by the Identification Name of the Equipment at the point of termination (Destination Point).
3. The following provides a brief description to each of the fields required within a cable tag:

FIELD	DESCRIPTION
- Cable Identification (Cable ID):	A five (5) alphanumeric character field that shall uniquely identify a cable within the facility. The first character shall identify the cable type as follows: C - for Control Cables I - for Instrumentation Cables P - for Power Cables The remaining four (4) alphanumeric characters shall make-up a unique number for a given cable type within the facility.
- Source Equipment Identification Name:	A twelve (12) alphanumeric character field that shall be the same as the physical Equipment Identification Nameplate attached to the source (origination) equipment.
- Destination Equipment Identification Name:	A twelve (12) alphanumeric character field that shall be the same as the physical Equipment Identification Nameplate attached to the destination equipment (equipment at point of termination).

4. All cable tags (except in Manholes, handholes, above ground cable closets, and in cable tray system), shall be of 3-ply engraved plastic (phenolic) with background color, letter sizes, etc. as follows:

Cable Type	Tag Color	Color of Lettering	Letter Height
600 volt Power Cable	Orange	White	3/16" (min.)
600 volt Control Cable	Orange	White	3/16" (min.)
Instrumentation Cable	Black	White	3/16" (min.)

END OF SECTION

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PART 1 GENERAL

1.01 SUMMARY

- A. Furnish and install all cabinets, junction boxes, pull boxes and outlet boxes as shown on the PLANS, required by the Specifications or National Electrical Code (NEC), or as otherwise necessary for a satisfactory operating system.

1.02 RELATED REQUIREMENTS

- A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
- B. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
- C. Related work as called for on the PLANS, as specified herein or in other Sections of the Specifications.

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with the Section 01300 of the Specifications.
- B. Submit Operations and Maintenance Manuals (O&M) in accordance with Section 01730 of the Specifications. O&M Manuals shall include copies of the approved shop drawings, factory and on-site/field test data.

PART 2 PRODUCTS

2.01 JUNCTION AND PULL BOXES

- A. Lighting and power, signal, telephone, voice communication, instrumentation and controls, and any other junction and pull boxes hereinafter specified or shown on the PLANS shall be as provided as follows:
 - 1. Outdoor boxes shall be NEMA-4X Type 316-Stainless Steel Boxes. Boxes shall be equipped with hinged doors complete with 1/4 (quarter) turn door latches.
 - 2. Indoor boxes in non-environmentally controlled rooms shall be as follows:
 - a. All areas:
 - 1) Smaller than or equal to 12" wide x 12" high: 99.0% copper-free rigid Aluminum NEMA-4X corrosion resistant and water tight boxes.
 - 2) Larger than 12" side x 12" high: NEMA-4X Type 316-stainless steel Boxes.
 - b. Boxes shall be equipped with hinged doors complete with 1/4 (quarter) turn door latches.

3. Indoor boxes in environmentally controlled rooms shall be as follows:
 - a. NEMA 12 with ANSI No. 61 Gray finish
 - b. Boxes shall be equipped with hinged doors complete with 1/4 (quarter) turn door latches.
- B. Boxes or cabinets shall be not less than 6-inches deep and their minimum height and width dimensions shall be determined by the requirements of, and in compliance with the NEC.
- C. Each type of box and cabinet on the project shall be manufactured by a single manufacturer.
- D. Manufacturer:
 1. Hoffman Concept Series, Rittal, Milbank, or approved equal.

2.02 DEVICE BOXES FOR CONVENIENCE/SPECIAL PURPOSE RECEPTACLES AND LIGHT SWITCHES

- A. Boxes for convenience/special-purpose receptacles shall be as specified in Section 16300 "Wiring Devices".
- B. Boxes for Light Switches shall be as specified in Section 16300 "Wiring Devices".

2.03 NAMEPLATES

- A. General:
 1. Type: 3-ply, 1/8" thick, rigid thermoset phenolic resin laminated cellulose paper base engraving stock per ASTM D-709, Type I. Nameplates shall be ASTM Grade ES-1, ES-2, or ES-3 as applicable for the face and lettering colors specified hereinafter. Flexible or acrylic tags will be not be accepted
 2. Color: White-Black-White
 3. Lettering: 1/4 inch height, minimum, engraved through the face layer to the melamine middle layer
 4. Accessories: Provide holes for mechanical fastening. Provide adhesive backplane where required in Part 3, Execution.

PART 3 EXECUTION

3.01 APPLICATION

- A. General:
 1. Pullboxes shall be used only to reduce the number of bends for conduit, supports, taps, troughs and similar applications. No splicing shall be performed in pullboxes.
 2. Junction boxes shall only be used where shown on the PLANS. Any other use of junction boxes other than for receptacle and lighting circuit wiring, is not permitted.
 3. Outlet boxes shall be used for ceiling or wall mounting of light fixtures, receptacles, open type manual motor starters, and where required by the PLANS and Specifications to facilitate proper connection to equipment.

3.02 INSTALLATION

- A. Set box square and true with building surfaces. Secure boxes firmly to support channels. Coordinate final location of boxes with other trades to avoid any conflicts.
- B. Utilize specified support channels, then secure/mount boxes and cabinets to the support channels. All mounting hardware shall be Type 316-stainless steel. Equipment support channels shall be per the requirements of Section 16150 "Raceways, Fittings, and Supports". Additionally, refer to details shown on the PLANS.
- C. Tagging:
 - 1. Tag each box with the name as it appears on the PLANS using the specified namplates.
 - 2. Attach identification nameplates with two stainless steel screws.
- D. Cap all outlets not used under this Contract with blank outlet covers.
- E. Furnish and install labels as required by the NEC.

END OF SECTION

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PART 1 GENERAL**1.01 SUMMARY**

- A. Furnish and install all necessary wiring devices at the locations indicated on the PLANS and as specified herein.

1.02 RELATED REQUIREMENTS

- A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
- B. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
- C. Related work as called for on the PLANS, as specified herein or in other Sections of the Specifications.

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with Section 01300 of the Contract Specifications. Include manufacturer's catalog data/notification certifying Aluminum Device Boxes, as specified hereinafter, to be 99.0% copper-free.
- B. Submit Operations and Maintenance Manuals (O&M) in accordance with Section 01730 of the Contract Specifications. O&M Manuals shall include copies of the approved shop drawings, factory and on-site/field test data.

PART 2 PRODUCTS**2.01 LIGHT SWITCHES**

- A. Installed indoors inside the environmentally and climate controlled ELECTRICAL ROOMS:
 - 1. Specification grade, 20 amp, 120/277 volts
 - 2. Provide the number of poles as required by the PLANS.
 - 3. Provide maintained action type operation, unless momentary action is specifically required by the PLANS.
 - 4. Ivory color switch handle operator.
 - 5. Manufacturer: Pass and Seymour No. PS20AC, or approved equal.
- B. Installed indoors inside STORAGE ROOMS and PROCESS MECHANICAL EQUIPMENT ROOMS and installed in ALL OUTDOOR AREAS:
 - 1. Specification grade, 20 amp, 120/277 volts
 - 2. Provide the number of poles as required by the PLANS.

3. Provide maintained action type operation, unless momentary action is specifically required by the PLANS.
4. Factory-sealed where each switch is enclosed in a unique sealing well with double flanges that mate with the light switch cover and box assembly.
5. Raintight, corrosion resistant and rated for use in wet locations and in Class I Division 2 hazardous areas (as classified by NEC).
6. Manufacturer: Cooper Crouse-Hinds, Killark, or approved equal.

C. Box: Provide as hereinafter specified.

2.02 120 VOLTS AC, COVENIENCE RECEPTACLES

A. Installed indoors inside the environmentally and climate controlled ELECTRICAL ROOMS:

1. Receptacle
 - a. Specification grade
 - b. Duplex, 3-wire, polarized grounding type, rated 20 amp, 125 volt, 60 Hertz
 - c. Ivory color
 - d. Manufacturer: Hubbell No. HBL5362I, Bryant, Pass and Seymour, or approved equal.
2. Ground Fault Interrupter Receptacle:
 - a. Provide where G.F.I receptacles are indicated on the PLANS
 - b. Specification grade, weather-resistant type,
 - c. Duplex, 3-wire, polarized grounding type, rated 20 amp, 125 volt, 60 Hertz.
 - d. Red indicator light
 - e. Test and Reset pushbutton
 - f. Ivory color.
 - g. Manufacturer: Pass & Seymour Cat. No. 2095TRWR, or approved equal.
3. Box: Provide as hereinafter specified.

B. Installed indoors inside STORAGE ROOMS and PROCESS MECHANICAL EQUIPMENT ROOMS and installed in ALL OUTDOOR AREAS:

1. Specification grade
2. 2-wire, 3-pole, rated 20 amp, 120 volt,
3. Twist-lock, factory-sealed, pin and sleeve
4. Internal horsepower and AIC-rated switch that shall activate only after the Plug is inserted into the receptacle and twisted.
5. Dead-front, mechanically interlocked where plug cannot be engaged or disengaged under load.
6. Brass receptacle blades/contacts
7. Watertight, raintight and corrosion resistant and rated for use in Class I Division 2 hazardous areas.
8. Fully gasketed, watertight, dustight and corrosion resistant twist-on cover.
9. Type 12 nylon enclosure with 316 stainless steel hardware
10. Manufacturer: Cooper Crouse-Hinds Series IEC-309 Hazardous Area Receptacles/Plugs and Interlocks, Factory-Sealed, TYPE GHG Pin and Sleeve receptacles complete with device boxes and specified accessories.
11. Furnish and install a total count of Two (2) Sets of completely assembled matching CORD and PLUG assembly for the Pin and Sleeve Receptacles. The cord and plug assembly (of each set) shall consist of:

- a. Matching Male Plug manufactured by Cooper Crouse-Hinds Series IEC-309 Hazardous Area Plugs and Interlocks, Factory-Sealed, TYPE GHG Pin and Sleeve Twist-On plug
- b. 25-feet of #12AWG, 3-conductor extra-flexible Type SO-CORD power cord (each conductor shall be 100%-conductive-soft-copper conductors with 41-strands).
- c. NEMA 5-20R Female Connector, 20-amp, 125 volt rated having tin-plated-copper spade-connectors.

2.03 DEVICE ENCLOSURES AND COVERPLATES

- A. Installed indoors inside the environmentally and climate controlled ELECTRICAL ROOMS:
 - 1. Enclosures for exposed surface mounted devices:
 - a. Sand Cast Aluminum, 99.0% copper-free, one piece construction, suitable for surface mounting
 - b. Single and Multi-Gang Weatherproof Outlet boxes, as required.
 - c. 3/4-inch threaded hubs, minimum box depth shall be 2-5/8". Use 2-3/4" depth when "gang" arrangements of outlets are used.
 - d. Manufacturer: Crouse-Hinds Series FS or FD, Appleton, or approved equal.
 - 2. Coverplates:
 - a. Switches: Die Cast Aluminum, 99.0% copper-free, gasketed coverplate with external operating handle for on-off operation (with hole for lock), as manufactured by Crouse-Hinds or approved equal.
 - b. Receptacles: Die Cast Aluminum 99.0% copper-free, complete with rubber gasket, as manufactured by Crouse-Hinds WLRS (single cover), WLRD (duplex cover), WLGf-FS and WLGf-FSV (GFCI cover) or approved equal.
- B. Installed indoors inside STORAGE ROOMS and PROCESS MECHANICAL EQUIPMENT ROOMS and installed in ALL OUTDOOR AREAS:
 - 1. Enclosures:
 - a. Sand Cast Aluminum, 99.0% copper-free, one piece construction, suitable for surface mounting
 - b. Single and Multi-Gang Weatherproof Outlet boxes, as required.
 - c. 3/4-inch threaded hubs, minimum box depth shall be 2-5/8". Use 2-3/4" depth when "gang" arrangements of outlets are used.
 - d. Manufacturer: Crouse-Hinds Series FS or FD, Appleton, or approved equal.
 - 2. Coverplates:
 - a. Switches: Die Cast Aluminum, 99.0% copper-free, watertight and corrosion resistant and having an external front operator (for snap switches). In a group installation, provide manufacturer's assemblies for two gang tandem, three, four and/or five gang bodies (device boxes). Light switch covers shall be as manufactured by Crouse-Hinds, Killark, or approved equal.
 - b. Receptacles: See Part 2.02 B this Section of the Specifications.

2.04 MISCELLANEOUS

- A. All mounting hardware shall be Type 316-stainless steel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Mounting: Device enclosures shall be surface mounted on conduit support channels per Section 16150 and as shown on the PLANS.
- B. Mounting heights shall be as follows unless otherwise noted on the PLANS:
 - 1. Light switches: 48 inches above finished floor to center of switch
 - 2. Receptacles: 36 inches above finished floor to center of receptacle.
- C. Tagging:
 - 1. Tag all receptacles and switches
 - 2. Tagging format: "ckt. LPY-XX" where Y represents the panel number (e.g. for panel "LP-01", Y is 1) and XX represents the circuit number. Add voltage if other than 120V.
 - 3. Tag type:
 - a. Type: 3-ply, 1/8" thick, rigid thermoset phenolic resin laminated cellulose paper base engraving stock per ASTM D-709, Type I. Nameplates shall be ASTM Grade ES-1, ES-2, or ES-3 as applicable for the face and lettering colors specified hereinafter. Flexible or acrylic tags will be not be accepted.
 - b. Color: White-Black-White.
 - c. Lettering: Engraved through the face layer to the melamine middle layer.
 - d. Accessories: adhesive backplane.
- D. Provide 6-inches offset for receptacles or other wiring devices mounted on opposite sides of a wall.
- E. Do not use switch boxes as junction boxes for switch and receptacle.
- F. Set box square and true with building surfaces.
- G. Maintain symmetry of all devices as closely as possible within the Architectural Section contained. For example, center a light fixture over a doorway, or a receptacle in a section of wall, if shown in that approximate position.
- H. Verify location of receptacles and switches in finished rooms. In centering devices and locating device boxes, allow for overhead pipes, and mechanical equipment; etc., and correct any inaccuracy from failure to do so without extra expense to the OWNER.
- I. Cap all device boxes not used under this Contract with blank outlet covers.

END OF SECTION

PART 1 GENERAL**1.01 SCOPE OF WORK**

- A. Furnish and install the 480 Volt Manual Transfer Switch (MTS) as specified herein and as shown on the PLANS.

1.02 RELATED WORK NOT INCLUDED

- A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
- B. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
- C. The PLANS designate the size, rating, and other requirements of the equipment specified under this Section.
- D. Related work as called for on the PLANS, as specified herein or in other Sections of the Specifications.

1.03 QUALIFICATIONS

- A. The MTS shall be designed, constructed, and tested in accordance with the latest applicable requirements of NEMA, ANSI, U.L., and NEC standards.
- B. All MTS's on the project shall be manufactured by a single MTS manufacturer.
- C. The MTS shall be as manufactured by "Eaton Cutler-Hammer, Catalog Number "MTVXKDA30225XDU", or approved equal.

1.04 SUBMITTALS

- A. Submit Shop Drawings in accordance with Section 01300 of the Specifications. Submittals shall include:
 - 1. Dimensioned/scaled top and bottom views, front elevations, and internal component/device layouts
 - 2. One-line and wiring diagrams,
 - 3. Catalog cut sheets
- B. Submit Operations and Maintenance Manuals (O&M) in accordance with Section 01730 of the Specifications. O&M Manuals shall include copies of the approved shop drawings. Also, as minimum the Operations and Maintenance Manuals shall include:
 - 1. Copies of certified and approved shop drawings.
 - 2. Detailed information on each component used, including:

- a. Installation and operation manual.
- b. Renewal parts bulletin.
- c. As built drawings, including approved shop drawings.
- d. Test data.

1.05 STORAGE AND HANDLING

- A. Protection
 1. The CONTRACTOR, and hence the MTS supplier, shall be responsible for safety of the MTS during storage, transporting and handling.
 2. The MTS shall be environmentally protected and stored in an indoor climate controlled (temperature and humidity, etc.) environment.
 3. At all times the MTS shall be housed inside a moisture free, non-porous, extra heavy duty plastic weatherproof housing.
 4. Interior and exterior of the MTS shall be kept clean at all times.
 5. Size, furnish and install temporary space heaters within the MTS and energize during storage and installation for humidity control.

PART 2 PRODUCT

2.01 MANUAL TRANSFER SWITCHES (MTS) REQUIREMENTS AND UNIT DESCRIPTION

- A. General:
 1. MTS shall be completely factory interconnected, pre-wired and tested.
 2. MTS mechanism shall be a manually operated, non-automatic, transfer switch to transfer the load from one power source to another.
 3. MTS main contacts shall consist of two (2) molded case switches that are mechanically and electrically interlocked to prevent the two sets of main contacts from being closed simultaneously.
 4. Molded case switches shall have a rating of 225 amperes at 480 volts.
 5. The MTS shall have a U.L. listed minimum RMS symmetrical short circuit current rating equal to or greater than 42,000 A.I.C. symmetrical at rated voltage.
 6. A transfer mechanism shall transfer between power sources through a motor driven ratchet type operation creating a rotational motion on an indicator wheel. The indicator wheel shall indicate whether the transfer switch is in the Normal, Neutral, or Emergency position.
 7. A manual operating handle shall be provided to create the rotational motion required to open and close the main contacts.
 8. MTS shall be furnished with a multi-tap enclosed transformer within the MTS enclosure to facilitate application of voltages from 208 VAC to 600 VAC.
 9. MTS shall be furnished with a thermostatically controlled enclosure space heater rated 100 watts, minimum.
 10. MTS enclosure shall be furnished with a ground bar per the manufacturer's standard.
 11. All components of the MTS shall be mounted, as one unit, in a single enclosure as specified hereinafter. The MTS shall be mounted where shown on the PLANS.

2.02 MANUAL TRANSFER SWITCH (MTS) CONTROL REQUIREMENTS

- A. General:
 - 1. The MTS shall manually transfer power from one power source to another. The MTS shall ensure continuity of the load circuit power supply for as long as one of the two primary feeders to the MTS is active and the active source is selected.
- B. Accessories:
 - 1. Nameplates:
 - a. Provide nameplates/legend plates for each pilot device and each component/device/equipment installed on the face and inside the enclosure of the MTS.
 - b. Identification Nameplates:
 - 1) Type: 3-ply, 1/8" thick, rigid thermoset phenolic resin laminated cellulose paper base engraving stock per ASTM D-709, Type I. Nameplates shall be ASTM Grade ES-1, ES-2, or ES-3 as applicable for the face and lettering colors specified hereinafter. Flexible or acrylic tags will be not be accepted.
 - 2) Color: White-Black-White.
 - 3) Lettering: Nameplate shall be legible at a distance of six feet from the nameplate. Lettering shall be engraved through the face layer to the melamine middle layer.
 - 4) Accessories: Provide holes for mechanical fastening
 - 5) Nameplates located on the face of the cabinet shall be secured with two Stainless Steel screws.

2.03 MANUAL TRANSFER SWITCH (MTS) ENCLOSURE

- A. The MTS assembly (switches, transfer mechanism, manual operating handle, etc.) shall be mounted in a NEMA-4X stainless steel enclosure. The MTS selector switch and pilot light control devices shall be mounted on the face of the enclosure door. Enclosure door shall be supplied with minimum of three (3) door hinges having removable hinge pins and with key-lockable stainless steel handle.

PART 3 EXECUTION

3.01 FACTORY INSPECTION AND TESTS

- A. Standard factory tests shall be performed on the equipment specified in this section. All tests shall be in accordance with the latest version of ANSI and NEMA standards. The manufacturer shall provide certified copies of factory test reports prior to shipment of the equipment to the project site. Format and quantities of the test report shall be in accordance to Section 01300 and Section 01730 of the Contract Specifications.

3.02 FIELD INSTALLATION (BY CONTRACTOR)

- A. Mount the MTS as shown on the PLANS. Top of MTS shall be no higher than 6 foot 0 inches above the finished floor elevation. For surface mounting, use support

channel per the requirements of Section 16150 "Raceways, Fittings and Supports" and per the details shown on the PLANS. Also refer to the details shown on the PLANS.

3.03 FIELD TEST AND CHECKS

- A. The following minimum test and checks shall be made before energizing the MTS. These tests shall be performed by a Factory Trained Field Technician (non sales type):
 - 1. Thoroughly inspect MTS.
 - 2. Test for proper operation.
 - 3. Submit documentation of all tests outlined above. Include all test documentation data in operation and maintenance manuals.

3.04 EQUIPMENT PROTECTION AND RESTORATION (BY CONTRACTOR)

- A. Clean and vacuum clean all interior of the equipment.
- B. Touch-up and restore damaged surfaces to factory finish.

3.05 TRAINING

- A. Provide training sessions for OWNER's representatives for One (1) normal workday and Four (4) working hours, at the job-site location. If training is conducted in less than the time required by these Specifications, the remaining time shall be utilized at the discretion of the OWNER.
- B. The training session shall be conducted by the MTS manufacturer's non-sales-type technical representative.
- C. At minimum, the training session shall include:
 - 1. Operation and maintenance procedure for the equipment and all components installed within the MTS.
 - 2. Factory contact persons phone numbers, persons names, ordering procedures and procedures to follow to obtain meaningful results from the factory.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

- A. Furnish and install field control stations as specified herein and as shown on the PLANS.

1.02 RELATED WORK NOT INCLUDED

- A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
- B. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
- C. Related work as called for on the PLANS, as specified herein or in other Sections of the Specifications.

1.03 SUBMITTALS

- A. Submit shop drawings, product data, and layout drawings for the products of this Section in accordance with Section 01300 of the Specifications.
- B. Submit Operations and Maintenance Manuals (O&M) in accordance with Section 01730 of the Contract Specifications. O&M Manuals shall include copies of the approved shop drawings.

PART 2 PRODUCTS

2.01 PUSHBUTTONS, SELECTOR SWITCHES, PILOT LIGHTS

- A. General Requirements:
 - 1. Rating: NEMA 4X/13, heavy duty, oil tight/corrosion resistant, hermetically sealed and rated for use in wet locations and in Class I Division 2 hazardous areas (as classified by NEC).
 - 2. Size: NEMA Style full size 30-millimeter (30mm),
 - 3. Contacts: 5 ampere minimum at 120 volts A.C. Hermetically sealed and stackable contact blocks. Provide number of contacts to satisfy the requirements of the PLANS.
 - 4. Legend Plate: Provide per manufacturer's standard with inscription as shown on the PLANS.
 - 5. Manufacturer: Allen Bradley Bulletin 800R, or approved equal.
- B. Additional Requirements for Selector Switch/ Pushbuttons:
 - 1. Operator Color: Black, unless shown otherwise on the PLANS.

Special Specifications

2. Selector Switch Action Type: Maintained action, unless shown otherwise on the PLANS.
 3. Pushbutton Action Type: Momentary action, unless shown otherwise on the PLANS.
- C. Additional Requirements for Pilot Lights:
1. Type: Transformer Type Light Emitting Diode (LED),
 2. Voltage: 120 volts A.C.
 3. Style: Push-to-test
 4. Lens Color: Provide the colors as shown on the PLANS.
- D. Additional requirements for Emergency Stop/Trip Push-Button Stations:
1. Action Type: Push-Pull maintained
 2. Operator Type: Mushroom head
 3. Operator Color: Red, unless shown otherwise on the PLANS
 4. Padlock attachment: Furnish and install as manufactured by Allen-Bradley Bulletin Push-Pull Padlocking Attachment Catalog Number 800T-N314, or approved equal.
 5. Padlock: Furnish and install padlock with 0.25 inch diameter padlock shackle. Coordinate the shackle diameter with the padlock attachment. Furnish and install padlock as manufactured by Master Lock, or approved equal.

2.02 FIELD CONTROL STATION ENCLOSURE:

- A. Size: As required.
- B. Rating: NEMA-4X.
- C. Material: Type 316 Stainless Steel.
- D. Doors and door latches: Boxes shall be equipped with hinged doors complete with 1/4 (quarter) turn door latches.
- E. Manufacturer: Allen-Bradley, Hoffman, Rittal, Millbank, or approved equal.

2.03 LEGEND PLATES/NAMEPLATES FOR CONTROL STATIONS

- A. General:
 1. Provide nameplates/legend plates for each control station, and each pilot device installed in a control station as shown on the PLANS and as previously specified.
- B. Identification Nameplates:
 1. General: Furnish and install identification nameplates for each field control station as follows unless shown otherwise on the PLANS:
 - a. Type: 3-ply, 1/8" thick, rigid thermoset phenolic resin laminated cellulose paper base engraving stock per ASTM D-709, Type I. Nameplates shall be ASTM Grade ES-1, ES-2, or ES-3 as applicable for the face and lettering colors specified hereinafter. Flexible or acrylic tags will be not be accepted.
 - b. Color: White-Black-White

Special Specifications

- c. Lettering: 1/4-inch height minimum unless shown otherwise on the PLANS, engraved through the face layer to the melamine middle layer.
- d. Accessories: Provide holes for mechanical fastening
- e. Attachment Means: Secured with two Stainless Steel screws.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Minimum mounting height shall be 3-foot 6-inches above finished floor unless shown otherwise on the PLANS. Secure stations firmly to support channels as specified in Section 16150 "Raceways, Fittings and Supports".

3.02 FIELD TESTING

- A. Perform field testing as required elsewhere.

END OF SECTION

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PART 1 GENERAL**1.01 SUMMARY**

- A. Provide grounding in accordance with the PLANS, these Specifications and the National Electrical Code "N.E.C." Included within this section are furnishing and installing all the wire, connections, and other devices associated with the grounding system associated with the aforementioned.

1.02 RELATED REQUIREMENTS

- A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
- B. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
- C. Related work as called for on the PLANS, as specified herein or in other Sections of the Specifications.

1.03 SUBMITTALS

- A. Submit shop drawings on all grounding system product and in accordance with Section 01300 of the Specifications. Include material safety data sheet for ground enhancement material.
- B. Submit Operations and Maintenance Manuals (O&M) in accordance with Section 01730 of the Specifications. O&M Manuals shall include copies of the approved shop drawings, and on-site/field test data.

PART 2 PRODUCTS**2.01 GENERAL**

- A. Ground electrodes shall be 24 inch long by 24 inch wide high conductivity copper sheet plates with 0.25 inch minimum plate thickness as manufactured by Erico (Cadweld), or approved equal. Each ground plate shall have two bare copper 250 kCMIL wire pigtails exothermically welded to the plate by the plate manufacturer. Exception: ground plates connected to test wells are not required to have pigtails. Refer to the PLANS for additional requirements.
- B. Concrete encased ground electrodes for all new buildings or structures having a concrete foundation shall be encased in the concrete foundation a minimum of 20 feet and tied to the foundation's steel reinforcing bar system. The concrete encased ground electrode shall be a minimum 3/4 inch diameter Type 316 stainless steel

reinforcing bar per ASTM A955/A955M. The concrete encased ground electrode shall extend outside of the concrete foundation and turn up into a concrete encased electrode accessibility ground port enclosure as shown on the PLANS. Refer to the PLANS for additional requirements. The enclosure shall comply with the requirements of Section 16250 of the Specifications "Boxes and Cabinets".

- C. Connections between ground electrode and grounding electrode conductors shall be made below grade using Cadweld, Burndy Thermoweld, or equal thermite reaction welding system. Exception: Connections between ground electrode and grounding electrode conductors made inside an accessible underground Grounding System Test Well, only where noted/detailed/shown on the PLANS, shall be permitted to be made with tin-plated Bolted Ground Lug connectors as manufactured by BURNDY Type GK, or approved equal.
- D. Grounding electrode conductors/wire shall be green insulated stranded copper. Use bare copper for grounding grids only (as shown on the PLANS).
- E. Equipment and/or static voltage and/or any other ground buses/bars (for any other type of use) called for on the PLANS and Specifications shall be tin-plated copper.

2.02 GROUND ENHANCEMENT MATERIAL

- A. The Contractor shall encase the underground ground electrodes with the hereinafter specified Ground Enhancement Material.
- B. Material: Low resistance non-corrosive carbon based backfill material, free of concrete and bentonite. Material shall not require periodic wetting or other Owner intervention in order to maintain its conductivity.
- C. Application: Suitable for use as backfill material in rocky, sand, gravel, and other high resistance soil types to lower the ground resistance. Suitable for use in horizontal and vertical trench applications.
- D. Manufacturer: Harger Model "Ultrafill", Erico "Ground Enhancement Material (GEM)", or approved equal.

PART 3 EXECUTION

3.01 GENERAL:

- A. Connect each Ground Bus/bar directly to the Grounding Network conduit routed in the duct bank system in addition to the Grounding System around the manhole/handhole, as also shown on the PLANS.
- B. Extend a dedicated equipment ground wire, minimum size No. 6 AWG green insulated wire, from each Ground Bus/bar to each individual conduit system grounding bushings, each cable clamp, each support channel, etc. housed inside the associated electrical manhole/handhole. Also, refer to the PLANS

- C. Ground all electrical and instrumentation and control equipment, including lights, receptacles, instruments, etc., with a separate equipment ground wire installed in the conduit with the power conductors.
- D. Install grounding system electrically and mechanically continuous throughout. System neutral shall be bonded only at the building service transformer.
- E. Ground lighting transformer neutrals to their housing and bond the housing to the equipment grounding conductor.
- F. Connect equipment grounding conductors to ground bars or busses provided at panelboards, motor control centers, disconnect switches, switchgears, etc., from which the equipment is served.
- G. Where the equipment has no facility to attach an equipment ground wire, use a Burndy Quicklug or equal. Clean the metal surface under the lug to bright metal so that good contact can be made. Repaint metal surfaces after the lug and connecting ground wires are installed.
- H. Make ground connections to equipment by using ground lugs or ground bars, where they are provided.
- I. Use a thermite reaction welding system process as previously specified to make connections to ground plates; and, at any joint or connection which will be inaccessible after the construction. Exception: Connect to Grounding System Test Wells as previously specified and as also shown on the PLANS. Do not cover until each connection has been inspected by the Owner.
- J. Furnish bonding jumpers as shown or as otherwise required by the National Electrical Code "N.E.C." Use stranded copper wire.
- K. Inside buildings and at above ground level and through concrete floor slabs, route the ground wire(s) in a conduit raceway system. Fill annular space between ground wire and conduit with Crouse Hinds, Nelson or Raychem watertight and flame-retardant sealant.
- L. Connect ground wires entering outlet boxes in such a manner that removal of the receptacle will not interrupt the continuity of the grounding circuit. A grounding screw attached to the box, and used for no other purpose, may be used to accomplish this.
- M. After ground wire connections have been made to equipment, to structures, in test wells and encased grounding electrode accessibility ground port enclosures, etc., the Contractor shall apply "3M" 1601 Clear-Color Fast Drying Sealer and Insulator, or approved equal corrosion resistant and moisture repelling electrical coating/spray to all exposed wiring and all wire connections, inclusive of mechanical and exothermic weld connections. Coordinate application with the Owner.
- N. Test grounding in accordance with Section 16800. Maximum resistance to ground shall not exceed 2.0-ohms. At no additional cost to the owner, install additional

ground plates over the number required by the PLANS, as necessary to accomplish the 2.0-ohms or less resistance.

- O. Install a bonding jumper from the grounding lug of each Conduit-Grounding-Bushing to the ground bar or bus of each enclosure and/or equipment housing (such as pull boxes, junction boxes, panelboards, motor control centers, transformers, automatic transfer switches, instrument and control panels, etc.), as applicable. Instrument Grounds to be separate from power grounds. Instrument ground to be insulated up to the connection to the ground grid. Also refer to details shown on the Drawings. Bonding jumper wire for Conduit system Grounding-Bushings shall be STRANDED bare copper wire with minimum of 19-strands. Bonding jumper wire size as required by the National Electrical Code "N.E.C.", however, minimum wire size shall be #10 AWG.

- P. Where Grounding System bare copper underground conductors pass through a transition from soil to concrete/mud slab concrete/flowable fill concrete/etc., the conductors shall be wrapped with 20 mil polyvinyl chloride based Pipe Tape using a 50 percent overlap. Pipe tape coverage shall be installed at the point of the transition and an additional 12 inches of distance beyond either side of the point of transition/contacted region. Pipe Tape shall be 3M Company No.51, or approved equal.

- Q. Ground Enhancement Material Installation:
 - 1. All underground grounding electrodes shall be encased in an envelope of grounding enhancement material extending beyond the extents of the grounding electrode a minimum of 4 inches in all directions.
 - 2. Prior to installation, all ground enhancement material shall be mixed with water into a slurry in accordance with the ground enhancement material manufacturer's installation instructions. Salt water shall not be mixed with the grounding enhancement material.
 - 3. Refer to and comply with the installation details shown on the PLANS. Additionally, follow the ground enhancement manufacturer's installation instructions.

END OF SECTION

**DISCONNECT SWITCHES AND ENCLOSED
CIRCUIT BREAKERS
SECTION 16600**

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish and install disconnect switches and enclosed circuit breakers as shown on the PLANS and specified herein.

1.02 RELATED REQUIREMENTS

- A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
- B. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
- C. The PLANS designate the size, rating, and other requirements of the equipment specified under this Section.
- D. Related work as called for on the PLANS, as specified herein or in other Sections of the Specifications.

1.03 SUBMITTALS

- A. Submit Shop Drawings in accordance with Section 01300 of the Contract Specifications. For each individual Disconnect Switch and Enclosed Circuit Breaker include:
 - 1. Dimensioned/scaled fabrication drawings
 - 2. Ratings
 - 3. Wiring connection diagram
 - 4. Protective device coordination curves and current limiting circuit breaker/fuse peak current let through curves, where applicable.
- B. Submit Operations and Maintenance Manuals (O&M) in accordance with Section 01730 of the Contract Specifications. Include:
 - 1. Copies of the approved shop drawings
 - 2. On-site/field test data.

PART 2 PRODUCTS

2.01 DISCONNECT SWITCHES

- A. Construction:
 - 1. U.L. Listed, Non-fused, Single Throw, Heavy Duty type. Complies with UL98 and NEMA KS-1.

2. Switchblades shall be fully visible in the "OFF" position when the door is open.
 3. Dead-front construction with permanently attached arc suppressors.
 4. Switches to have quick-make and quick-break operating mechanism and handles with provision for padlocking in all three positions, with at least four padlocks. The locking provisions shall be such that the padlock directly interferes with the operating handle and is fully visible.
 5. Switches shall have a dual cover interlock to prevent unauthorized opening of the switch door in an "ON" position from either source, or closing of the switch mechanism with the door open.
 6. Furnish lugs to terminate the incoming/outgoing field wiring as shown on the PLANS. Refer to the PLANS. Additionally, provide a grounding lug for equipment ground wire connection. Lugs to be U.L. listed.
 7. All current-carrying parts to be plated.
- B. Ratings:
1. Voltage Rating: 600 Volts AC
 2. Current Rating: Maximum continuous current capacity shown on the PLANS
 3. Number of Phases: Three, unless shown otherwise on the PLANS
 4. Minimum RMS symmetrical short circuit current rating: 10000 ampere at 208 volts A.C.
- C. Enclosure:
1. NEMA-4X Type 316-Stainless Steel gasketed cabinets.
- D. Manufacturer:
1. All Disconnect Switches on the project shall be manufactured by a single Disconnect Switch manufacturer.
 2. Square D Company Class 3110, Asea Brown Boveri, Eaton Cutler-Hammer Corporation, or approved equal.

2.02 ENCLOSED CIRCUIT BREAKERS

- A. Construction:
1. Molded case type, NEMA rated, and U.L. Listed.
 2. Circuit breakers shall have an overcenter, toggle handle-operated, trip free mechanism with quick make, quick break action independent of the speed of the toggle handle operation. Breakers shall be thermal magnetic molded case type having inverse time thermal trip and instantaneous time magnetic trip. The design shall provide common tripping of all poles.
 3. Circuit breaker shall have handles with provision for padlocking in the "OFF" position. The locking provisions shall be such that the padlock directly interferes with the operating handle and is fully visible. Circuit breakers shall have a dual enclosure interlock to prevent unauthorized opening of the enclosure door when the circuit breaker is in the "ON" position, or closing of the circuit breaker mechanism with the door open.
 4. Furnish lugs to terminate the incoming/outgoing field wiring as shown on the PLANS. Refer to the PLANS. Additionally, provide a grounding lug for equipment ground wire connection. Lugs shall be U.L. listed.
- B. Enclosures: NEMA-4X type 316 Stainless Steel gasketed cabinet

- C. Circuit Breaker Ratings:
1. Voltage Ratings: 600 volts AC
 2. Number of Phases: Three, unless shown otherwise on the PLANS.
 3. Current Rating: Maximum continuous current carrying capacity shown on the PLANS
 4. Minimum RMS symmetrical short circuit current rating: Equal to or greater than that of bus serving the circuit breaker at rated bus voltage A.C.
 5. Breakers shall operate continuously when operating/running current is equal to 80% of the long time trip setting (or frame rating, as applicable) of the breakers.
 6. Provide complete with rating plug and other accessories as required for proper operation of circuit breaker.
 7. Furnish current limiting type circuit breakers when specifically required by the one-line drawings shown on the PLANS.
 8. Provide electronic trip attachment where specifically shown on the PLANS. Trip unit shall be solid state type with adjustable long time, short time, instantaneous, ground fault and pick up settings as manufactured by "Square D" Micrologic LSIG Series B Trip Unit and Internal Ground Fault Protection, or approved equal.
- D. Manufacturer: Circuit breakers shall be Square D Company Type FCL, Asea Brown Boveri, Eaton Cutler-Hammer Corporation, or approved equal.

2.03 IDENTIFICATION

- A. General:
1. Furnish and install identification nameplates for each piece of equipment as follows:
 - a. Type: 3-ply, 1/8" thick, rigid thermoset phenolic resin laminated cellulose paper base engraving stock per ASTM D-709, Type I. Nameplates shall be ASTM Grade ES-1, ES-2, or ES-3 as applicable for the face and lettering colors specified hereinafter. Flexible or acrylic tags will be not be accepted.
 - b. Color: White-Black-White
 - c. Lettering: 1/4 inch height, minimum, engraved through the face layer to the melamine middle layer.
 - d. Accessories: Provide holes for mechanical fastening
 - e. Attachment Means: Secured with two Stainless Steel screws.
 2. Exception: Identify manual motor starters mounted in environmentally controlled rooms as specified in Section 16300 "Wiring Devices".

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install where the top of each enclosure is no higher than 6-feet-0-inches above the finished floor elevation, unless otherwise noted on the PLANS.

- B. Surface mount on support channels per the requirements Section 16150 “Raceways, Fittings and Supports” and the details shown on the PLANS. Also refer to details shown on the PLANS.
- C. Tag equipment with the name as it appears on the PLANS using the specified nameplates.

END OF SECTION

PART 1 GENERAL**1.01 SUMMARY**

- A. Provide all equipment and labor required for calibration, setting and testing as described herein or otherwise required. All tests shall be witnessed by the OWNER or the OWNER's designated representative. Give written notification of the tests at least seven days prior to the desired date to perform the tests. Repair or replace all defective material, equipment or workmanship disclosed as a result of these tests at no cost to OWNER.
- B. All work, including installation, connection, calibration, testing, and adjustment, shall be accomplished by qualified, experienced personnel working under continuous, competent supervision. The completed installation shall display competent work, reflecting adherence to prevailing industrial standards and methods.
- C. Tests: The Contractor shall make all tests required by these specifications, or other authorities having jurisdictions. All such tests shall be performed in the presence of the OWNER or the OWNER's designated representative. The Contractor shall furnish all necessary testing equipment and pay all costs of tests, including all replacement parts and labor necessary due to damage resulting from damaged equipment or from test and correction of faulty installation.

1.02 SUBMITTALS

- A. Submittals shall include copies of the test results/reports. Submittals shall be per the quantity and format requirements of Section 01300 and 01730 of the Specifications. Include the following at minimum:
 - 1. Test results, inclusive of catalog number/drawing cross-reference, where applicable, and any other data entered on the field test report
 - 2. Testing Plans
 - 3. All test instrument data sheets and calibration certificates

1.03 TEST PLAN AND TEST RESULTS

- A. Performance: Testing shall be performed in compliance with the approved Test Plan. The Test Plan shall be submitted in accordance with the outline given below. Provide the OWNER with typewritten results of all tests, including a description of the equipment tested, the date and time of day tested, names of witnesses, weather conditions; and test values and results.
- B. Test plan: At minimum, Submit a Test Plan for each of the Sections listed in Division 16 of these specifications. Test Plan shall be submitted at least two (2) weeks prior to the desired date and time of the test. Test Plan shall clearly identify the following, as applicable:
 - 1. Desired date and time to perform the test
 - 2. Name of Entity/individual that shall perform the test

3. Test procedures and recording data sheets
4. Name, description, catalog number, calibration date, and calibration entity's name of each of the test instruments to be used in executing the test
5. Expected duration of the test
6. Request for type, time and duration of any shutdown that may be required during the test.

C. Test Results:

Submit Test Results for each of the Sections listed in Division 16 of these specifications. Test Results shall be submitted no later than at least two (2) weeks after the last date of the respective test. Test Results shall be typewritten and shall include the following, as minimum:

1. All data and information provided in the Test Plan
2. Name of Entities and individuals that attended and witnessed the test
3. Weather Conditions
4. Tabulated test values and results
5. Corrective measures taken and/or to be taken toward defective material, equipment or workmanship disclosed as a result of these tests. Also include Re-Test dates and procedures for defective material, equipment or workmanship disclosed from the previous test.

1.04 TEST EQUIPMENT

- A. Each test instrument shall have been certified by an established calibration laboratory within the six (6) months prior to its use in testing and calibration procedures. Calibration shall be traceable to the National Institute of Standards and Technology (NIST).

PART 2 PRODUCTS

- A. No products are required by this Section of the Specifications.

PART 3 EXECUTION

3.01 INSULATION RESISTANCE (MEGGER) TESTS:

- A. Use a minimum 500 volt megohmmeter.
- B. Take each reading for at least one minute.

C. Include the following tests:

<u>Equipment</u>	<u>Minimum Resistance</u>
115 and 230 volt motors	5.0 Megohms
460 volt motors	7.0 Megohms
600 volt transformer winding	100.0 Megohms
600 volt wiring up to 1000 ft.	25.0 Megohms

Coordinate minimum values shown with equipment manufacturer's recommendations.

D. Test all transformer windings as follows:

1. Primary to ground
2. Secondary to ground
3. Primary to secondary

E. Record and submit all Megger readings to the OWNER/ENGINEER for review and record keeping purposes. Neatly type all readings and organize in a Database table form. Incremental megger readings shall also be recorded and included in the table.

3.02 GROUND TEST

- A. Ground System testing shall be performed by an independent professional testing company specialized in, and well equipped to perform, ground resistance testing.
- B. Ground testing shall assure resistance to ground values listed in the Grounding Specification. All tests must be witnessed by the Owner or the Owner's designated representative.
- C. At a minimum, test each of the following separately, with ground under test isolated from other grounds:
 1. Each process area/building grounding network, i.e., Thickener Building, etc. Furnish and install additional grounding/ground electrodes if the resistance to ground measures more than the values stipulated in the Grounding Section of the Specifications. This shall be executed at no additional cost to the Owner.
 2. Each manhole,
 3. Each handhole,
- D. Finally, after all tests of each individual process area/building, manhole, handhole, etc., are performed as previously specified, perform a final test after all of the individual process areas/buildings, manholes, handholes, etc. grounding networks are interconnected as also shown on the PLANS.

3.03 MOTORS

- A. Test the insulation resistance (megger test) of all motors installed under this Contract inclusive of process mechanical drive motors and the Heating and

Ventilation System drive motors such as exhaust fans, fan and coil units drive motors, etc. Test all motors in accordance to with subsection 3.01 above.

- B. Dry out any wet insulation by use of space heaters or other approved methods.
- C. Check coupling alignment, shaft end play, lubrication, and other mechanical checks as required. Follow manufacturer's instructions.
- D. Check for proper motor rotation.

3.04 RECEPTACLES

- A. Test all receptacles for proper connections and grounding. Use an approved plug-in tester equal to Woodhead 1750 or Hubbell 5200.

3.05 CONTROL CIRCUITS

- A. Check all circuits for continuity, proper connection, and proper operations.
- B. Set all time delay relays and timers for the desired operations. Record the settings, indicating the relay or timer, its location, and the setting used. Verify all settings with a stopwatch.

3.06 CONTINUITY TESTS

- A. Perform continuity test on all low voltage conductors (600 volt, and below, wiring system). Continuity test must be performed after wiring is pulled in the conduit system and/or underground electrical system (as applicable). Continuity test must be performed on each conductor between its source and final destination (point of termination to load/device/etc.). Utilize Ohmmeter for this test. Ohmmeter must be set to lowest ohm setting (highest resolution).

END OF SECTION

**PROCESS INSTRUMENTATION
AND CONTROL SYSTEMS (PICS)
SECTION 17100**

PART 1 GENERAL**1.01 SUMMARY**

- A. Provide all labor, materials, and equipment to design, furnish, install, calibrate, test, adjust, and place in operation the facility complete monitoring and control system as specified herein and as shown on the PLANS. The PLANS and Specifications show and specify those features required to illustrate and describe functional requirements of the monitoring and control system.
- B. A single Instrument and Control System Contractor (ICS) shall furnish all services and equipment defined herein and in other Specification sections as listed below under Related Work. The Instrument and Control System Contractor is referred to herein and after (in Division 17 of the Specifications) as the ICS, ICS supplier/firm, or Contractor. The ICS shall have the qualifications as described in subsection 2.0, "Quality Assurance", this Section of the Specifications.
- C. The ICS shall also:
1. Terminate and tag all field wiring associated with the process instrumentation and control system shown on the PLANS and specified herein and in other Specification sections listed below under Related Work.
 2. Tag Instrumentation and control wiring/cable per the requirements and methodology/scheme outlined in specifications Section 16200 "Wiring (600 Volts and Below)" paragraph 3.03 "Wire Tagging Methodology".
 3. Calibrate, set and test the PICS equipment, components, cables, hardware, and software.
 4. For all PICS equipment and ancillaries, provide:
 - a. Required submittals.
 - b. Equipment and ancillaries.
 - c. Instructions, details, and recommendations to, and coordination with, all other installation entities for Certificate of Proper Installation.
 - d. Certifying readiness for operation.
 - e. Starting up.
 - f. Testing.
 - g. Training
 - h. Use of testing/calibration equipment to facilitate calibration/testing of field sensors and instruments. Equipment shall include, but not be limited to:
 - 1) Test pressure pump for field calibration/testing of pressure transmitters.
 - 2) Signal generator/multi-function meter for field calibration/testing of resistance temperature detector (RTD) monitoring devices
 - 3) Temperature/heat generator for field calibration/testing of temperature transmitters.
 - 4) Shaker table for vibration transmitters, etc.

5. Provide special additional services during installation, including:
 - a. Verifying that the following are furnished and installed:
 - 1) Correct type size, and number of signal wires with their raceways.
 - 2) Correct electrical power circuits and raceways.
 - 3) Correct size, type, and number of PICS related pipes, valves, fittings, and tubes.
 - 4) Correct size, type, materials, and connections of process mechanical piping for in-line primary elements
 - b. For equipment not provided by the ICS, but directly connected to the PICS:
 - 1) Obtain manufacturer's information regarding installation, interface, function, and adjustment for equipment from the Contractor.
 - 2) Coordinate with Contractor to allow required interface and operation with the PICS.
 - 3) Verify that installation, interfacing signal terminations, calibration, and adjustments have been completed in accordance with the manufacturer's recommendations.
 - 4) Test to demonstrate the required interface and operation with the PICS.
 - 5) Examples of equipment in this category include, but are not limited to the following:
 - a) OWNER's Top-End Computer System
 - b) Motorized Valve Operators
 - c) Motor Control Centers
 - d) Process/Mechanical Equipment
 6. Assist OWNER/ENGINEER in the PAT testing, including any possible testing of the Applications Software which shall be developed by OWNER/ENGINEER for the DCS related to the renovations in this project.
- D. Extensive field verification is required for all modifications to existing control panels. The ICS shall include effort associated with field verifying spatial dimensions inside the existing control panels for proposed equipment, wiring terminations, loop power supply sizes, loads on existing instrument loops, points of connections to existing equipment, etc. as required to support the proposed modification effort associated with this project. The ICS shall field locate proposed equipment to be installed inside the existing control panel as also shown on the PLANS. The proposed location shall be coordinated with the arrangement of the existing control panel internally and externally mounted components.
- E. The OWNER's existing distributed control system is vital to the OWNER's treatment plant process system. Therefore, required interruptions to the OWNER's existing distributed control system shall be minimized and coordinated with the OWNER. Should an outage to a facility be required, the Contractor shall request such an outage in writing no less than ninety-six (96) hours in advance. Contractor's written request shall identify the desired date, time, duration, and purpose of the requested day unless he/she obtains a written approval from the owner authorizing the outage. The OWNER reserves the right to modify or reject any request such an outage. Modification or rejection of the contractors request be the OWNER shall not be considered reason for delays in the construction schedule. Unless otherwise noted, the duration of the outage shall be limited to four (4) hours or less. The OWNER reserves the right to limit the duration of the outage to less than 4 hours.

Modification of the outage duration by the OWNER shall not be considered reason for delays in the construction schedule.

- F. The OWNER's existing distributed control system equipment and its associated interconnect wiring, power supplies, fuses, etc., is in perfect working condition. Should the existing equipment, its associated interconnect wiring, power supplies, fuses, etc., as applicable, be damaged or become otherwise unusable during the construction course of this project, the ICS shall determine the problem, correct it, and furnish and install all necessary wiring/hardware/etc., to match existing and make all final connections such that all affected equipment operates as previously operated to the OWNER's satisfaction at No Additional Cost to the OWNER.

1.02 RELATED REQUIREMENTS

- A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
- B. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
- C. Division-16 ELECTRICAL SPECIFICATIONS
- D. Division-17: INSTRUMENTATION AND CONTROL SPECIFICATIONS
- E. All other divisions of the Specifications related to the installation of the process mechanical equipment, etc. that are related to the operation of the instrumentation and control system.
- F. Related work as called for on the PLANS, as specified herein or in other Sections of the Specifications.

1.03 SUBMITTALS

- A. General: Do not design, manufacture, or ship any PICS equipment until all related submittals have been reviewed and approved by the ENGINEER. Submit shop drawings and product data in complete functional packages; i.e., submit all shop drawings and product data for a given loop or subsystem together as a functional package. Piecemeal submittals not organized by systems or incomplete submittals for a given loop or subsystem will not be accepted.
- B. Administrative Submittals:
 - 1. Schedule of Values
 - a. Purpose: Project Schedule of Values to provide a basis for Partial Payment for Work completed.
 - b. Content: Summary of major milestones and associated Partial Payments for Work provided under PICS Subsystems.
 - 2. PICS Progress schedule
 - a. Purpose: Supplement the overall Project Progress Schedule to:
 - 1) Coordinate activities between the Contractor and the ICS

- 2) Coordinate interactions with the OWNER/ENGINEER for coordination meetings, submittal reviews, etc.
 - 3) Clarify required work sequences and major milestone prerequisites.
 - b. Provide multiple submittals of the project schedule throughout the duration of the Project as required.
 3. OWNER Training Plan: Submit description/schedule of OWNER Training to be provided.
 4. Statements of Qualification: Submit for PICS firm, site representative, start-up and testing team member.
- C. Submit shop drawings in accordance with Section 01300 of the Specifications and as specified below:
1. Detailed product data, catalog cut sheets, cabinet exterior and interior front elevations, bill of materials, and spare parts list
 2. Point-to-Point Wiring Diagrams: Prepare Point-to-Point Instrument Loop Wiring Diagrams, ladder diagrams (control schematics), cabinet wiring, and other field wiring diagrams in accordance to the format shown on the PLANS. Drawings shall be neat, and legible, and on 11 inch x 17 inch sized sheets. Drawings to include all relevant information for equipment connected to the PICS, regardless if the equipment is provided by the ICS or not, i.e., include motor control centers, OWNER pre-purchased equipment, etc. Contractor shall also submit for approval a complete schedule of all wire tag numbers sorted by area and equipment/instrument/field device.
 3. Although typical control schematics/instrument loops are presented on the PLANS for some equipment, the Contractor shall generate specific equipment control schematic drawings/instrument loops (i.e., individual control schematic/instrument loop drawings dedicated for each specific equipment) based upon the typical control schematic/instrument loop drawings, the device identification/tag replacement schedules shown on the PLANS, and the additional requirements described herein. The Contractor generated specific equipment control schematics/instrument loops shall follow the same overall presentation format as the typical equipment control schematics/instrument loops presented on the PLANS. The specific equipment control schematics/instrument loop drawings complete with all specific equipment/device tags (as a minimum, also refer to the additional requirements described herein) shall be generated by the Contractor and included with the project submittals (i.e., prior to equipment purchase) and the "As-Built" drawings. Any Contractor generated control schematic/instrument loop shown as applicable for multiple equipment shall not be accepted.
 4. Contractor may submit wire tag samples for all types of interconnect and field wiring from the proposed/existing cabinets/panels with associated point-to-point wiring diagrams in a separate submittal for approval prior to submitting the complete wire tag schedule for review. After approval of the sample wire tags, a wire tag table showing all provided wire tags shall be submitted for review with the associated point-to-point wiring diagrams. Refer to Specification 17100 Subsection 1.03.C.5 for additional wire tag table requirements. Refer to Specification 16200 Subsection 3.03 for wiring tagging methodology.
 5. Wire Tags: Contractor shall also submit for approval a complete schedule of all wire tag numbers sorted by area and equipment/instrument/field device. It is anticipated that all wire numbers cannot be accommodated on the loop

diagrams, ladder diagrams, control schematics, etc. format shown on the PLANS. As a minimum, to facilitate the depiction of the wire numbers on the loop diagrams, ladder diagrams, control schematics, etc., the Contractor shall generate and include uniquely identified alpha-numeric wire codes on the loop diagrams, ladder diagrams, control schematics, etc. The wire codes shall cross-reference tables of wire numbers shown on additional drawings that shall be generated by the Contractor. At minimum, the Contractor shall generate the wire codes and the cross-reference tables which depict the wire numbers associated with each wire code and shall group the cross-reference tables by specific equipment (Gas Scrubber No. 1, Gas Scrubber No. 2, etc.). As a minimum, the Contractor shall generate drawings to depict the wire code and wire tag cross-reference tables and these drawings shall also be grouped by specific equipment (Gas Scrubber No. 1, Gas Scrubber No. 2, etc.). Additional requirements concerning the cross-reference table headings, table organization, wire code generation, formatting, etc., shall be provided by the Owner during the Pre-Submittal Conference specified hereinafter (*refer to subsection 1.03G in this Section of the Specifications*) and the Contractor shall incorporate these requirements at no additional cost to the Owner. Contractor shall submit wire tag samples for all types of interconnect and field wiring from the proposed/existing cabinets/panels with associated point-to-point wiring diagrams in a separate submittal for approval prior to submitting the complete wire tag schedule for review.

- D. Testing Related Submittals:
1. Submit factory and field calibration reports
 2. Submit the following for each of type of test (ORT and PAT) required under Division 17 of the Specifications:
 - a. Preliminary Test Procedures: Outlines of proposed tests, forms, and checklists.
 - b. Final Test Procedures: Proposed test procedures, forms, and checklists.
 - c. Test Documentation: Copy of signed off test procedures when tests are completed.
- E. Training Related Submittals:
1. Submit the following for each type of training required under Division 17 of the Specifications:
 - a. Training plan, course topics, subjects to be addressed in the training
 - b. Schedule
 - c. Training agenda for each course
 - d. Instructor qualifications
 - e. Listing of available training courses and outline of course topics and agendas
- F. Submit Operation and Maintenance manuals in accordance with Section 01300 and 01730 of the Specifications and as specified below:
1. Include approved shop drawing data in the Operation and Maintenance manuals with the following modifications to the shop drawing exhibits:
 - a. Reflect "As-Built" conditions.
 - b. Prints of exhibits, wiring diagrams, etc. shall be half size (11 inch by 17 inch).
 2. Procedures for operating and shut-down

3. Included approved Testing Related Submittals with final "As-Built" conditions.
 4. Safety instructions.
 5. Calibration instructions and factory test results of each instrument.
 6. Maintenance and repair instructions.
 7. Recommended spare parts list.
 8. Name, address and phone number of instrumentation control system supplier's local representative.
 9. Additionally, comply with the requirements of the Contract Documents.
- G. Pre-submittal conference
1. General:
 - a. Review the manner in which the contract requirements will be met prior to preparation of submittals. The Contractor, Engineer, OWNER, and ICS shall attend. Schedule, conduct, and arrange the conference within 90 calendar days after receipt of written notice to proceed work is given by the OWNER.
 - b. The ICS shall present the following at the conference:
 - 1) List of equipment and materials required and the brand that shall be used for each item
 - 2) Sample submittals from similar projects including the types of drawings/data/lists specified herein

1.04 SPECIAL CONDITIONS

- A. All components used in the instrument and control systems shall be new (not used) and the current model produced by the manufacturer.
- B. All equipment of a common type shall be the product of a single manufacturer.

PART 2 QUALITY ASSURANCE

2.01 ACCEPTABLE PROCESS INSTRUMENTATION AND CONTROL SYSTEM (PICS)

- A. Provide a complete, workable, and installed-in-place Process Instrument and Control System, hereinafter referred to as the PICS, as specified herein. The PICS shall be designed, installed, and started up by the single ICS firm.
- B. Acceptable ICS firm shall have the following minimum qualifications:
 1. ICS Firm: Minimum of 5 years experience in providing, integrating, installing, testing, and start-up similar systems as those required for this project
 2. ICS Firm Site Representative: Minimum of 8 years experience installing similar systems as those required for this project
 3. ICS Firm Start-up and Testing Team Members: Minimum of 3 years experience in testing systems similar to those required for this project.
- C. PICS meetings to be scheduled in accordance with the Contract Documents.

2.02 SYSTEM COORDINATION AND QUALITY

- A. Coordinate installation of instrumentation with mechanical and electrical systems.

- B. Coordinate subsystems to provide a complete operational and functional instrumentation system to the satisfaction of the OWNER and ENGINEER.
- C. Equipment, instruments, components, and materials for PICS components shall be new (not used) and of the current model.
- D. Instrument and Control Components Furnished By Others: Certain items of instrumentation and controls shall be furnished by various equipment manufacturers. Coordinate the purchase orders of the items such that the resulting system will function properly.

2.03 DESIGN CRITERIA

- A. Design, construct, and install all PICS components in compliance with the applicable provisions of the following standards, codes, and regulations:
 - 1. American National Standards Institute (ANSI) Standards.
 - 2. American Institute of Steel Construction (AISC) Standards.
 - 3. American Society for Testing and Materials (ASTM) Standards.
 - 4. American Waterworks Association (AWWA) Standards.
 - 5. Joint Industrial Council (JIC) Standards.
 - 6. National Electric Code (NEC)
 - 7. National Electrical Manufacturer's Association (NEMA) Standards.
 - 8. Local and State Building Codes.
 - 9. Occupational Safety and Health Administration (OSHA) Regulations.
 - 10. Scientific Apparatus Manufacturer's Association (SAMA) Standards.
 - 11. International Society of Automation (ISA) Standards.
 - 12. National Fire Protection Association (NFPA)
 - 13. Institute of Electrical and Electronics Engineers (IEEE).

2.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery: Should any proposed cabinets be required on this project, then enclose the proposed cabinets and subassemblies in heavy polyethylene envelopes to protect them from dust and moisture. Place corrosive-inhibitive vapor capsules in shipping containers, and related equipment as recommended by the capsule manufacturer.
- B. Storage: All materials and equipment shall be environmentally protected and stored in climate controlled (temperature and humidity, etc.) environment. The Instrument Control Panels and the field control and instrument/monitoring panels shall not be moved from climate controlled storage room to the project site until the construction of each electrical/control room is completed, and, the air-conditioning and heating system of the facility is in an operating condition satisfactory to the OWNER and ENGINEER.

2.05 CALIBRATION INSTRUMENTS

- A. Each instrument used for calibrating PICS equipment shall bear the seal of a reputable laboratory certifying that instrument has been calibrated within the previous twelve (12) months to a standard endorsed by the National Institute of

Standards and Technology (NIST). At OWNER's request, ICS shall submit calibration certification report.

2.06 START DATE OF THE PROCESS INSTRUMENTATION AND CONTROL SYSTEM AND ASSOCIATED SUBSYSTEM WARRANTY (PICS INCLUDING SUBSYSTEMS)

- A. Start Date of the process instrumentation and control system and associated subsystem Warranty (PICS including Subsystems) shall commence the date in which the Warranty period commences for the overall project per the requirements of the Procurement Documents.

PART 3 SEQUENCING AND SCHEDULING

3.01 GENERAL

- A. All work provided under this section shall be in accordance with the OWNER/ENGINEER-approved Schedule of Submittal Submissions and Schedule of Values.
- B. Specification and Construction Implementation Plan requires phased installation of equipment and systems. Stage all PICS activities (submittals, fabrication, installation, testing, start-up, training, etc.) to support the construction sequencing requirements of the project.
- C. Wherever language in this section refers to the PICS, the entire installed PICS, the entire PICS, or similar language, it shall be interpreted to apply to the individual phases of the work; except the requirements for the Performance Acceptance Test (PAT).
- D. Key milestone dates associated with PICS activity shall be included in the overall project schedule. Include the following dates as a minimum:
 - 1. ORT start and end date
 - 2. PAT start and end date
 - 3. Training dates

3.02 PREREQUISITE ACTIVITIES AND LEAD TIMES:

- A. Start the following key Project activities when prerequisite activities and lead times listed below have been completed and satisfied:
 - 1. Shop Drawings submittal prerequisite: Completion of the Pre-submittal conference
 - 2. Test Prerequisite:
 - a. All associated process and mechanical equipment, controlled and monitored by the instrumentation and control system, complete in place
 - b. Associated test plan submittal completed. For ORT and PAT, notice of test schedule required 4 weeks prior to the start of test
 - 3. ORT Prerequisite:
 - a. Approved ORT test procedures
 - b. Approved ORT test forms

- c. 30 calendar days advance written notice to given to OWNER of impending ORT.
4. PAT Prerequisite:
 - a. ORT successfully completed.
 - b. Approved PAT test procedures
 - c. 30 calendar days advance written notice to given to OWNER of impending PAT.
5. O&M submittal prerequisite: PAT successfully completed.

PART 4 PRODUCTS

4.01 GENERAL

Refer to requirements of PICS Subsystem provided in Division-17 Specifications.

4.02 SOURCE QUALITY CONTROL

- A. General:
 1. Test all PICS elements, both hardware and specific software, to demonstrate that PICS satisfies all requirements.
 2. On-Site Tests Described Under PART 5 - EXECUTION:
 - a. Operational Readiness Test "ORT"
 - b. Performance Acceptance Tests "PAT".
 3. Test Format: Cause and effect
 - a. Person conducting test initiates an input (cause)
 - b. Specific test requirement is satisfied if the correct result (effect) occurs
 4. Procedures, Forms, and Checklists:
 - a. Conduct all tests in accordance with, and documented on, ENGINEER accepted procedures, forms, and checklists.
 - b. Describe each test item to be performed.
 - c. Have space after each test item description for sign off by appropriate party after satisfactory completion.
 5. Required Test Documentation: Test procedures, forms, and checklists. All signed by OWNER/ENGINEER and Contractor.
 6. Conducting Tests:
 - a. All special testing materials and equipment.
 - b. Wherever possible, perform tests using actual process variables, equipment, and data.
 - c. If it is not practical to test with real process variables, equipment, and data, provide suitable means of simulation.
 - d. Define simulation techniques in test procedures
 - e. For PICS Subsystems for which OWNER provides applications software, provide sufficient temporary software configuring to allow for ORT testing of these subsystems.
 7. OWNER/ENGINEER will actively participate in many of the tests.
 8. OWNER/ENGINEER reserves the right to test or retest all specified functions whether or not explicitly stated in the Test Procedures.
 9. OWNER's/ENGINEER's decision will be final regarding acceptability and completeness of all testing.

- B. Provide field support during OWNER/Engineer testing of installed applications software

PART 5 EXECUTION

5.01 EXAMINATION

- A. Equipment furnished by Supplier or any other subcontractor and installed by the ICS/Contractor, requires Supplier to observe and advise on installation to extent required to certify that equipment has been properly installed and will perform as required.
- B. For equipment not provided by the ICS, but that directly interfaces with the PICS, verify the following conditions:
 - 1. Proper installation.
 - 2. Calibration and adjustment of all instrumentation and control devices.
 - 3. Correct control action.
 - 4. Switch settings.
 - 5. Opening and closing speeds and travel stops.
 - 6. Input and output signals.

5.02 INSTALLATION

- A. Material and Equipment Installation:
 - 1. Follow manufacturer's installation instructions, unless otherwise indicated or directed by the OWNER/ENGINEER
 - 2. Retain a copy of the manufacturer's instructions at the project site, available for review at all times.
- B. Wiring:
 - 1. All wiring connected to PICS components and assemblies shall be in accordance to the requirements of Division 16 and 17 of the Specifications.

5.03 FIELD QUALITY CONTROL

- A. General: All requirements listed in Subsection Source Quality Control, above, also apply to this Subsection, Field Quality Control.
- B. Onsite Supervision:
 - 1. The ICS Project Site Representative shall supervise and coordinate all onsite PICS activities.
 - 2. The ICS Project Site Representative shall be On-Site during total period required to complete all On-Site PICS activities.
- C. Startup and Testing Team:
 - 1. Thoroughly check installation, termination, and adjustment for all PICS Subsystems and their components.
 - 2. Completed On-Site tests.
 - 3. Provide and conduct startup services
 - 4. Complete onsite training.

- D. Sequence of Work: Provide individual ORTs and PATs for individual process equipment where required to support the staged construction and startup of the facility. Coordinate the construction sequencing requirements with the OWNER.
- E. Specialty Equipment: For certain components or systems provided under this Section but not manufactured by the ICS, provide services of qualified manufacturer's representative during installation, start-up, testing (both ORT and PAT) and OWNER's training. For example: RTD calibrator, vibration shaker table (which may be furnished/operated by vibration sensor manufacturer representative), pressure calibrator, etc, shall be provided as required.
- F. Operational Readiness Test (ORT):
1. Prior to start of the Performance Acceptance Test "PAT", the ICS firm shall inspect, test the PICS equipment and systems, document the resulting tests performed, implement all corrective actions necessary, perform all associated re-testing, and document that the PICS is installed and ready for operation. Subsequent to the ICS documentation that the PICS is installed and ready for operation, perform jointly with the OWNER an ORT on the associated PICS equipment to demonstrate that it is fully operable as required by the Contract Documents.
 2. For PICS subsystems where the PLC application software is provided by the OWNER, provide sufficient temporary software configuring to allow testing of these subsystems.
 3. Loop/Component Inspections and Tests:
 - a. Check PICS for proper installation, calibration, and adjustment on a loop-by-loop, and component-by-component basis.
 - b. Develop and provide forms as required to document ORT. All forms generated shall have provisions for signature by PICS representative.
 - c. Develop and provide test form hereinafter called the "Loop Status Report" to organize, track inspection, adjustment, and calibration of each loop. Loop Status Report shall include the following as a minimum:
 - 1) Project name
 - 2) Loop number
 - 3) Tag number for each component
 - 4) Checkoff/signoffs for each component:
 - a) Tag/identification
 - b) Installation
 - c) Wiring termination
 - d) Tubing termination
 - e) Calibration/adjustment
 - 5) Checkoffs/signoffs for each loop:
 - a) Panel interface termination
 - b) PLC I/O interface terminations
 - 6) PLC I/O Signals are Operational: Received/sent, processed, adjusted
 - 7) Total loop operational
 - 8) Space for comments.
 - d. Develop and provide test form hereinafter called the "Component Calibration Sheet" to organize, track inspection, adjustment, and calibration of each component (except hand switches, pilot lights, gauges,

and similar items) and each PLCs I/O Module. The Component Calibration Sheet shall include the following as a minimum:

- 1) Project Name
 - 2) Loop Number
 - 3) Component tag number or I/O module number
 - 4) Manufacturer name
 - 5) Model number/serial number
 - 6) Summary of functional requirements. For example:
 - a) Indicators
 - b) Transmitters/converters, input and output ranges
 - c) Computing elements' functions
 - d) Controllers, action (direct/reverse) and control modes (P&ID)
 - e) Switching elements, unit range, differential (fixed/adjustable), reset (auto/manual)
 - f) PLC I/O modules: input or output
 - 7) Calibrations, for example, but not limited to:
 - a) Analog devices: Actual inputs and output at 0, 25, 50, 75, and 100 percent of span, rising and falling
 - b) Discrete Devices: Actual trip points and rest points
 - c) Controllers: Mode settings (P&ID)
 - d) PLC I/O Modules: Actual inputs or outputs of 0, 25, 50, 75, and 100 percent of span, rising and falling.
 - 8) Space for comments
 - e. Maintain loop status reports, valve adjustment sheets, and component calibration sheets at the project site and make them available to the OWNER at all times.
 - f. These inspections and tests, inclusive of the above described forms, will be spot checked by the OWNER.
 - g. The ICS shall implement all corrective measures needed and perform re-test on any modified sub-system/component.
 - h. The Contractor shall claim and validate a thorough ORT was performed successfully and all resulting corrective action measures taken were performed successfully and re-tested successfully. Upon successful completion of the ORT, the Contractor shall submit letter notification to the OWNER stating that the ORT has been successfully completed. The letter notification shall further state that the ICS is ready to begin the Performance Acceptance Test. Submit all forms upon completion of ORT as required by the OWNER.
- G. Performance Acceptance Tests "PAT":
1. Once the ORT has been successfully completed, perform jointly with the OWNER a PAT on the associated PICS to demonstrate that it is operating as required by the Contract Documents.
 2. Minimum duration of the PAT shall be a cumulative total of twenty (20) calendar days. The cumulative total quantity of calendar days shall be consumed in association and in synch with the overall construction sequence for the project. Any Holidays that occur during the PAT shall result in a corresponding number of days being added to the duration of the PAT. The PAT encompasses startup and testing period of the instrumentation and control system for the associated process and mechanical equipment that are controlled and monitored by the instrumentation and control system. The ICS

- shall test functions installed and the hard-wired system and the entire associated instrumentation and control system including validating the operation and monitoring and control functions of the all instruments, all control devices, all instrument and control components, control functions, alarm function, monitoring function, calibration ranges, control/alarm setpoint operations, etc. The ICS shall also test the DCS.
3. Demonstrate each required function on a paragraph-by-paragraph, loop-by-loop, and site-by-site basis based upon the operating description used by the OWNER.
 4. Non-loop specific tests shall be the same as previously required except that the entire installed PICS shall be tested using actual process variables and all functions demonstrated.
 5. Perform local and manual tests for each loop before proceeding to remote and automatic modes
 6. Where possible, verify test results using visual confirmation of process equipment and actual process variable. Unless otherwise directed, exercise and observe devices supplied by Others, as needed to verify correct signals to and from such devices and to confirm overall system functionality. Test verification by means of disconnecting wires or measuring signal levels is acceptable only where direct operation of plant equipment is not possible.
 7. Make updated versions of documentation required for PAT available to the OWNER at the project site, both before and during tests.
 8. Develop and provide PAT test forms that include the following, at minimum:
 - a. Project name
 - b. Lists the requirements of the loop
 - c. Briefly describes the test
 - d. Cites the expected results and the actual results
 - e. Provides space for checkoff by witnesses.
 9. Make one copy of all O&M manuals available to the OWNER at the site both before and during testing.
 10. The ICS shall implement all corrective measures needed and perform re-test on any modified system.

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**INSTRUMENTATION AND CONTROL
CABINETS AND ASSOCIATED EQUIPMENT
SECTION 17200**

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish, install, and put into satisfactory service the modifications to the Owner's existing Dechlorination Building Main Instrumentation/Control Panels and/or Distributed Control System Panels as specified herein and as shown on the Drawings.
- B. Furnish, install, and put into satisfactory service the modifications to the Owner's existing Chlorine Storage Building Main Instrumentation/Control Panels and/or Distributed Control System Panels as specified herein and as shown on the Drawings.
- C. The requirements of this Section of the Specifications applies to all of the various types of instrumentation and control cabinets/boxes as specified herein and shown on the PLANS.

1.02 RELATED REQUIREMENTS

- A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.
- B. It is the CONTRACTOR's responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other individuals or entities performing or furnishing any of CONTRACTOR's Work.
- C. Related work as called for on the PLANS, as specified herein or in other Sections of the Specifications.

1.03 SUBMITTALS

- A. Submit the following in accordance with the Section 01300 and 01730 of the Specifications:
 - 1. Shop drawings and product data. Include paint color selection chart for selection of paint color by OWNER.
 - 2. Operation and maintenance manuals.

1.04 TOOLS AND SPARE PARTS

- A. Furnish the following spare parts in conformance with the specifications:
 - 1. One set (minimum 3) of fuses for each type and size used.
 - 2. One set (minimum 3) of Circuit Breaker Overcurrent Protection Devices for each type and size used.
 - 3. Twenty (20) terminal blocks of each color and type used.

4. Four (4) control relay assemblies of each type specified, complete with all accessories.
5. Four (4) timing relay assemblies of each type specified, complete with all accessories.
6. Two (2) complete Instrument Loop Current Isolators (I/I converters) for each type specified.
7. 25 percent spare push-buttons, selector switches, indication light assemblies for each type used (minimum of 2 per type).
8. 50 percent of spare lenses and lamps for each type, color and size used (minimum of 4 per type)

PART 2 PRODUCTS

2.01 INSTRUMENT AND CONTROL CABINETS/PANELS

A. General:

1. The various instrument and control cabinets/panels shall be constructed to the approximate dimensions and instrument arrangement as shown on the PLANS. The ENGINEER will review alternate arrangements and recommendations.
2. Hinges and doors shall be capable of supporting weight of equipment mounted on doors.
3. Mounting channels and interior panels shall be provided in the cabinets for mounting terminals, relays, etc.
4. The cabinet shall be completely assembled and wired at the factory such that installation can be accomplished by connecting field wiring to terminal strips located in the panel.
5. Furnish and install both isolated and non-isolated ground bars for each cabinet. Furnish and install for each ground bus:
 - a. Required number of terminals for proper wiring in addition to 20 percent spare terminals for future connections
 - b. Isolated Ground Bus Only: 600 volt mounting isolators.
 - c. Certain microprocessor based control equipment (e.g. PLCs, etc.) will require the connection of both distorted and undistorted (isolated) ground wires. Provide this wiring as required.

B. Wall/Rack Mounted Cabinets/Panels

1. Each enclosure shall be 316 stainless steel NEMA 4X. Enclosure shall be equipped with hinged doors complete with 1/4 (quarter) turn door latches. Provide door latch handle.
2. Each enclosure door assembly shall be furnished with manufacturer's door stop kit that will hold the door open in any position between 0-130 degrees. Each door shall be electrically bonded to the frame of the associated enclosure with #8 AWG 600 volts insulated green ground wire. Utilize manufacturer's grounding device assembly. The inside of each door shall be equipped with the manufacturer's data-pocket for storing drawings and manuals.
3. Each enclosure shall be furnished with a full and solid backpanel (one piece full subpanel). The backpanel shall extend the full height and width of the cabinet/panel.

4. Cabinet/Panel manufacturer's additional hardware and component accessories shall also be provided that will result in a neat, safe, aesthetically pleasing installation. Adherence to this requirement is necessary in order to accomplish a good craftsmanship-like system installation to the satisfaction of the Owner and Engineer.
5. Each enclosure shall be as manufactured by "Hoffman" model Concept series industrial enclosures complete with specified accessories, or approved equal by "Rittal".
6. The minimum anticipated panel size for each wall/rack mounted cabinet/panel is shown on the PLANS. The Contractor shall size each cabinet/panel per the requirements of the NEC. Contractor to determine exact as-built size required for the cabinet/panel to meet the contract documents (drawings and specifications) without any additional cost to the Owner (should the final size be larger than that which was anticipated by the PLANS). Additionally, the Contractor is to carefully review the electrical/control floor plan drawing and make any adjustments/equipment rearrangements necessary to meet National Electrical Code requirements and any other safety codes adopted by the City of Austin should the cabinet/panel size be any greater/larger than the minimum size required by the PLANS. Conduit/wiring, etc. adjustment caused by any equipment rearrangement, etc. shall also be provided at no additional cost to the Owner.

2.02 INSTRUMENT AND CONTROL WIRING

- A. General wiring and control power and alarm wiring:
 1. Extra flexible, #14 AWG, tin plated copper conductor 600V insulation, SIS wire manufactured by General Cable Company, The Okonite Company or approved equal. The pigmentation of the wire insulation shall conform to the color table listed below:

<u>Wiring Function</u>	<u>Wire Jacket Color</u>
Wiring for 120 volts A.C. control/status/alarm	Red
Wiring to actuate electro-mechanical relay coils only	Gray
Wiring for 120 volts A.C. power wiring	Gray
Wiring for 24 volts D.C. power supply wiring	Blue = Positive Brown = Negative
Wiring for 120 volts A.C. light fixtures and convenience receptacles	Black = Line White = Neutral
Wiring to Discrete Input PLC modules	Violet
Wiring to Discrete Output PLC modules	Pink

- B. 4-20 Milliamp Signal wiring:
 1. Number of Pairs: One

2. Wire Size: #16 AWG
 3. Type of Conductors: Stranded copper conductors, twisted
 4. Individual Conductor Insulation: PVC
 5. Individual Conductor Insulation Color: Positive (+) is Black, Negative (-) is White
 6. Drain Wire: Tinned copper
 7. Overall Shield: Aluminum-mylar shield.
 8. Overall Jacket: PVC
 9. Overall Jack Color: Black.
 10. Manufacturer: Samuel Moore and Company, Dekoron Division, Cat. No. 1852 or approved equal.
- C. Multi-Conductor RTD Temperature Signal Wiring:
1. Number of Triads: One
 2. Wire Size: #16 AWG
 3. Type of Conductors: Stranded copper conductors, twisted
 4. Individual Conductor Insulation: PVC
 5. Individual Conductor Insulation Color: Positive (+) is Black, Negative (-) is White, Sense (S) is Red.
 6. Drain Wire: Tinned copper
 7. Overall Shield: Aluminum-mylar shield.
 8. Overall Jacket: PVC
 9. Overall Jack Color: Black.
 10. Manufacturer: Samuel Moore and Company, Dekoron Division, Cat. No. 1862 or approved equal.

2.03 INSTRUMENT AND CONTROL CABINETS EQUIPMENT

- A. Overcurrent Protection
1. General: Individually protect each device as shown on the PLANS. Furnish and install protection using the devices shown on the PLANS and as specified hereinafter.
 2. 120 volts AC circuit Protective Devices:
 - a. Ratings: 120 volts A. C., one pole. Size per NEC. Note: Use 20 ampere rating for control panel convenience receptacles.
 - b. Certifications: U. L. Listed.
 - c. Mounting: Din Rail Mountable
 - d. Indications: Visible trip indicator
 - e. Manufacturer: Allen-Bradley Series 1492-SP, Phoenix Contact, or approved equal.
 3. 24 volts DC circuit breakers:
 - a. Ratings: 24 volts DC, one pole. Size per NEC.
 - b. Certifications: U. L. Listed
 - c. Mounting: DIN rail mountable
 - d. Indications: Visible trip indicator
 - e. Manufacturer: Allen-Bradley Series 1492-GH, Phoenix Contact, or approved equal.
- B. Convenience Receptacle:
1. Furnish and install where required by the PLANS. Additional receptacle assembly features are as follows:

- a. Specification grade
 - b. Duplex, 3-wire, polarized grounding type, rated 20 amp, 125 volt, 60 Hertz
 - c. Ivory Color
 - d. Manufacturer: Hubbell No. HBL5362I, Bryant, Pass and Seymour, or approved equal.
 - e. Coverplate: 304 brushed stainless steel, as manufactured by Hubbell, Killark, or approved equal.
 - f. Install in NEMA-1 enclosure inside of the control panel.
- C. Pushbuttons, Selector Switches, Pilot Lights
- 1. General Requirements when installed indoors inside the environmentally and climate controlled ELECTRICAL ROOMS:
 - a. Rating: NEMA 4X corrosion resistant, Heavy Duty
 - b. Size: NEMA Style full size 30-millimeter (30mm),
 - c. Contacts: 10 ampere minimum at 120 volts A.C. Provide number of contacts to satisfy the requirements of the PLANS.
 - d. Legend Plate: Furnish and install per manufacturer's standard with inscription as shown on the PLANS.
 - e. Manufacturer: Allen Bradley Bulletin 800H, or approved equal.
 - 2. General Requirements when installed indoors inside STORAGE ROOMS and PROCESS MECHANICAL EQUIPMENT ROOMS and installed in ALL OUTDOOR AREAS:
 - a. Rating: NEMA 4X/13, watertight/oiltight, heavy duty, corrosion resistant, hermetically sealed and rated for use in Class I Division 2 hazardous areas (as classified by NEC).
 - b. Size: NEMA Style full size 30-millimeter (30mm),
 - c. Contacts: 5 ampere minimum at 120 volts A.C. Provide number of contacts to satisfy the requirements of the PLANS.
 - d. Legend Plate: Furnish and install per manufacturer's standard with inscription as shown on the PLANS.
 - e. Manufacturer: Allen Bradley Bulletin 800R, or approved equal.
 - 3. Additional Requirements for Selector Switch/ Pushbuttons:
 - a. Operator Color: Furnish and install the color as shown on the PLANS, black otherwise.
 - b. Selector Switch Action Type: Maintained action, unless shown otherwise on the PLANS.
 - c. Pushbutton Action Type: Momentary action, unless shown otherwise on the PLANS.
 - 4. Additional Requirements for Pilot Lights:
 - a. Type: Transformer Type Light Emitting Diode (LED),
 - b. Style: Push-to-test
 - c. Lens Color: Furnish and install the colors as shown on the PLANS.
 - 5. Additional requirements for Emergency Stop/Trip Push-Button Stations:
 - a. Action Type: Push-Pull maintained
 - b. Operator Type: Mushroom head
 - c. Operator Color: Red, unless shown otherwise on the PLANS
 - d. Padlock attachment: Furnish and install as manufactured by Allen-Bradley Bulletin Push-Pull Padlocking Attachment Catalog Number 800T-N314, or approved equal.
 - e. Padlock: Furnish and install padlock with 0.25 inch diameter padlock shackle. Coordinate the shackle diameter with the padlock attachment.

Furnish and install padlock as manufactured by Master Lock, or approved equal.

- D. Control Relays: Control relays shall be furnished and installed as required by the schematic diagrams. All control relays shall be Type I relays unless specifically noted otherwise on the PLANS or as specified hereinafter.
1. Type I Control Relays:
 - a. Type: 300 volt "Ice-Cube" type
 - b. Rated: Pilot-Duty C300 rated
 - c. Coil Voltage: 120 volts A.C.
 - d. Contact Rating: 10 ampere at 120 volts A.C.
 - e. Number and Configuration of Contacts: three Form-C Contacts (3PDT)
 - f. Position Indication: Integral LED pilot light
 - g. Manual Operator: Integral to relay
 - h. Mounting: DIN rail mountable socket
 - i. Accessories: Socket, Retaining Clip, Relay Manufacturer's Transient Voltage Suppression Module.
 - j. Manufacturer: "Allen-Bradley" Bulletin 700-HA33A1-1-4, complete with 700-HN203 socket, 700-HSV3 surge suppressor, and 700-HN151 retainer clip, or approved equal.
 - k. The following are additional requirements associated with Type I control relays:
 - 1) Of the maximum of three Form-C type contacts that are available from each Type I Control Relay, one of the Form-C contacts shall be dedicated as "spare" and wired to terminal blocks for future use by the OWNER. Multiple Type I relay coils shall not be connected in parallel in order to develop additional contacts as may be shown on the PLANS. Should the PLANS require greater than two contacts from a control relay, then furnish and install a Type II Control Relay in lieu of a Type I Control Relay.
 2. Type II Control Relays:
 - a. Type: 600 volt Heavy-Duty industrial type
 - b. Rated: NEMA rated
 - c. Coil Voltage: 120 volts A.C.
 - d. Contact Rating: 10 ampere at 120 volts A.C.
 - e. Number and Configuration of Contacts: 4 Normally Open and 4 Normally Closed, at minimum. Furnish and install one additional normally open (N.O.) and one additional normally closed (N.C.) contact, over that required by the PLANS. Field configurable type contacts.
 - f. Position Indication: Visual mechanical unlatch-latch indicator
 - g. Mounting: Provide universal mounting strip/plate for backpanel mounting.
 - h. Accessories: Relay Manufacturer's Transient Voltage Suppression Module
 - i. Manufacturer: Allen Bradley Bulletin 700-P, or approved equal.
 3. Type III Control Relays:
 - a. Type: 300 volt "Ice-Cube" type
 - b. Coil Voltage: 24 volts D.C. (nominal voltage)
 - c. Position Indication: Integral LED pilot light
 - d. Manual Operator: Integral to relay
 - e. Contact Rating: 10 ampere at 120 volts A.C.
 - f. Number and Configuration of Contacts: four (4) Form-C Contacts (4PDT)

- g. Mounting: DIN rail mountable socket
 - h. Accessories: LED indicator light, Push-to-Test button, socket and retaining clip
 - i. Miscellaneous: Used only where specifically noted on the DRAWINGS.
 - j. Manufacturer: "Allen-Bradley", catalog 700-HF34Z24-3-4, complete with relay socket base catalog number 700-HN139 and relay retaining clip 700-HN140, or approved equal.
- E. Timing Relays:
- 1. Type: Solid state, multi-time, and multi-function type relay. Both timing ranges and timing modes shall be field selectable. Each relay shall be capable of the following timing modes: On Delay, Off Delay, One Shot, Repeat Cycle, and Interval
 - 2. Coil Voltage: 120 volts A. C.
 - 3. Contact Rating: 10 amps, continuous, at 120 VAC.
 - 4. Number and Configuration of Contacts: 2 Form C (2PDT)
 - 5. Mounting: DIN rail mountable socket
 - 6. Accessories: Socket, DIN rail mountable
 - 7. Manufacturer: Square D Class 9050 model No. JCK70 complete with Type NR61 Socket, or approved equal.
- F. Single Input, Dual Output Instrument Loop Current Isolators (I/I Converters)
- 1. Number and Type of Input Signals: One 4-20mA input signal
 - 2. Number and Type of Output Signals: Two 4-20 mA isolated output signals. Integral load trimmer.
 - 3. Maximum Load: 1200 Ohms per output channel.
 - 4. Power Requirements: External 24 VDC supply as also shown on the PLANS.
 - 5. Accuracy: +/- 0.1% of full span
 - 6. Housing: Corrosion resistant metal
 - 7. Mounting: DIN rail mountable.
 - 8. Noise Protection: Provide RFI /EMI protection such that less than +/- 0.1 % of span error is incurred when tested against a reference signal of 30 volts per meter over the frequency range of 20 to 1000 MHz, inclusive.
 - 9. Transmitter Excitation: Provide with field selectable transmitter excitation option which allows the isolator to supply 24VDC power to a 2-wire instrument connected to the isolator input.
 - 10. Manufacturer: MOORE Industries Model ECT-DIN with TX, or approved equal.
- G. Single Input, Single Output Instrument Loop Current Isolators (I/I Converters)
- 1. Number and Type of Input Signals: One 4-20mA
 - 2. Number and Type of Output Signals: One 4-20mA. Integral load trimmer
 - 3. Maximum Load: 1000 Ohms
 - 4. Power Requirements: External 24 VDC supply as also shown on the PLANS.
 - 5. Accuracy: +/- 0.1% of full span
 - 6. Housing: Corrosion resistant metal
 - 7. Mounting: DIN rail mountable
 - 8. Noise Protection: Provide RFI/EMI protection such that less than +/- 0.1 % of span error is incurred when tested against a reference signal of 30 volts per meter over the frequency range of 20 to 1000 MHz, inclusive.

9. Transmitter Excitation: Provide with field selectable transmitter excitation option which allows the isolator to supply 24VDC power to a 2-wire instrument connected to the isolator input.
 10. Manufacturer: MOORE Industries Model ECT-DIN with TX option, or approved equal
- H. Instrument Control Panels/Cabinets Dual Input Single Output 24VDC Instrument Loop Power Supply:
1. Number of inputs and voltage: Two, 120 volts A.C.
 2. Number of outputs and voltage: Two, 24 volts D.C.
 3. Type: Dual Redundant primary-backup (secondary) arrangement
 4. Topology: Two switching type power supplies connected in parallel via current steering diodes with automatic switchover from the primary to the backup (secondary) power supply unit.
 5. Input Power Regulation: 0.2% from 105 to 130 VAC.
 6. Output Current, per unit: 15 ampere
 7. Output Voltage Adjustment Range: 24 to 28 VDC, field adjustable
 8. Output Voltage Ripple: 0.5% at full load, maximum
 9. Output load regulation: 0.2% maximum from zero to full load.
 10. Output Protection: Integral current limiting and over voltage
 11. Common Alarm Contact Ratings: 5 ampere at 120 volts A.C.
 12. Mounting: Provide rack/wall mounting configuration as shown on the PLANS
 13. Accessories:
 - a. Draw-out handles mounted on the face of the power supply unit.
 - b. Voltage level analog indicator, one per source (primary and redundant).
 - c. Current level analog indicator, one per source (primary and redundant)
 - d. Ventilated metal case.
 14. Manufacturer: Acopian Switching Regulated Redundant Power Package, or approved equal.
- I. Thermostat:
1. Type: Heavy Duty line voltage type, suitable for use in controlling heating and cooling circuits. Shall have field adjustable temperature setpoint and also display the measured ambient temperature.
 2. Measurement Range:
 - a. Thermostat: 40 to 90 degrees Fahrenheit
 - b. Thermometer: 50 to 90 degrees Fahrenheit
 3. Sensing Element: Liquid filled with diaphragm and lever mechanism
 4. Thermometer: Bi-metal type
 5. Number and Type of Output Contacts: One Single Pole Double Throw (SPDT), snap acting
 6. Contact Ratings:
 - a. Heating Contact: 16 ampere at 120 Vac.
 - b. Cooling Contact: 8 ampere at 120 Vac
 7. Enclosure: Thermoplastic cover, suitable for vertical or horizontal mounting configuration
 8. Accessories:
 - a. Provide temperature adjustment knob
 - b. Provide faceplate with each thermostat with temperature measured in degrees Fahrenheit. Faceplate shall include cutout such that the measured ambient temperature is visible.

- c. Mount each thermostat in a device enclosure on the enclosure backpanel in accordance with the manufacturer’s recommendations.
- 9. Manufacturer: Johnson Controls Model T26T Series Line Voltage Thermostat, or approved equal

J. Terminal Blocks:

- 1. Type: Single Layer
- 2. Rating: 600 volts A.C./D.C., 55 ampere
- 3. Wire Range: No. 22 through No. 8 AWG
- 4. Material: Nylon or polypropylene
- 5. Quantity per Foot: 37
- 6. Terminal Block Colors: Provide terminal blocks with the colors as follows:

Terminal Block Function	Terminal Block Color
Terminal Blocks for 120 volts A.C. control/status/alarm/ PLC monitoring	Red
Terminal Blocks for 120 volts A.C. power wiring	Black
Terminal Blocks for Ground wiring	Green
Terminal Blocks for 24 volts D.C. wiring	White

- 7. Manufacturer: Allen-Bradley Bulletin 1492-HM3, Phoenix Contact, or approved equal.
- 8. Accessories:
 - a. All terminal blocks shall be provided with manufacturer’s standard snap-in marker card and holder as manufactured by Allen-Bradley Bulletin No. 1492-SMN81, Phoenix Contact, or approved equal. Provide manufacturer’s standard typed adhesive terminal block tag for each terminal block.
 - b. Provide manufacturer’s standard insulating jumpers, DIN rail, barriers, end anchors, etc., and all related mounting hardware as required for a complete and functional installation. Coordinate models of terminal block accessories such as end anchors, jumpers, DIN rail, etc., with the terminal blocks as specified hereinafter for a complete and functional installation.

K. Flexible spiral wrapping: Size as required. Provide as manufactured by Electrovert Spiraband, or approved equal.

L. Plastic Wireway: Size as required. Also refer to the PLANS. Provide white color unless specified otherwise. Provide as manufactured by Panduit, or approved equal.

- M. Multi-Outlet Power Strip: Furnish and install where shown on the PLANS.
1. Shelf Mounted: Provide white color unless specified otherwise. Multi-Outlet Power Strip shall have six 15 ampere, 120 volt NEMA 5-15R receptacles, U. L. Listed, main circuit breaker and integral on/off switch and indicator light and integral 4 foot power cord. Furnish and install as manufactured by Kensington Model 50688 or approved equal.

2.04 INSTRUMENT CONTROL PANELS/CABINETS UPS:

- A. Where required by the PLANS, furnish and install the quantity of Uninterruptible Power Supply (UPS) units in each of the instrument/control/communication cabinets as shown on the PLANS. Each UPS shall be as follows:
1. The UPS shall have the apparent power rating as shown on the PLANS at minimum.
 2. Each UPS shall operate from 120 VAC input power and shall provide 120 VAC output power. The UPS shall have a capacity to deliver the continuous full load AC output current shown on the PLANS at 120 VAC for fifteen (15) consecutive minutes at minimum, after the input power is removed. The output wave form shall be 60Hz sinusoidal with 5% maximum harmonic distortion. The UPS shall be filtered with 0.3% IEEE surge let-through and zero clamping response time, complying with UL 1449 requirements. The output shall have over current protection with latched shutdown.
 3. The UPS shall consist of a field configurable bypass mode for automatic or manual bypass to the AC input source
 4. The UPS shall consist of automatic self test, executed on start up and at regular intervals (minimum of once per 14 days), and fault detection LED annunciating self test failure. Upon inverter module failure, the UPS shall automatically direct connect the connected load to the input power source and bypass the inverter module.
 5. The UPS shall consist of automatic voltage regulation to maintain its sine wave output in accordance to these specifications. The settings for the UPS AC input source voltage high and low values to initiate transfer to battery power shall be field adjustable.
 6. The UPS shall have the following front panel indications (LED type) and alphanumeric display:
 - a. UPS On Status
 - b. Fault
 - c. On Battery
 - d. Bypass
 - e. Battery Replacement Needed
 7. The UPS shall have the following audible alarms:
 - a. UPS failure
 - b. Battery failure
 - c. Power loss to the UPS
 8. The UPS shall have the following front panel mounted push buttons:
 - a. Energizing UPS
 - b. De-energizing UPS
 - c. Manual UPS Self test initiation
 9. The batteries shall be maintenance-free, fumeless, sealed, leak proof batteries that are accessible for replacement by the OWNER. The batteries shall be rated for use in Computer Rooms (by NFPA and all other Safety Codes).

Batteries shall have maximum of five (5) hours to charge to 95 percent capacity. Provide battery extension cabinet where required to obtain a minimum duration runtime of fifteen (15) minutes for the connected load in the event of a power loss and where shown on the PLANS.

10. The UPS shall be provided with a manufacturer's standard external maintenance bypass switch. The external maintenance bypass switch shall be sized such to carry the full load current of the UPS inclusive of inrush current, at minimum. Also refer to the requirements shown on the PLANS. The maintenance bypass switch shall be installed in such a manner that the selector switch is accessible from the front of the control cabinet. Provide any additional accessories necessary to facilitate the installation of the maintenance bypass switch.
11. The UPS and the battery backup units shall be installed in a NEMA-12 enclosures
12. The UPS shall be able to operate from 0 to 40 degrees C.
13. Accessories:
 - a. The UPS shall consist of a relay I/O module which provides 24VDC, 1A rated relay output contacts. At minimum, the card shall consist of a dry contact indicating UPS fault, and a dry contact indicating requirement for Battery Replacement. Wire the UPS fault alarm, the battery replacement alarm, and the UPS in bypass status in series to a 24VDC rated Type II control relay as specified in section 17200. An alarm contact from the 24VDC UPS fail relay shall be wired as a discrete input into the programmable logic controller to indicate a UPS common trouble/fail alarm. Also refer to PLANS for wiring to the UPS relay I/O module.
 - b. The UPS shall be provided with all necessary interconnecting cables, connectors, Windows compatible configuration software (if necessary), for a complete and functional installation.
 - c. Provide all 19 inch rack mounting brackets, miscellaneous mounting hardware to facilitate the mounting shown on the PLANS. Provide for the mounting configuration as shown on the PLANS. Mount UPS within the control cabinet, without obstructing access to components within cabinet. Install UPS in accordance to manufacturers requirements and recommendations, including proper UPS power termination, ventilation, and cooling.
14. The UPS shall have a two (2) year manufacturer's warranty at minimum after the final completion of the project
15. The UPS shall be as manufactured by Eaton Model 9PX Series UPS with external maintenance bypass switch Eaton HotSwap MBP Model EHBPL****R-PDU1U (where **** is based on UPS rating shown on the PLANS), and Relay Interface Card Eaton Model No. Relay-MS , or approved equal.

2.05 IDENTIFICATION

- A. Instrument and Control Devices Identification
 1. General:
 - a. The device designations shall agree with those shown on the PLANS.
 - b. Each device shall be provided with permanent type identifying nameplate.
 - c. Nameplates:

- 1) Type: 3-ply, 1/8" thick, rigid thermoset phenolic resin laminated cellulose paper base engraving stock per ASTM D-709, Type I. Nameplates shall be ASTM Grade ES-1, ES-2, or ES-3 as applicable for the face and lettering colors specified hereinafter. Flexible or acrylic tags will be not be accepted.
 - 2) Color: White-Black-White, unless shown otherwise on the PLANS.
 - 3) Lettering: 1/4 inch height minimum unless shown otherwise on the PLANS, engraved through the face layer to the melamine middle layer.
 - 4) Accessories: Provide holes for mechanical fastening.
2. Devices located on the face of, on the back, or inside of instrument control cabinets/panels:
 - a. Devices which penetrate the door shall be provided with two nameplates, one located on face of the door and one located on the rear of the door.
 - b. Nameplates located on the panels/cabinets face shall be secured with two Type 316-Stainless Steel screws.
 3. Field mounted control and instrument devices:
 - a. Securely hang nameplates from each instrument/control device by a flexible stainless steel snap-on type hanger/key-chain cord (neatly drill a hole through the top of the identification nameplate for this purpose).

B. Wire Tag:

1. Rating: Flame-Retardant,
2. Style: Heavy-Duty Industrial Grade
3. Type: Heat Shrinkable type.
4. Character Height: 1/8 inch.
5. Maximum Length: 2 inches.
6. Text Type: Typed with indelible marking process. Handwritten shall not be accepted.
7. Color: Yellow. Exception: Use White for 120 volts A.C. power circuits to instrument/devices, and branch circuit lighting and convenience receptacle circuits.
8. Manufacturer: "Raychem type Heavy-Duty Industrial Grade ShrinkMark Heat-Shrinkable Marking Sleeves", or approved equal. Utilize "Raychem" Portable-Marking-System" complete with wire tag cartridges, or approved equal.

2.06 MISCELLANEOUS

- A. Corrosion Resistant and Moisture Repelling Electrical Coating/Spray:
 1. Color: Clear. Coordinate spray color with the Owner. Furnish and install the color requested by the Owner at No Additional Cost to the Owner.
 2. Type: Corrosion resistant and moisture repellent fast drying spray coating sealant
 3. Manufacturer: "3M" 1601 Clear-Color Fast Drying Sealer and Insulator, or approved equal.

PART 3 EXECUTION**3.01 STORAGE**

- A. Storage: Refer to Section 17100.

3.02 PANEL ASSEMBLY

- A. All panel assembly, internal wiring, device installation, tagging, etc. shall be accomplished by the ICS prior to shipment. All wiring shall be connected as shown on PLANS and all systems shall be thoroughly checked out prior to shipment of the panel to the site. Additional requirements are as described below.
- B. Termination and Routing of Wiring:
1. Prior to being connected to any instrument or switch, all incoming wiring shall be terminated to terminal blocks located on an interior panel. Although multiple types of terminal blocks are specified, not all types may be used for this project. Terminal block application shall be limited as follows:
 - a. Type I Terminal Blocks: All proposed control panels/cabinets specified herein.
 - b. Type II Terminal Blocks: Used at the discretion of packaged control system manufacturer as defined in Section 13390 for process/mechanical equipment with packaged control systems.
 - c. Type III Terminal Blocks: Used at the discretion of packaged control system manufacturer as defined in Section 13390 for process/mechanical equipment with packaged control systems.
 2. Provide separate terminal blocks for power wiring, from control/discrete signal wiring, and from analog/instrument wiring. Additionally, segregate and isolate analog/instrument terminal strips from control/discrete signal wiring terminal strips from power wiring terminal strips.
 3. Terminate shield wire of each shielded cable to a terminal point (block) on the terminal strip (i.e., treat as current carrying conductor), with each shield terminated to a dedicated terminal block. Extend No. 14 AWG insulated green ground wire from each shielded cable shield termination terminal point to the isolated main ground bar of the cabinet (shield/drain wire ground).
 4. Wire spare contacts of each device (i.e., control relays, timing relays, selector switches, indicating/controlling instruments/devices, etc.) to terminal blocks for future use by the OWNER.
 5. Tag each terminal block. All tags must be typed and neatly attached to the marking surface.
 6. Tag each terminal strip/string of terminal blocks with nameplates as previously specified.
 7. Terminal blocks shall have the colors previously specified according to the function of the terminal block.
 8. Utilize manufacturer's standard terminal block insulated side jumpers for making connections between adjacent terminal blocks.
 9. Route all wiring from a device (instrument, relay contact, push button, etc.) through the terminal block to the other device (instrument, relay contact, push button, etc.) rather than directly from one device to the other.
 10. All wiring shall be neatly bundled, laced together and routed as required throughout the cabinet. Enclose wiring routed against the back panel in plastic

wireways where possible. Otherwise, group where possible and wrap with flexible wire wrapping or waxed twine. Wiring routed on doors shall be routed such that the door can be fully opened without stressing the wiring.

11. Wire entering the cabinets shall enter through the floor, the side and/or the top of the cabinets via conduits with bushings or hubs.
12. Also refer to and comply with the requirements of the PLANS.

C. Wire Tagging

1. Tag each wire at each end.
2. Tag each wire in multi-conductor cable in addition to the overall cable.
3. Heat shrink all wire tags.
4. Wire Tag Content:
 - a. Wiring of each equipment (such as Distribution Service Pump, Pump Discharge Control Valve, etc.) within the facility must be tagged different from any other equipment
 - b. Terminal block terminal designation must be included in the wire tag.
 - c. To represent all of the text to be shown, multiple wire tags may be needed at each end of the wire. Provide additional tags as necessary at no additional cost to the OWNER.
 - d. Provide per Section 16200 "Wiring (600 volt and Below)", subsection 3.03 "Wire Tagging Methodology".

D. After all wiring connections have been made, the Contractor shall apply the Corrosion Resistant and Moisture Repelling Electrical Coating/Spray to all wiring connections. Coordinate application with the Owner. The extent of spray application is further clarified as follows:

1. Spray shall be applied for all terminations of the following types of connections at a minimum:
 - a. termination points, terminals, terminal blocks, ground bar, neutral bar/bus,
 - b. lugs of circuit breakers, buses, doors, etc.
 - c. exposed/stripped ends of each conductor, etc.
 - d. bolt-on connections, split-bolt connections, ring lugs, etc.
 - e. compression connectors, connector blocks, etc.
 - f. all other connection types not listed above
2. Spray shall be applied for all terminations at the following types of equipment at a minimum:
 - a. Local and main control panels, field instruments, junction boxes, field control stations, control relays, signal isolators, selector switches, pushbuttons, etc.,
 - b. Panelboards, transformers, motor control centers, manual motor starters, contactors, light switches, light fixtures, etc.
 - c. Motor termination enclosures, valve actuators, cathodic protection system, package control panels of process equipment, etc.
 - d. Security system devices, cameras, roadway gate operators, etc.
 - e. Convenience receptacles, scada receptacles, etc.
 - f. All other types of equipment not listed above.

3.03 FIELD INSTALLATION

- A. Install the panels in the locations shown on the PLANS. Also refer to the installation details shown on the PLANS.

- B. All wiring shall be connected as shown on PLANS and all systems shall be thoroughly checked out.
- C. Install all equipment in accordance with the drawings and instructions furnished by the manufacturer.
- D. Inspect each new instrument, control component, etc., before installation. Replace deficient items.
- E. Touch-up and restore damaged surfaces to factory finish to match existing.

3.04 INSTALLATION REPORT

- A. After installation, the manufacturer's representatives shall inspect the installation and prepare a report or reports to include the following:
 - 1. A list of all deficiencies found.
 - 2. Recommend corrective action for all deficiencies.
 - 3. Certification that the item or system is properly installed, except as noted.

3.05 FIELD CALIBRATION AND TESTING

- A. Calibrate instruments and prepare calibration reports. All calibration shall be performed by factory-trained technical personnel. Calibration shall be witnessed by OWNER.
- B. The complete system shall be tested by an experienced factory-trained technical person. All system tests shall be witnessed by OWNER.
- C. Perform the following tests using simulated inputs:
 - 1. Check the overall system and each subsystem to see that they function as specified based on simulated inputs at each sensor and at each set of field contacts monitored. This check shall include the testing of all automatic functions, sounding of alarms, shutdowns, etc.
 - 2. Check the overall accuracy of each new and modified instrument loop to ensure that it is within acceptable tolerance.
- D. If defects are found under simulated conditions, make corrections and retest.
- E. After start-up, test the complete system under actual conditions to determine that all specified functions can be performed.
- F. After completion of testing, submit a System Test Report. This report shall include:
 - 1. Certification that the system is operating correctly and within tolerances.
 - 2. Listing of calculated tolerances for each new and modified instrument loop.

3.06 OPERATION AND MAINTENANCE TRAINING

- A. Start-up Training: Provide required instruction to the OWNER's personnel during start-up period.
- B. Special Training School: Provide services of a factory-trained instructor or instructors for a period of not less than two (2) working days for the purpose of

instructing the OWNER's personnel in the correct operating and maintenance procedures for all the instrument and hard-wired control system components and the entire Instrumentation and Control System, and Communications System including the various instrument and control system cabinets/panels installed in this project. The date of this school shall be scheduled with the OWNER, but will be after the entire instrument and control systems is in operation.

END OF SECTION

FIBERGLASS REINFORCED PLASTIC DUCTWORK

Section SS23311

PART 1 -- GENERAL

1.1 SUMMARY

- A.** Remove and dispose of existing FRP ductwork as shown in the Drawings.
- B.** The CONTRACTOR shall furnish and install fiberglass reinforced plastic (FRP) duct and all appurtenances, complete and in place, all in accordance with the requirements of the Drawings.

1.2 RELATED WORK

- A.** Plans and Project Manual for the "Walnut Creek WWTP Gas Scrubber System Renewal" Project, CLMP187.

1.3 REFERENCED SPECIFICATIONS, CODES, AND STANDARDS

- A.** Fiberglass reinforced plastic ductwork and accessories shall be constructed and inspected according to the following standards:
 - 1.** ASTM D 3567 – Practice for Determining Dimensions of "Fiberglass" (Glass Fiber Reinforced-Thermosetting-Resin) Pipe and Fittings.
 - 2.** ASTM C 582 – Standard Specification for Contact-Molded Reinforced Thermosetting Plastic (RTP) Laminates for Corrosion Resistant Equipment.
 - 3.** ASTM D 2563-70 – Standard Practice for Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts.
 - 4.** ASTM D 3982 – Standard Specification for Contact Molded "Fiberglass" Duct and Hoods or NBS PS 15-69 Custom Contact-Molded Reinforced Polyester Chemical-Resistant Process Equipment.
 - 5.** ASTM D 2310 – Standard Classification for Machine-Made "Fiberglass" Pipe.
 - 6.** ASTM D 2583 – Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
 - 7.** ASTM D 2996 – Specification for Filament-Wound "Fiberglass" (Glass Fiber-Reinforced Thermosetting Resin) Pipe
 - 8.** ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials
 - 9.** 2018 Uniform Mechanical Code
- B.** In the event of conflict between these references, the most appropriate and stringent source shall be followed.

1.4 SUBMITTALS

- A.** Shop Drawings
 - 1.** The CONTRACTOR shall submit Shop Drawings of duct and fittings in accordance with the requirements in this Section, and according to Section 01300 Submittals (09/17/18 version) of the Contract Specifications.
- B.** Additional Submittal Information

Special Specifications

1. The CONTRACTOR shall submit a copy of this specification with check-marks by each line to show full compliance or a note with attached supporting information noting any deviation for Engineer review.
2. Submit product data on all products proposed for installation under this section.
3. Statement of resins and reinforcing proposed for use along with resin and reinforcing manufacture's product literature.
4. Manufacture's data and descriptive literature for duct accessories.
5. A letter from the resin supplier stating that the material used for this project complies with the specification and meets all corrosion requirements.
6. Shop drawings depicting the following information:
 - a. Dimensioned duct layout.
 - b. Location of supports, hangers, anchors, guides and expansion joints.
 - c. Joints used at each connection and detail of each joint type.
7. Design calculations performed by the manufacturer and stamped by a Professional Engineer for record purposes.
8. Samples shall be representative of the ductwork (construction method and material used) to be supplied on this project.
9. Joint fabrication and/or installation instructions.
10. Detailed information regarding any proposed design modifications.

1.5 QUALITY ASSURANCE

- A. Work shall be performed in a neat, proficient manner by skilled workers experienced in the fabrication and installation of ductwork systems of similar complexity.
- B. The CONTRACTOR shall demonstrate experience on at least 5 projects requiring similar fabrication and installation methods. Both the Fabricator and the Installer shall have a minimum of five years' experience for similar projects.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Material shall be delivered and stored on the Project site in a manner to protect from dirt, moisture, and physical damage. The CONTRACTOR shall be responsible for providing on-site storage facilities.
- B. Do not install materials damaged prior to installation. Replace damaged materials with new materials.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate demolition and installation schedule of ductwork with overall construction schedule.
- B. Coordinate installation locations of ductwork with the work of other traders to maximize accessibility and, where necessary, operability and maintainability of all process and building systems.

PART 2 -- PRODUCTS

2.1 GENERAL

- A.** Manufacturer: Provide FRP duct as manufactured by one of the following w/o exception: Belco Manufacturing, Ershings, Bondstrand, Fibercast, Tankinetics, Augusta Fiberglass, Industrial Plastic Systems, Viron, Beetle Plastics, All Plastics and Fiberglass Products or Harrington. All equipment (ducts, dampers, and fittings) shall be the product of a single manufacturer. Out-sourcing of fabrication or parts of the system will not be accepted.
- B.** Service Conditions:
 - 1.** Duct Contents: Sulfur dioxide gas with concentrations up to 500,000 ppmv.
 - 2.** Ambient Temperature: -10 to 120 degrees F.
 - 3.** Gas Temperature: Ambient.
 - 4.** Location: Outdoor exposed and indoors. See Drawings.
 - 5.** Wind Load: Per International Building Code.
 - 6.** Seismic Requirements: Per International Building Code.
 - 7.** All equipment shall be designed for a minimum working pressure of 5 inch WC Positive and 12 inch WC Negative pressure.
 - 8.** The minimum wall thickness for all FRP duct shall conform to the following:
 - a.** Wall thickness for internal positive pressure should be determined by ASTM 2310 using duct manufacturers Certified ASTM 2992 HDB test results. A full copy of the HDB testing should be submitted with the wall thickness calculations.
 - b.**

Duct Inside Diameter (inches)	Minimum Wall Thickness (inches)
3 – 16	0.1875
18 – 24	0.220
30 – 36	0.250
 - 9.** Duct Support Criteria
 - a.** Maximum Duct Deflection: 1/2-inch (between supports).
 - b.** Support spacing shall be as shown on the Drawings, but shall not exceed 10 feet unless noted on the Drawings.
 - 10.** Unless stated otherwise, all remaining aspects of the duct design shall be in accordance with ASTM D 3982.
 - 11.** Resin:
 - a.** Resin shall be a premium grade vinylester product formulated to withstand chemical and environmental exposures and temperature range listed above. All duct shall meet a flame spread rating of 25 or less in accordance with ASTM E 84. Fillers, which shall be permitted only for flame retardance, shall not exceed five percent by weight. Vinylester resin shall be Derakane 510C, Hetron FR992, Corezyn 8440 or Reichhold FR 9300. No alternate resins shall be allowed for construction of duct.

12. Reinforcement:

- a.** Surfacing veil shall be C glass veil with a silane finish and a styrene soluble binder.
- b.** Chopped strand mat shall be Type E glass minimum 1-1/2-oz/ft² with silane finish and styrene soluble binder.
- c.** Continuous roving for chopper gun spray up shall be Type E glass.
- d.** Woven roving shall be Type E glass minimum 24-oz/yd² with a five by four weave.
- e.** Continuous roving for filament winding shall be Type E glass with a silane finish.

C. Construction:

- 1.** All FRP duct shall be filament wound or contact molded, glass fiber reinforced vinylester resin pipe with a reinforced vinylester resin liner. Filament wound construction shall conform with the requirements of ASTM D 2996. Contact molded construction shall conform with the requirements of ASTM C 582 and ASTM D 3982.
- 2.** Maximum allowable deflection for any size ductwork shall be 1/2-in between supports and for any size of duct under worst case operating conditions.
- 3.** FRP ductwork shall be designed using a safety factor of 4 to 1 for pressure and 2 to 1 for vacuum without exception.
- 4.** Out-of-roundness of duct shall be limited to 1 percent of the diameter.
- 5.** Length of all flanged duct sections shall not vary more than \pm 1/2-in at 70 F.
- 6.** All un-flanged duct shall be square on the ends in relation to the center axis within \pm 1/8-in up to and including 24-in diameter and within \pm 3/16-in for all diameters greater than 24-in.
- 7. Laminates:**
 - a.** All ductwork shall have a resin-rich inner surface, an interior corrosion barrier, an interior structural layer and an exterior corrosion layer, and UV resistant coating.
 - b.** Inner surface: Nominal 10 mils thick composed of a single ply of the C glass surfacing veil embedded in a resin-rich surface. Resin content shall be 90 percent.
 - c.** Interior layer: Nominal 90 mils thick composed of at least two layers of chopped strand mat or equivalent chopped strand. Resin content shall be 75 percent.
 - d.** Structural layer: Type E glass to meet minimum wall thickness as specified. The total wall thickness includes the inner surface.
 - 1)** Contact molded structural layer shall include alternate layers of chopped strand mat and woven roving.
 - 2)** Filament wound structural layer shall be preceded by a layer of chopped strand mat or spray chop. The structural layer shall consist of a minimum of two complete cross hatched layers of continuous filaments

Special Specifications

applied in a helix angle of 55 to 65 degrees for above-ground ductwork and 75 degrees for any buried ductwork.

- e. Exterior corrosion layer: Single A or C Veil shall be applied to all duct exterior.
 - f. Exterior UV resistant coating: Factory applied paraffinated gel coat with UV inhibitors. Color shall be determined by the Engineer.
- 8. Fittings:**
- a. All fittings shall be hand lay-up construction fabricated from the same resin and have the same strength as hand lay-up FRP ductwork.
 - b. The internal diameter of all fittings shall be equal to the adjacent duct.
 - c. The tolerance on angles of all fittings shall be ± 1 degree up to and including 24-in diameter and $\pm 1/2$ degree for 30-in diameter and above.
- 9. Elbows:**
- a. The centerline radius of all elbows shall be 1-1/2 times the diameter.
 - b. Elbows 24-in diameter and smaller shall be smooth radius. Elbows 30-in and larger shall be mitered. Provide a minimum of two mitered joints (3-piece) for all elbows above 45 degrees.
- 10. Flanges:**
- a. Provide flanged connections to flexible connectors, expansion joints, vessels, demisters, fans, silencers, and other locations as shown on the Drawings.
 - b. Flanges shall be hand lay-up construction. Dimensions shall be in accordance with ASTM D 3982, Table 1, and the Duct Dimension Schedule.
 - c. Flanges shall be drilled in accordance with ASTM D 3982, Table 1. Backs of flange face shall be flat so that washer seats fully on bolt face and flange backing.
 - d. Flange tolerances shall be in ASTM D 3982, Section 8, Tolerances.
 - e. Gaskets shall be EPDM, full face and minimum 1/8-in thickness.
 - f. All bolts, nuts and washers shall be Type 316 stainless steel.
- 11. Joints:**
- a. Provide all butt and strap joints in accordance with ASTM D 3982, Table 2, and manufacturer's drawings.
 - b. Field weld kits shall be supplied by the duct manufacturer. All necessary fiberglass and reinforcing material shall be supplied pre-cut and individually packaged for each joint. Bulk Glass rolls will not be acceptable.
 - c. All resin, catalyst and putty shall be supplied in quantities to complete all field joints plus 20 percent extra for waste.
- 12. Expansion joints**
- a. Provide expansion joints where shown on the Drawings.
 - b. Expansion joints shall be manufactured by Mercer Rubber, RM-Holz, The Metraflex Company, or equal.

Special Specifications

- c. Expansion joints shall be flanged where connecting ductwork to equipment; otherwise, slip-type will be acceptable.

13. Flexible Connectors

- a. Manufactures: Subject to compliance with requirements, provide products by one of the following: Ductmate Industries, Inc., Duro Dyne, Inc., Elgen Manufacturing, Ventfabrics, Inc., Ward Industries, Inc., a division of Hart & Cooley, Inc.
- b. Materials: Flame-retardant or noncombustible fabrics.
- c. Coatings and Adhesives: Comply with UL 181, Class 1
- d. Outdoor System, Flexible Connector Fabric: Glass fabric double-coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
 - 1) Minimum Weight: 24 oz./sq. yd.
 - 2) Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
 - 3) Service Temperature: Minus 50 to plus 250 deg F.

PART 3 -- EXECUTIVE

3.1 GENERAL

- A. Transitions shall be made with a slope not exceeding 1:4 where space permits.
- B. Ductwork shall be assembled from manufactured sections of duct and fittings.
- C. Ductwork joints shall be made-up in accordance with the duct fitting manufacturer's installation instructions.
- D. All transitions shall be flat on bottom unless otherwise noted.

3.2 INSTALLATION

- A. Verify dimensions and conditions in the field prior to preparing shop drawings and fabricating duct.
- B. All duct and fittings shall be thoroughly cleaned and inspected prior to installation and shall be kept clean until installed.
- C. Cut, fit and install duct in accordance with manufacturer's recommendations.
- D. Seal cut edges with compatible resin.
- E. Field Joints: Provide material for field joints in kit form; one kit for one joint.
- F. Ductwork shall be installed level, plumb and true.

3.3 DUCT SUPPORT AND HANGERS

- A. The CONTRACTOR shall be responsible for selecting and locating all outdoor supports and hangers. CONTRACTOR shall also select and locate all saddle types to ensure provision is made for adequate duct compression and expansion.

3.4 FIELD QUALITY CONTROL

- A. All ductwork shall be leak tested in accordance with SMACNA Air Duct Leakage Test Manual. Duct system shall be sealed to provide a system that is within an allowable leakage limit of 2.5 percent of total air flow at system operating flow and pressure. The ductwork test report shall be submitted to the Engineer.

Special Specifications

- B.** If the system is tested in sections, the leakage rates shall be added to define the performance of the whole system.

END

COMMON WORK RESULTS FOR HVAC
Special Specification Section SS230500

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A.** This Section includes the following:
 - 1.** Piping materials and installation instructions common to most piping systems.
 - 2.** Transition fittings.
 - 3.** Dielectric fittings.
 - 4.** Mechanical sleeve seals.
 - 5.** Sleeves.
 - 6.** Escutcheons.
 - 7.** Grout.
 - 8.** Equipment installation requirements common to equipment sections.
 - 9.** Painting and finishing.
 - 10.** Concrete bases.
 - 11.** Supports and anchorages.

1.3 DEFINITIONS

- A.** Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B.** Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C.** Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D.** Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
- E.** Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F.** The following are industry abbreviations for plastic materials:
 - 1.** CPVC: Chlorinated polyvinyl chloride plastic.
 - 2.** PE: Polyethylene plastic.
 - 3.** PVC: Polyvinyl chloride plastic.

- G.** The following are industry abbreviations for rubber materials:
 - 1.** EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 2.** NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A.** Submit shop drawings in accordance with the requirements of Section 01300 of the Contract Specifications.
- B.** Product Data: For the following:
 - 1.** Transition fittings.
 - 2.** Dielectric fittings.
 - 3.** Mechanical sleeve seals.
 - 4.** Escutcheons.
- C.** Welding certificates.

1.5 QUALITY ASSURANCE

- A.** Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B.** Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A.** Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B.** Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

- A.** Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.
- B.** Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C.** Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A.** In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1.** Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

- A.** Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.
- B.** Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A.** Refer to individual Division 23 piping Sections for special joining materials not listed below.
- B.** Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1.** ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
 - a.** Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b.** Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2.** AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C.** Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D.** Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E.** Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- F.** Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 DIELECTRIC FITTINGS

- A.** Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B.** Insulating Material: Suitable for system fluid, pressure, and temperature.
- C.** Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
 - 1.** Manufacturers:
 - a.** Capitol Manufacturing Co.
 - b.** Central Plastics Company.
 - c.** Eclipse, Inc.
 - d.** Epco Sales, Inc.
 - e.** Hart Industries, International, Inc.
 - f.** Watts Industries, Inc.; Water Products Div.
 - g.** Zurn Industries, Inc.; Wilkins Div.

- D.** Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
 - 1.** Manufacturers:
 - a.** Capitol Manufacturing Co.
 - b.** Central Plastics Company.
 - c.** Epco Sales, Inc.
 - d.** Watts Industries, Inc.; Water Products Div.
- E.** Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - 1.** Manufacturers:
 - a.** Advance Products & Systems, Inc.
 - b.** Calpico, Inc.
 - c.** Central Plastics Company.
 - d.** Pipeline Seal and Insulator, Inc.
 - 2.** Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.
- F.** Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
 - 1.** Manufacturers:
 - a.** Calpico, Inc.
 - b.** Lochinvar Corp.
- G.** Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.
 - 1.** Manufacturers:
 - a.** Perfection Corp.
 - b.** Precision Plumbing Products, Inc.
 - c.** Sioux Chief Manufacturing Co., Inc.
 - d.** Victaulic Co. of America.

2.5 MECHANICAL SLEEVE SEALS

- A.** Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - 1.** Manufacturers:
 - a.** Advance Products & Systems, Inc.
 - b.** Calpico, Inc.
 - c.** Metraflex Co.

- d. Pipeline Seal and Insulator, Inc.
- 2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
- 3. Pressure Plates: Plastic Carbon steel. Include two for each sealing element.
- 4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.6 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

2.7 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.
- C. One-Piece, Floor-Plate Type: Cast-iron floor plate.
- D. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.8 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

2.9 PAINTS, ADHESIVES AND SEALANTS

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

- C.** Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D.** Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E.** Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F.** Install piping to permit easy valve servicing.
- G.** Install piping at indicated slopes.
- H.** Install piping free of sags and bends.
- I.** Install fittings for changes in direction and branch connections.
- J.** Install piping to allow application of insulation.
- K.** Select system components with pressure rating equal to or greater than system operating pressure.
- L.** Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - 1.** New Piping:
 - a.** Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b.** Insulated Piping: One-piece, stamped-steel type with spring clips.
 - c.** Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - d.** Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type and set screw.
 - e.** Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - f.** Bare Piping in Equipment Rooms: One-piece, stamped-steel type with set screw or spring clips.
 - g.** Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- M.** Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
 - 1.** Cut sleeves to length for mounting flush with both surfaces.
 - a.** Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2.** Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 3.** Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

- a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
 - 1) Seal space outside of sleeve fittings with grout.
 - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint.
 - N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 - 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
 - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
 - O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
 - P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.
 - Q. Verify final equipment locations for roughing-in.
 - R. Refer to equipment specifications in other Sections of these Specifications and manufacturers data for roughing-in requirements.
- 3.2 PIPING JOINT CONSTRUCTION**
- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
 - B. Ream ends of pipes and tubes and remove burrs. Bevelclai plain ends of steel pipe.
 - C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

3.3 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with no interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING

- A. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.6 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions.
 - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
 - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
 - 3. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 5. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 - 6. Use 3000-psi, 28-day compressive-strength concrete and reinforcements.

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.
- B. Field Welding: Comply with AWS D1.1.

3.8 GROUTING

- A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.

Special Specification

- B.** Clean surfaces that will come into contact with grout.
- C.** Provide forms as required for placement of grout.
- D.** Avoid air entrapment during placement of grout.
- E.** Place grout, completely filling equipment bases.
- F.** Place grout on concrete bases and provide smooth bearing surface for equipment.
- G.** Place grout around anchors.
- H.** Cure placed grout.

END

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

Special Specification Section SS230529

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Steel pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Metal framing systems.
 - 4. Thermal-hanger shield inserts.
 - 5. Fastener systems.
 - 6. Equipment supports.
- B. See Division 23 Section "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

- A. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7
 - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel pipe hangers and supports.
 - 2. Thermal-hanger shield inserts.
 - 3. Powder-actuated fastener systems.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze pipe hangers. Include Product Data for components.
 - 2. Metal framing systems. Include Product Data for components.
 - 3. Equipment supports.
- C. Welding certificates.

1.6 QUALITY ASSURANCE

- A.** Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B.** Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A.** In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1.** Manufacturers: provide products by one of the manufacturers specified.

2.2 STEEL PIPE HANGERS AND SUPPORTS

2.3 METAL PIPE HANGERS AND SUPPORTS

- A.** Carbon-Steel Pipe Hangers and Supports:
 - 1.** Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2.** Galvanized Metallic Coatings: Pregalvanized or hot dipped.
 - 3.** Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - 4.** Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 5.** Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel
- B.** Manufacturers:
 - 1.** B-Line Systems, Inc.; a division of Cooper Industries.
 - 2.** Empire Industries, Inc.
 - 3.** Globe Pipe Hanger Products, Inc.
 - 4.** Grinnell Corp.
 - 5.** National Pipe Hanger Corporation.
 - 6.** Piping Technology & Products, Inc.

2.4 METAL FRAMING SYSTEMS

- A.** MFMA Manufacturer Metal Framing Systems:
 - 1.** Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a.** Cooper B-Line, Inc.
 - b.** Thomas & Betts Corporation.
 - c.** Unistrut Corporation; Tyco International, Ltd.
 - 2.** Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
 - 3.** Standard: MFMA-4.
 - 4.** Channels: Continuous slotted steel channel with inturned lips.

5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel
7. Metallic Coating: galvanized

2.5 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.6 THERMAL-HANGER SHIELD INSERTS

- A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.
- B. Manufacturers:
 1. Carpenter & Paterson, Inc.
 2. ERICO/Michigan Hanger Co.
 3. PHS Industries, Inc.
 4. Pipe Shields, Inc.
 5. Rilco Manufacturing Company, Inc.
 6. Value Engineered Products, Inc.
- C. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with vapor barrier.
- D. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass.
- E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- G. Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.7 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 1. Manufacturers:
 - a. Hilti, Inc.
 - b. ITW Ramset/Red Head.
 - c. Masterset Fastening Systems, Inc.
 - d. MKT Fastening, LLC.
 - e. Powers Fasteners.

- B.** Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

- 1.** Manufacturers:

- a.** B-Line Systems, Inc.; a division of Cooper Industries.
- b.** Empire Industries, Inc.
- c.** Hilti, Inc.
- d.** ITW Ramset/Red Head.
- e.** MKT Fastening, LLC.
- f.** Powers Fasteners.

2.8 EQUIPMENT SUPPORTS

- A.** Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.9 MISCELLANEOUS MATERIALS

- A.** Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- B.** Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1.** Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2.** Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A.** Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.
- B.** Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- C.** Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.
- D.** Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.
- E.** Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- F.** Use padded hangers for piping that is subject to scratching galvanic or electrolysis erosion.
- G.** Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1.** Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.

Special Specification

2. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.
 3. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
- H.** Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.
- I.** Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
- J.** Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
 3. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 4. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
- K.** Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- L.** Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
- M.** Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

3.2 HANGER AND SUPPORT INSTALLATION

- A.** Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B.** Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
 - 1.** Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
 - 2.** Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
- C.** Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
- D.** Thermal-Hanger Shield Installation: Install in pipe hanger or shield for all insulated piping.
- E.** Fastener System Installation:
 - 1.** Install powder-actuated fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 - 2.** Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- F.** Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- G.** Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- H.** Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- I.** Install lateral bracing with pipe hangers and supports to prevent swaying.
- J.** Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- K.** Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- L.** Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.
- M.** Insulated Piping: Comply with the following:
 - 1.** Attach clamps and spacers to piping.

Special Specification

- a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.
2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
 5. Insert Material: Length at least as long as protective shield.
 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make smooth bearing surface.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

- A.** Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

- A.** Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1.** Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B.** Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END

TESTING, ADJUSTING, AND BALANCING FOR HVAC
Special Specification Section SS230593

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes TAB to produce design objectives for the following:
 - 1. All testing and balancing shall be performed by third party contractor provided by The General Contractor. The third party contractor will perform Testing and Balancing as required by this specification.
 - a. Variable-volume air systems.
 - 2. Hydronic Piping Systems:
 - a. Constant-flow systems.
 - 3. HVAC equipment quantitative-performance settings.
Verifying that automatic control devices are functioning properly.
 - 4. Reporting results of activities and procedures specified in this Section.

1.3 DEFINITIONS

- A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to indicated quantities.
- C. Barrier or Boundary: Construction, either vertical or horizontal, such as walls, floors, and ceilings that are designed and constructed to restrict the movement of airflow, smoke, odors, and other pollutants.
- D. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.
- E. NC: Noise criteria.
- F. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.
- G. RC: Room criteria.
- H. Report Forms: Test data sheets for recording test data in logical order.
- I. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.
- J. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.
- K. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

- L.** System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.
- M.** TAB: Testing, adjusting, and balancing.
- N.** Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- O.** Test: A procedure to determine quantitative performance of systems or equipment.
- P.** Testing, Adjusting, and Balancing (TAB) Firm: The entity responsible for performing and reporting TAB procedures.

1.4 SUBMITTALS

- A.** Strategies and Procedures Plan: Within 60 days from Contractor's Notice to Proceed, submit 6 copies of TAB strategies and step-by-step procedures as specified in Part 3 "Preparation" Article. Include a complete set of report forms intended for use on this Project.
- B.** Certified TAB Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.
- C.** Warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A.** TAB contractor to be independent of the mechanical contractor and will be retained by Owner
- B.** TAB Firm Qualifications: Engage a TAB firm certified by, NEBB or TABB.
- C.** Certification of TAB Reports: Certify TAB field data reports. This certification includes the following:
 - 1.** Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - 2.** Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.
- D.** TAB Report Forms: Use standard forms from NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
- E.** ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 7.2.2 - "Air Balancing."
- F.** ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6.7.2.3 - "System Balancing."

1.6 PROJECT CONDITIONS

- A.** Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

- A.** Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.

- B.** Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- C.** Perform TAB after leakage and pressure tests on air distribution systems have been satisfactorily completed.

1.8 WARRANTY

- A.** Special Guarantee: Provide a guarantee on NEBB forms stating that NEBB will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee shall include the following provisions:
 - 1.** The certified TAB firm has tested and balanced systems according to the Contract Documents.
 - 2.** Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A.** Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
 - 1.** Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B.** Examine approved submittal data of HVAC systems and equipment.
- C.** Examine Project Record Documents described in Division 01 Section "Project Record Documents."
- D.** Examine design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E.** Examine equipment performance data including fan and pump curves. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.
- F.** Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Sections have been performed.
- G.** Examine system and equipment test reports.

- H.** Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- I.** Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- J.** Examine HVAC equipment to ensure that clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- K.** Examine strainers for clean screens and proper perforations.
- L.** Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- M.** Examine system pumps to ensure absence of entrained air in the suction piping.
- N.** Examine equipment for installation and for properly operating safety interlocks and controls.
- O.** Examine automatic temperature system components to verify the following:
 - 1.** Dampers, valves, and other controlled devices are operated by the intended controller.
 - 2.** Dampers and valves are in the position indicated by the controller.
 - 3.** Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions.
 - 4.** Thermostats are located to avoid adverse effects of sunlight, drafts, and cold walls.
 - 5.** Sensors are located to sense only the intended conditions.
 - 6.** Sequence of operation for control modes is according to the Contract Documents.
 - 7.** Controller set points are set according to the design documents.
 - 8.** Interlocked systems are operating.
 - 9.** Changeover from heating to cooling mode occurs according to indicated values.
- P.** Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A.** Prepare a TAB plan that includes strategies and step-by-step procedures.
- B.** Complete system readiness checks and prepare system readiness reports. Verify the following:
 - 1.** Permanent electrical power wiring is complete.
 - 2.** Hydronic systems are filled, clean, and free of air.
 - 3.** Automatic temperature-control systems are operational.

4. Equipment and duct access doors are securely closed.
5. Balance, smoke, and fire dampers are open.
6. Isolating and balancing valves are open and control valves are operational.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.
 1. Comply with requirements in ASHRAE 62.1-2004, Section 7.2.2 - "Air Balancing."
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.
- C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- D. Check airflow patterns from the outside-air louvers and dampers and the return and exhaust-air dampers, through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling unit components.
- K. Check for proper sealing of air duct system.

3.5 PROCEDURE FOR DUCT SYSTEM LEAKAGE TESTING

- A. Leakage of the duct system shall not exceed 10% of total design airflow. The testing procedure shall be based on ASTM E1554, Standard Test Methods for Determining External Air Leakage of Air Distribution Systems by Fan Pressurization. Testing shall be performed by an independent third-party technician approved by the building official. Documentation verifying duct leakage of less than 10% shall be submitted with the Final Testing Report.

3.6 PROCEDURES FOR HYDRONIC SYSTEMS

3.7 PROCEDURES FOR TEMPERATURE MEASUREMENTS

- A.** During TAB, report the need for adjustment in temperature regulation within the automatic temperature-control system.
- B.** Measure indoor wet- and dry-bulb temperatures every other hour for a period of two successive eight-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.
- C.** Measure outside-air, wet- and dry-bulb temperatures.

3.8 TEMPERATURE-CONTROL VERIFICATION

- A.** Verify that controllers are calibrated and commissioned.
- B.** Check transmitter and controller locations and note conditions that would adversely affect control functions.
- C.** Record controller settings and note variances between set points and actual measurements.
- D.** Check the operation of limiting controllers (i.e., high- and low-temperature controllers).
- E.** Check free travel and proper operation of control devices such as damper and valve operators.
- F.** Check the sequence of operation of control devices.
- G.** Check the interaction of electrically operated switch transducers.
- H.** Check the interaction of interlock and lockout systems.
- I.** Check main control supply-air pressure and observe compressor and dryer operations.
- J.** Record voltages of power supply and controller output. Determine whether the system operates on a grounded or nongrounded power supply.
- K.** Note operation of electric actuators using spring return for proper fail-safe operations.

3.9 TOLERANCES

- A.** Set HVAC system airflow and water flow rates within the following tolerances:
 - 1.** Supply, Return, and Exhaust Fans and Equipment with Fans: Plus 5 to plus 10 percent.
 - 2.** Air Outlets and Inlets: 0 to minus 10 percent.
 - 3.** Heating-Water Flow Rate: 0 to minus 10 percent.
 - 4.** Cooling-Water Flow Rate: 0 to minus 5 percent.

3.10 FINAL REPORT

- A.** General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in three-ring binder, tabulated and divided into sections by tested and balanced systems.

Special Specification

- B.** Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
 - 1.** Include a list of instruments used for procedures, along with proof of calibration.
- C.** Final Report Contents: In addition to certified field report data, include the following:
 - 1.** Pump curves.
 - 2.** Fan curves.
 - 3.** Manufacturers' test data.
 - 4.** Field test reports prepared by system and equipment installers.
 - 5.** Other information relative to equipment performance, but do not include Shop Drawings and Product Data.
- D.** General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:
 - 1.** Title page.
 - 2.** Name and address of TAB firm.
 - 3.** Project name.
 - 4.** Project location.
 - 5.** Architect's name and address.
 - 6.** Engineer's name and address.
 - 7.** Contractor's name and address.
 - 8.** Report date.
 - 9.** Signature of TAB firm who certifies the report.
 - 10.** Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 - 11.** Summary of contents including the following:
 - a.** Indicated versus final performance.
 - b.** Notable characteristics of systems.
 - c.** Description of system operation sequence if it varies from the Contract Documents.
 - 12.** Nomenclature sheets for each item of equipment.
 - 13.** Data for terminal units, including manufacturer, type size, and fittings.
 - 14.** Notes to explain why certain final data in the body of reports varies from indicated values.
 - 15.** Test conditions for fans and pump performance forms including the following:
 - a.** Settings for outside-, return-, and exhaust-air dampers.
 - b.** Conditions of filters.
 - c.** Cooling coil, wet- and dry-bulb conditions.

- h.** Water flow rate in gpm.
 - i.** Water pressure differential in feet of head or psig.
 - j.** Entering-water temperature in deg F.
 - k.** Leaving-water temperature in deg F.
 - l.** Refrigerant expansion valve and refrigerant types.
 - m.** Refrigerant suction pressure in psig.
 - n.** Refrigerant suction temperature in deg F.
 - o.** Inlet steam pressure in psig.
- H.** Fan Test Reports: For supply, return, and exhaust fans, include the following:
- 1.** Fan Data:
 - a.** System identification.
 - b.** Location.
 - c.** Make and type.
 - d.** Model number and size.
 - e.** Manufacturer's serial number.
 - f.** Arrangement and class.
 - g.** Sheave make, size in inches, and bore.
 - h.** Sheave dimensions, center-to-center, and amount of adjustments in inches.
 - 2.** Motor Data:
 - a.** Make and frame type and size.
 - b.** Horsepower and rpm.
 - c.** Volts, phase, and hertz.
 - d.** Full-load amperage and service factor.
 - e.** Sheave make, size in inches, and bore.
 - f.** Sheave dimensions, center-to-center, and amount of adjustments in inches.
 - g.** Number of belts, make, and size.
 - 3.** Test Data (Indicated and Actual Values):
 - a.** Total airflow rate in cfm.
 - b.** Total system static pressure in inches wg.
 - c.** Fan rpm.
 - d.** Discharge static pressure in inches wg.
 - e.** Suction static pressure in inches wg.

- I.** Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 - 1.** Report Data:
 - a.** System and air-handling unit number.
 - b.** Location and zone.
 - c.** Traverse air temperature in deg F.
 - d.** Duct static pressure in inches wg.
 - e.** Duct size in inches.
 - f.** Duct area in sq. ft.
 - g.** Indicated airflow rate in cfm.
 - h.** Indicated velocity in fpm.
 - i.** Actual airflow rate in cfm.
 - j.** Actual average velocity in fpm.
 - k.** Barometric pressure in psig.
- J.** Indoor-Air Quality Measurement Reports for Each HVAC System:
 - 1.** HVAC system designation.
 - 2.** Date and time of test.
 - 3.** Outdoor temperature, relative humidity, wind speed, and wind direction at start of test.
 - 4.** Room number or similar description for each location.
 - 5.** Measurements at each location.
 - 6.** Observed deficiencies.
- K.** Instrument Calibration Reports:
 - 1.** Report Data:
 - a.** Instrument type and make.
 - b.** Serial number.
 - c.** Application.
 - d.** Dates of use.
 - e.** Dates of calibration.

3.11 INSPECTIONS

- A.** Initial Inspection:
 - 1.** After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the Final Report.
 - 2.** Randomly check the following for each system:
 - a.** Measure airflow of at least 10 percent of air outlets.
 - b.** Measure water flow of at least 5 percent of terminals.

PART 1 - GENERAL

1.1 SUMMARY

- A.** Section Includes:
- 1.** Insulation Materials:
 - a.** Cellular glass.
 - b.** Flexible elastomeric.
 - c.** Mineral fiber.
 - 2.** Insulating cements.
 - 3.** Adhesives.
 - 4.** Mastics.
 - 5.** Sealants.
 - 6.** Factory-applied jackets.
 - 7.** Field-applied fabric-reinforcing mesh.
 - 8.** Field-applied jackets.
 - 9.** Tapes.
 - 10.** Securements.
 - 11.** Corner angles.

1.2 SUBMITTALS

- A.** Product Data: For each type of product indicated.
- B.** Shop Drawings:
- 1.** Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2.** Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 - 3.** Detail removable insulation at piping specialties, equipment connections, and access panels.
 - 4.** Detail application of field-applied jackets.
 - 5.** Detail application at linkages of control devices.
 - 6.** Detail field application for each equipment type.

1.3 QUALITY ASSURANCE

- A.** Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- E. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cell-U-Foam Corporation; Ultra-CUF.
 - b. Pittsburgh Corning Corporation; Foamglas Super K.
 2. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.
 3. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
- F. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Aeroflex USA Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.
- G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 1. Products: Subject to compliance with requirements, provide one of the following:

- a. CertainTeed Corp.; Duct Wrap.
 - b. Johns Manville; Microlite.
 - c. Knauf Insulation; Duct Wrap.
 - d. Manson Insulation Inc.; Alley Wrap.
 - e. Owens Corning; All-Service Duct Wrap.
- H.** Sizes shown on the drawings are free area dimensions (after installation of duct liner)

2.2 ADHESIVES

- A.** Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B.** Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 deg F
- 1.** Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-97.
 - b. Foster Products Corporation, H. B. Fuller Company; 81-27/81-93.
 - c. Marathon Industries, Inc.; 290.
 - d. Mon-Eco Industries, Inc.; 22-30.
 - e. Vimasco Corporation; 760.
 - 2.** For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C.** Cellular-Glass, Phenolic, Polyisocyanurate, and Polystyrene Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.
- 1.** Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-96.
 - b. Foster Products Corporation, H. B. Fuller Company; 81-33.
 - 2.** For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D.** Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
- 1.** Products: Subject to compliance with requirements, provide one of the following:
 - a. Aeroflex USA Inc.; Aero seal.
 - b. Armacell LCC; 520 Adhesive.
 - c. Foster Products Corporation, H. B. Fuller Company; 85-75.
 - d. RBX Corporation; Rubatex Contact Adhesive.

Special Specifications

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E.** Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
 - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
 - d. Marathon Industries, Inc.; 225.
 - e. Mon-Eco Industries, Inc.; 22-25.
 2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 MASTICS

- A.** Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
- B.** Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-35.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-90.
 - c. ITW TACC, Division of Illinois Tool Works; CB-50.
 - d. Marathon Industries, Inc.; 590.
 - e. Mon-Eco Industries, Inc.; 55-40.
 - f. Vimasco Corporation; 749.
 2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 5. Color: White.
- C.** Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-10.
 - b. Foster Products Corporation, H. B. Fuller Company; 35-00.
 - c. ITW TACC, Division of Illinois Tool Works; CB-05/15.
 - d. Marathon Industries, Inc.; 550.

- e. Mon-Eco Industries, Inc.; 55-50.
 - f. Vimasco Corporation; WC-1/WC-5.
 - 2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 200 deg F.
 - 4. Solids Content: 63 percent by volume and 73 percent by weight.
 - 5. Color: White.

2.4 SEALANTS

A. Joint Sealants:

- 1. Joint Sealants for Cellular-Glass Products: Subject to compliance with requirements, provide the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Products, Division of ITW; CP-76.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-45.
 - c. Marathon Industries, Inc.; 405.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - e. Pittsburgh Corning Corporation; Pittseal 444.
 - f. Vimasco Corporation; 750.
- 2. Materials shall be compatible with insulation materials, jackets, and substrates.
- 3. Permanently flexible, elastomeric sealant.
- 4. Service Temperature Range: Minus 100 to plus 300 deg F.
- 5. Color: White or gray.

B. FSK and Metal Jacket Flashing Sealants:

- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-76-8.
 - b. Foster Products Corporation, H. B. Fuller Company; 95-44.
 - c. Marathon Industries, Inc.; 405.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - e. Vimasco Corporation; 750.
- 2. Materials shall be compatible with insulation materials, jackets, and substrates.
- 3. Fire- and water-resistant, flexible, elastomeric sealant.
- 4. Service Temperature Range: Minus 40 to plus 250 deg F.
- 5. Color: Aluminum.

2.5 FACTORY-APPLIED JACKETS

- A.** Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - 1.** ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2.6 FIELD-APPLIED JACKETS

- A.** Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B.** FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
- C.** Aluminum Jacket: Factory cut and rolled to indicated sizes. Comply with ASTM B 209, 3003 alloy, H-14 temper.
 - 1.** Finish and Thickness: Stucco-embossed finish, 0.016 inch thick.
 - 2.** Moisture Barrier: 1-mil- thick, heat-bonded polyethylene and kraft paper.
 - 3.** Elbows: Preformed, 45- and 90-degree, short- and long-radius elbows; same material, finish, and thickness as jacket.

2.7 TAPES - Not Allowed

2.8 SECUREMENTS

- A.** Aluminum Bands: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing or closed seal.
 - 1.** Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a.** Childers Products; Bands.
 - b.** PABCO Metals Corporation; Bands.
 - c.** RPR Products, Inc.; Bands.
- B.** Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.
- C.** Wire: 0.062-inch soft-annealed, stainless steel.
 - 1.** Manufacturers: Subject to compliance with requirements:
 - a.** C & F Wire.
 - b.** Childers Products.
 - c.** PABCO Metals Corporation.
 - d.** RPR Products, Inc.

2.9 CORNER ANGLES

- A.** Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105 or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 PREPARATION

- A.** Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B.** Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A.** Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
- B.** Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.
- C.** Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D.** Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E.** Install multiple layers of insulation with longitudinal and end seams staggered.
- F.** Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G.** Keep insulation materials dry during application and finishing.
- H.** Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I.** Install insulation with least number of joints practical.
- J.** Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1.** Install insulation continuously through hangers and around anchor attachments.
 - 2.** For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3.** Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4.** Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
 - 5.** Provide rigid insulation at all duct and pipe hangers, at all hanger locations.
- K.** Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L.** Install insulation with factory-applied jackets as follows:

Special Specifications

1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.
- M.** Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N.** Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O.** Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P.** For above ambient services, do not install insulation to the following:
1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Manholes.
 5. Handholes.
 6. Cleanouts.

3.3 PENETRATIONS

- A.** Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

3.4 GENERAL PIPE INSULATION INSTALLATION

- A.** Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B.** Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to

Special Specifications

- a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
- C.** Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D.** Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union.

Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.5 CELLULAR-GLASS INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.

2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.6 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
 1. Install pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Pipe Fittings and Elbows:
 1. Install mitered sections of pipe insulation.
 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- D. Insulation Installation on Valves and Pipe Specialties:
 1. Install preformed valve covers manufactured of same material as pipe insulation when available.
 2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 3. Install insulation to flanges as specified for flange insulation application.
 4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 MINERAL-FIBER INSULATION INSTALLATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

Special Specifications

- a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Impale insulation over pins and attach speed washers.
 - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches.
 5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
 6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.8 FIELD-APPLIED JACKET INSTALLATION

- A. Where (ASJ) All Service Jackets are indicated, install as follows:
 1. Draw jacket material smooth and tight.
 2. Install lap or joint strips with same material as jacket.
 3. Secure jacket to insulation with manufacturer's recommended adhesive.

4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
 5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
- B.** Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.9 FINISHES

- A.** Duct, Equipment, and Pipe Insulation with ASJ or Other Paintable Jacket Material: Paint jacket with paint system identified below.
1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
 - B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
 - C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
 - D. Do not field paint aluminum or stainless-steel jackets.

3.10 FIELD QUALITY CONTROL

- A.** Perform tests and inspections.
- B.** Tests and Inspections:
1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
 2. Inspect field-insulated equipment, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.
- C.** All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.11 DUCT INSULATION SCHEDULE, GENERAL

- A.** Plenums and Ducts Requiring Insulation:
1. Indoor, concealed supply, return and outdoor air.
 2. Indoor, exposed supply and outdoor air.
 3. Indoor, concealed return located in nonconditioned space.
 4. Indoor, concealed return air plenums.
- B.** Items Not Insulated:

1. Fibrous-glass ducts.
2. Factory-insulated flexible ducts.
3. Factory-insulated plenums and casings.
4. Flexible connectors.
5. Vibration-control devices.
6. Factory-insulated access panels and doors.

3.12 INDOOR DUCT AND PLENUM APPLICATION SCHEDULE

- A.** Service: Indoor, concealed rectangular and round, supply, return, and outside-air ducts.
1. Material: Mineral-fiber blanket.
 2. Thickness: 2 inches.
 3. Density: 1 lb/cu. ft.
 4. k value: 0.27 at 75 Degrees F
 5. Number of Layers: One.
 6. Vapor Barrier: Provide a vapor barrier on all supply and outside air ductwork
 7. Jacket: factory-applied All Service jacket (ASJ)

3.13 PIPING INSULATION SCHEDULE, GENERAL

- A.** Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range.
- B.** Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
1. Underground piping.
 2. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.14 INDOOR AND OUTDOOR PIPING INSULATION SCHEDULE

- A.** Refrigerant Suction and Hot-Gas Piping:
1. All Pipe Sizes: Insulation shall be the following:
 - a. Insulation Material: Flexible elastomeric
 - b. Insulation Thickness: 1 1/2 inches
 - c. Minimum K value @ 75 Deg F: 0.15
 - d. Jacket: Aluminum
 - e. Vapor Retarder Required: Yes
- B.** Condensate Lines from AHU
1. Operating Temperature: 35 to 80 deg F.
 2. Insulation Material: Flexible Elastomeric
 3. Insulation Thickness: 1 inch.
 4. Thermal conductivity: 0.27

Special Specifications

- 5.** Field-Applied Jacket: Aluminum for piping exposed in mechanical rooms /ASJ in all other locations.
- 6.** Vapor barrier: Yes
- 7.** Finish: Painted in exposed areas

END

REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A.** Section Includes:
 - 1.** Refrigerant pipes and fittings.
 - 2.** Refrigerant piping valves and specialties.
 - 3.** Refrigerants.

1.2 ACTION SUBMITTALS

- A.** Product Data: For each type of valve, refrigerant piping, and refrigerant piping specialty.
- B.** Shop Drawings:
 - 1.** Show piping size and piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.
 - 2.** Show interface and spatial relationships between piping and equipment.
 - 3.** Shop Drawing Scale: 1/4 inch equals 1 foot (1:50).

1.3 INFORMATIONAL SUBMITTALS

- A.** Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A.** Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A.** Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
- B.** Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A.** Line Test Pressure for Refrigerant R-134a:
 - 1.** Suction Lines for Air-Conditioning Applications: 115 psig (793 kPa).
 - 2.** Suction Lines for Heat-Pump Applications: 225 psig (1551 kPa).
 - 3.** Hot-Gas and Liquid Lines: 225 psig (1551 kPa).
- B.** Line Test Pressure for Refrigerant R-407C:
 - 1.** Suction Lines for Air-Conditioning Applications: 230 psig (1586 kPa).
 - 2.** Suction Lines for Heat-Pump Applications: 380 psig (2620 kPa).
 - 3.** Hot-Gas and Liquid Lines: 380 psig (2620 kPa).
- C.** Line Test Pressure for Refrigerant R-410A:
 - 1.** Suction Lines for Air-Conditioning Applications: 300 psig (2068 kPa).

2. Suction Lines for Heat-Pump Applications: 535 psig (3689 kPa).
3. Hot-Gas and Liquid Lines: 535 psig (3689 kPa).

2.2 COPPER TUBE AND FITTINGS

- A. Copper Tube: ASTM B 280, Type ACR.
- B. Wrought-Copper Fittings: ASME B16.22.
- C. Wrought-Copper Unions: ASME B16.22.
- D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.
- E. Brazing Filler Metals: AWS A5.8/A5.8M.
- F. Flexible Connectors:
 1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
 2. End Connections: Socket ends.
 3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
 4. Working Pressure Rating: Factory test at minimum 500 psig (3450 kPa).
 5. Maximum Operating Temperature: 250 deg F (121 deg C).

2.3 REFRIGERANTS

- A. ASHRAE 34, R-134a: Tetrafluoroethane.
- B. ASHRAE 34, R-407C: Difluoromethane/Pentafluoroethane/1,1,1,2-Tetrafluoroethane.
- C. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-134a

- A. Suction Lines: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed joints.
- B. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

- A. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.
- B. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for the device being protected:
 1. Solenoid valves.
 2. Thermostatic expansion valves.
 3. Hot-gas bypass valves.
 4. Compressor.
- C. Install filter dryers in liquid line between compressor and thermostatic expansion valve.

- D. Install receivers sized to accommodate pump-down charge.
- E. Install flexible connectors at compressors.

3.3 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.
- B. Install refrigerant piping according to ASHRAE 15.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping adjacent to machines to allow service and maintenance.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Select system components with pressure rating equal to or greater than system operating pressure.
- J. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- K. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection.
- L. Install refrigerant piping in protective conduit where installed belowground.
- M. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.
- N. Slope refrigerant piping as follows:
 - 1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
 - 2. Install horizontal suction lines with a uniform slope downward to compressor.
 - 3. Install traps and double risers to entrain oil in vertical runs.
 - 4. Liquid lines may be installed level.
- O. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.
- P. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

3.4 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.

Special Specifications

- B.** Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C.** Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
- D.** Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 - 1.** Use Type BCuP (copper-phosphorus) alloy for joining copper socket fittings with copper pipe.
 - 2.** Use Type BAg (cadmium-free silver) alloy for joining copper with bronze or steel.

3.5 HANGERS AND SUPPORTS

- A.** Comply with requirements for pipe hangers and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- B.** Install the following pipe attachments:
 - 1.** Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6 m) long.
 - 2.** Roller hangers and spring hangers for individual horizontal runs 20 feet (6 m) or longer.
 - 3.** Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
 - 4.** Spring hangers to support vertical runs.
 - 5.** Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
- C.** Install hangers for copper tubing with the following maximum spacing and minimum rod diameters:
 - 1.** NPS 1/2 (DN 15): Maximum span, 60 inches (1500 mm); minimum rod, 1/4 inch (6.4 mm).
 - 2.** NPS 5/8 (DN 18): Maximum span, 60 inches (1500 mm); minimum rod, 1/4 inch (6.4 mm).
 - 3.** NPS 1 (DN 25): Maximum span, 72 inches (1800 mm); minimum rod, 1/4 inch (6.4 mm).
 - 4.** NPS 1-1/4 (DN 32): Maximum span, 96 inches (2400 mm); minimum rod, 3/8 inch (9.5 mm).
 - 5.** NPS 1-1/2 (DN 40): Maximum span, 96 inches (2400 mm); minimum rod, 3/8 inch (9.5 mm).
 - 6.** NPS 2 (DN 50): Maximum span, 96 inches (2400 mm); minimum rod, 3/8 inch (9.5 mm).
 - 7.** NPS 2-1/2 (DN 65): Maximum span, 108 inches (2700 mm); minimum rod, 3/8 inch (9.5 mm).
 - 8.** NPS 3 (DN 80): Maximum span, 10 feet (3 m); minimum rod, 3/8 inch (9.5 mm).

9. NPS 4 (DN 100): Maximum span, 12 feet (3.7 m); minimum rod, 1/2 inch (13 mm).

D. Support multifloor vertical runs at least at each floor.

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in "Performance Requirements" Article.
 - a. Fill system with nitrogen to the required test pressure.
 - b. System shall maintain test pressure at the manifold gage throughout duration of test.
 - c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
 - d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

B. Prepare test and inspection reports.

3.7 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers (67 Pa). If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig (14 kPa).
4. Charge system with a new filter-dryer core in charging line.

3.8 ADJUSTING

- A.** Adjust thermostatic expansion valve to obtain proper evaporator superheat.
- B.** Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
- C.** Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.
- D.** Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
 1. Open shutoff valves in condenser water circuit.
 2. Verify that compressor oil level is correct.
 3. Open compressor suction and discharge valves.
 4. Open refrigerant valves except bypass valves that are used for other purposes.

Special Specifications

- 5.** Check open compressor-motor alignment and verify lubrication for motors and bearings.
- E.** Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

1.2 SUMMARY

- A.** Section Includes:
 - 1.** Rectangular ducts and fittings.
 - 2.** Round ducts and fittings.
 - 3.** Double wall duct and fittings
 - 4.** Sheet metal materials.
 - 5.** Sealants and gaskets.
 - 6.** Hangers and supports.
- B.** Related Sections:
 - 1.** Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
 - 2.** Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct mounting access doors and panels, turning vanes, and flexible ducts.

1.3 PERFORMANCE REQUIREMENTS

- A.** Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B.** Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"
- C.** Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

1.4 SUBMITTALS

- A.** Product Data: For each type of product indicated.
- B.** Shop Drawings:
 - 1.** Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 - 2.** Factory- and shop-fabricated ducts and fittings.
 - 3.** Duct layout indicating sizes, configuration, and static-pressure classes.
 - 4.** Dimensions of main duct runs from building grid lines.
 - 5.** Fittings.

6. Sheet metal thicknesses.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire, smoke, sound and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment and vibration isolation.
13. Materials, fabrication, assembly, and spacing of hangers and supports.

C. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
3. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.

1.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:
 - a. Supply Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 25 percent of total installed duct area for each designated pressure class.
3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Test for leaks before applying external insulation.
5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
6. Give seven days' advance notice for testing.
7. Schedule one test near the beginning of the ductwork installation to confirm duct sealing methods are acceptable.

- C. Duct system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports and deliver to the Architect within two days of each test.

PART 2 - PRODUCTS

2.1 RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements:
 - a. Lindab Inc.
 - b. McGill AirFlow LLC.
 - c. SEMCO Incorporated.
 - d. Sheet Metal Connectors, Inc.
 - e. Spiral Manufacturing Co., Inc.
- B. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Seams - Round Duct and Fittings," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

- D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- D. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.
- E. Aluminum Sheets: Comply with ASTM B 209 (ASTM B 209M) Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
- F. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Water-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Solids Content: Minimum 65 percent.
 - 3. Shore A Hardness: Minimum 20.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. VOC: Maximum 75 g/L (less water).
 - 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - 8. Service: Indoor or outdoor.

- 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- C. Flanged Joint Sealant: Comply with ASTM C 920.
 - 1. General: Single-component, acid-curing, silicone, elastomeric.
 - 2. Type: S.
 - 3. Grade: NS.
 - 4. Class: 25.
 - 5. Use: O.
- D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- E. Round Duct Joint O-Ring Seals:
 - 1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
 - 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
 - 3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.5 HANGERS AND SUPPORTS

- A. Hanger Rods: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- B. All metal components of ductwork system such as angle stiff shall be galvanized
- C. Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Rods for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- F. Duct Attachment for exposed double wall ducts shall be a single point connection concealed at the top of the duct to minimize visibility. Duct to be support by stainless steel air craft cable. Provide 45 degree lateral supports as required to stabilize each run.
- G. Trapeze and Riser Supports:
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

Special Specifications

- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install ducts with fewest possible joints.
- D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- J. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.
- K. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
 - 1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 2. Outdoor, Supply-Air Ducts: Seal Class A.

3. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class A.
 4. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
 5. Unconditioned Space, Exhaust Ducts: Seal Class C.
 6. Unconditioned Space, Return-Air Ducts: Seal Class B.
 7. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
 8. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
 9. Conditioned Space, Exhaust Ducts: Seal Class B.
 10. Conditioned Space, Return-Air Ducts: Seal Class C.
- C. Seal Ductwork exposed to view with materials that match the ductwork finish or provide matching ductwork material to conceal the exposed seals and provide a continuous finish look on the system.

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
1. Where practical, install concrete inserts before placing concrete.
 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: stainless steel air craft cable.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 CONNECTIONS

- A.** Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."
- B.** Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 DUCT CLEANING

- A.** Clean new duct system(s) before testing, adjusting, and balancing.
- B.** Use service openings for entry and inspection.
 - 1.** Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Division 23 Section "Air Duct Accessories" for access panels and doors.
 - 2.** Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 - 3.** Remove and reinstall ceiling to gain access during the cleaning process.
- C.** Clean the following components by removing surface contaminants and deposits:
 - 1.** Air outlets and inlets (registers, grilles, and diffusers).
 - 2.** Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 - 3.** Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, condensate drain pans, filters and filter sections, and condensate collectors and drains.
 - 4.** Coils and related components.
 - 5.** Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 - 6.** Supply-air ducts, dampers, actuators, and turning vanes.
 - 7.** Dedicated exhaust and ventilation components and makeup air systems.

3.7 PAINTING

- A.** Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer.

3.8 DUCT SCHEDULE

- A.** Fabricate ducts as follows:
 - 1.** Concealed Supply Ducts
 - a.** Aluminum
 - b.** Positive 3-inch wg.
 - 2.** Exposed Supply Ducts
 - a.** Aluminum with aluminum jacket (Alumaguard 60 or approved alternate)

NONMETAL DUCTS

Special Specification Section SS233116

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Thermoset FRP ducts and fittings.

1.3 SUBMITTALS

- A. Product data Thermoset FRP duct materials.
- B. Shop Drawings:
 - 1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 - 2. Duct layout indicating sizes and pressure classes.
 - 3. Elevation of top of ducts.
 - 4. Dimensions of main duct runs from building grid lines.
 - 5. Fittings.
 - 6. Reinforcement and spacing.
 - 7. Seam and joint construction.
 - 8. Penetrations through fire-rated, smoke-rated, and other partitions.
 - 9. Fire and smoke damper locations.
 - 10. Equipment installation based on equipment being used on Project.
 - 11. Retain "Delegated-Design Submittal" Paragraph below if design services have been delegated to Contractor.
 - 12. Duct installation in congested spaces, indicating coordination with general construction, building components, including electrical, plumbing, fire protection, and other building services. Indicate proposed changes to duct layout.
 - 13. Suspended ceiling components.
 - 14. Structural members to which duct will be attached.
 - 15. Size and location of initial access modules for acoustical tile.
 - 16. Penetrations of smoke barriers and fire-rated construction.
 - 17. Items provided by all trades mounted on or penetrating finished ceiling.
 - 18. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 19. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

- C. Welding certificates.
- D. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Hanger and Support Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for steel hangers and supports.
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum hangers and supports.

PART 2 - PRODUCTS

2.1 THERMOSET FRP DUCTS AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Monoxivent Co.
 - 2. Perry Fiberglass Products, Inc.
 - 3. Viron International.
- B. Duct and Fittings:
 - 1. Thermoset FRP Resin: Comply with UL 181, Class 1, maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested by an NRTL according to ASTM E84.
 - 2. Inner Liner: FSK liner rated by an NRTL to comply with UL 181, Class 1.
 - 3. Round Duct: ASTM D2996, Type I, Grade 2, Class E, filament-wound duct, minimum 0.125-inch wall thickness, with tapered bell-and-spigot ends for adhesive joints or with plain ends with couplings.
 - 4. Round Fittings: Compression or spray-up/contact, molded of same material, pressure class, and joining method as duct.
 - 5. Rectangular Fittings: Minimum 0.125-inch- thick, flat sheet with fiberglass roving and resin-reinforced joints and seams.
- C. Joining Materials: Roving and polyester resin.
- D. Fabrication:
 - 1. Fabricate joints, seams, transitions, reinforcement, elbows, branch connections, and access doors and panels according to SMACNA's "Thermoset FRP Duct Construction Manual," Ch. 7, "Requirements."
 - 2. Fabricate 90-degree rectangular mitered elbows to include turning vanes, and 90-degree round elbows with a minimum of three segments for 12 inches and smaller and a minimum of five segments for 14 inches and larger.
- E. Drains: Formed drain pockets with a minimum of NPS 1 threaded pipe connections.

2.2 CONTROL DAMPERS

- A.** Manufacturers: Subject to compliance with requirements, available manufacturers.
- B.** Frame:
 - 1.** Damper frame shall be of one-piece FRP construction with a resin rich interior corrosion barrier minimum of 100 mils.
 - 2.** Structural lay-up shall consist of alternate layers of chopped strand mat and woven roving to conform to ASME.ANSI ATO-1 and ASTM D3982.
 - 3.** Glass resin ratio shall be a minimum of 35% glass to 65% resin.
 - 4.** Wall thickness, flange thickness, drilling pattern and width shall conform to ASTM D3982.
 - 5.** Exterior surface of the damper shall contain UV inhibitors and a gelcoat.
- C.** Blades:
 - 1.** FRP.
 - 2.** Blade shall be constructed of the same material as the damper frame and shall have a resin rich surfacing veil on both sides.
 - 3.** Provide blade stiffeners as required. Blade stiffeners shall be FRP or FRP encapsulated.
 - 4.** EPDM gasket.
- D.** Corrosion Resistant Blade Axles:
 - 1.** Axels shall be 304 or 315 stainless steel or pultruded FRP.
 - 2.** Coordinate damper axels with final approved actuator submittals.

2.3 HANGERS AND SUPPORTS

- A.** Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- B.** Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- C.** Trapeze and Riser Supports: Steel shapes complying with ASTM A36/A36M.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A.** Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B.** Install duct sections in maximum practical lengths with fewest possible joints.
- C.** Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

Special Specifications

- D. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- E. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- F. Install ducts with a minimum clearance of 1 inch, plus allowance for insulation thickness.
- G. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- H. Protect duct interiors from moisture, construction debris and dust, and other foreign materials both before and after installation. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."
- I. Elbows: Use long-radius elbows wherever they fit.
 - 1. Fabricate 90-degree rectangular mitered elbows to include turning vanes, and 90-degree round elbows with a minimum of three segments for 12 inches and smaller and a minimum of five segments for 14 inches and larger.
- J. Branch Connections: Use lateral or conical branch connections.
- K. Install thermoset FRP ducts and fittings to comply with SMACNA's "Thermoset FRP Duct Construction Manual."

3.2 HANGER AND SUPPORT INSTALLATION

- A. Install hangers and supports for thermoset FRP ducts and fittings to comply with SMACNA's "Thermoset FRP Duct Construction Manual," Ch. 7, "Requirements."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

3.4 STARTUP SERVICE

- A.** Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.5 DUCT SCHEDULE

- A.** Indoor Ducts and Fittings:
 - 1.** Install FRP ductwork as indicated on the construction drawings.
 - 2.** Provide suitable external surface protection as recommended by manufacturer.
 - 3.** Thermoset FRP Round Ducts and Fittings:
 - a. Flanged system

END

AIR DUCT ACCESSORIES

Special Specification Section SS233300

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A.** This Section includes the following:
 - 1.** Backdraft dampers.
 - 2.** Volume dampers.
 - 3.** Motorized control dampers.
 - 4.** Fire dampers
 - 5.** Combination fire and smoke dampers.
 - 6.** Turning vanes.
 - 7.** Duct-mounted access doors.
 - 8.** Flexible connectors.
 - 9.** Flexible ducts.
 - 10.** Duct accessory hardware.
- B.** Related Sections include the following:
 - 1.** Division 23 Section "Metal Ducts."

1.3 SUBMITTALS

- A.** Product Data: For the following:
 - 1.** Backdraft dampers.
 - 2.** Volume dampers.
 - 3.** Fire dampers
 - 4.** Turning vanes.
 - 5.** Duct-mounted access doors.
 - 6.** Flexible connectors.
 - 7.** Flexible ducts.

1.4 QUALITY ASSURANCE

- A.** Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A.** In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1.** Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SHEET METAL MATERIALS

- A.** Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.
- B.** Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G90coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C.** Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for stainless-steel ducts.
- D.** Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 BACKDRAFT DAMPERS

- A.** Manufacturers:
 - 1.** Air Balance, Inc.
 - 2.** American Warming and Ventilating.
 - 3.** CESCO Products.
 - 4.** Duro Dyne Corp.
 - 5.** Greenheck.
 - 6.** Penn Ventilation Company, Inc.
 - 7.** Prefco Products, Inc.
 - 8.** Ruskin Company.
 - 9.** Vent Products Company, Inc.
- B.** Description: Multiple-blade, parallel action gravity balanced, with center-pivoted blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.
- C.** Frame: 0.052-inch-thick, galvanized sheet steel with welded corners and mounting flange.
- D.** Blades: 0.025-inch-thick, roll-formed aluminum.
- E.** Blade Seals: Vinyl.
- F.** Blade Axles: Galvanized steel.
- G.** Tie Bars and Brackets: Galvanized steel.
- H.** Return Spring: Adjustable tension.

2.4 VOLUME DAMPERS

A. Manufacturers:

1. Air Balance, Inc.
2. American Warming and Ventilating.
3. Flexmaster U.S.A., Inc.
4. McGill AirFlow Corporation.
5. METALAIRE, Inc.
6. Nailor Industries Inc.
7. Penn Ventilation Company, Inc.
8. Ruskin Company.
9. Vent Products Company, Inc.

B. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

1. Pressure Classes of 3-Inch wg or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.

C. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.

1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
2. Roll-Formed Steel Blades: 0.064-inch-thick, galvanized sheet steel.
3. Blade Axles: Galvanized steel.
4. Bearings: Oil-impregnated bronze.
5. Tie Bars and Brackets: Galvanized steel.

D. Low-Leakage Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, low-leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.

1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
2. Roll-Formed Steel Blades: 0.064-inch-thick, galvanized sheet steel.
3. Blade Axles: Galvanized steel.
4. Bearings: Oil-impregnated bronze thrust or ball.
5. Blade Seals: Vinyl.

- 6. Jamb Seals: Cambered stainless steel.
- 7. Tie Bars and Brackets: Galvanized steel.
- E. Jackshaft: 1-inch-diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - 1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.
- F. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.5 CONTROL DAMPERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Greenheck Fan Corporation.
 - 2. McGill AirFlow LLC.
 - 3. Pottorff.
 - 4. Ruskin Company.
- B. Low-leakage rating and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
- C. Frames:
 - 1. 0.094-inch-thick, galvanized sheet steel.
 - 2. Mitered and welded corners.
- D. Blades:
 - 1. Multiple blade with maximum blade width of 8 inches.
 - 2. Parallel- and opposed-blade design.
 - 3. Galvanized steel.
 - 4. 0.064 inch thick single skin.
 - 5. Blade Edging: Closed-cell neoprene.
 - 6. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.
- E. Blade Axles: 1/2-inch-diameter; galvanized steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.
 - 1. Operating Temperature Range: From minus 40 to plus 200 deg F.
- F. Bearings:
 - 1. Molded synthetic.
 - 2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - 3. Thrust bearings at each end of every blade.

2.6 FIRE DAMPERS

- A.** Manufacturers:
 - 1. Air Balance, Inc.
 - 2. CESCO Products.
 - 3. Greenheck.
 - 4. McGill AirFlow Corporation.
 - 5. METALAIRE, Inc.
 - 6. Nailor Industries Inc.
 - 7. Penn Ventilation Company, Inc.
 - 8. Prefco Products, Inc.
 - 9. Ruskin Company.
 - 10. Vent Products Company, Inc.
 - 11. Ward Industries, Inc.
- B.** Fire dampers shall be labeled according to UL 555.
- C.** Fire Rating: As required to maintain wall rating but not less than 1-1/2 hours.
- D.** Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034-inch-thick galvanized steel; with mitered and interlocking corners.
- E.** Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.
 - 1. Minimum Thickness: 0.052 or 0.138 inch thick as indicated and of length to suit application.
 - 2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.
- F.** Mounting Orientation: Vertical or horizontal as indicated.
- G.** Blades: Roll-formed, interlocking, 0.034-inch-thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch-thick, galvanized-steel blade connectors.
- H.** Horizontal Dampers: Include blade lock and stainless-steel closure spring.
- I.** Fusible Links: Replaceable, 165 deg F rated.

2.7 COMBINATION FIRE AND SMOKE DAMPERS

- A.** Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Greenheck Fan Corporation.
 - 2. Nailor Industries Inc.
 - 3. Pottorff.
 - 4. Ruskin Company.
- B.** Type: Dynamic; rated and labeled according to UL 555 and UL 555S by an NRTL.

Special Specifications

- C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000-fpm velocity.
- D. Fire Rating: 1-1/2 and 3 hours.
- E. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel, with welded corners and mounting flange.
- F. Heat-Responsive Device: Electric resettable device and switch package, factory installed, rated.
- G. Smoke Detector: Integral, factory wired for single-point connection.
- H. Blades: Roll-formed, horizontal, interlocking, 0.063-inch thick, galvanized sheet steel.
- I. Leakage: Class I Insert class.
- J. Rated pressure and velocity to exceed design airflow conditions.
- K. Mounting Sleeve: Factory-installed, 0.039-inch-thick, galvanized sheet steel; length to suit wall or floor application with factory-furnished silicone caulking.
- L. Master control panel for use in dynamic smoke-management systems.
- M. Damper Motors: Modulating or two-position action.
 - 1. **Motor Sizes: Minimum size as indicated.** If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - 2. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
 - 3. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.
 - 4. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.
 - 5. Nonspring-Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.
 - 6. Electrical Connection: 115 V, single phase, 60 Hz.
- N. Accessories:
 - 1. Auxiliary switches for signaling or position indication.
 - 2. Test and reset switches, damper mounted.

2.8 TURNING VANES

- A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.

- B.** Manufactured Turning Vanes: Fabricate 1-1/2-inch-wide, single-vane, curved blades of galvanized sheet steel set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into vane runners suitable for duct mounting.
 - 1.** Manufacturers:
 - a.** Ductmate Industries, Inc.
 - b.** Duro Dyne Corp.
 - c.** METALAIRE, Inc.
 - d.** Ward Industries, Inc.

2.9 DUCT-MOUNTED ACCESS DOORS

- A.** General Description: Fabricate doors airtight and suitable for duct pressure class.
- B.** Door: Double wall, duct mounting, and rectangular; fabricated of galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.
 - 1.** Manufacturers:
 - a.** American Warming and Ventilating.
 - b.** CESCO Products.
 - c.** Ductmate Industries, Inc.
 - d.** Flexmaster U.S.A., Inc.
 - e.** Greenheck.
 - f.** McGill AirFlow Corporation.
 - g.** Nailor Industries Inc.
 - h.** Ventfabrics, Inc.
 - i.** Ward Industries, Inc.
 - 2.** Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 - 3.** Provide number of hinges and locks as follows:
 - a.** Less than 12 Inches Square: Secure with two sash locks.
 - b.** Up to 18 Inches Square: Two hinges and two sash locks.
 - c.** Up to 24 by 48 Inches: Three hinges and two compression latches.
 - d.** Sizes 24 by 48 Inches and Larger: One additional hinge.
- C.** Seal around frame attachment to duct and door to frame with neoprene or foam rubber.
- D.** Insulation: 1-inch-thick, fibrous-glass or polystyrene-foam board.

2.10 FLEXIBLE CONNECTORS

- A.** Manufacturers:
 - 1.** Duro Dyne Corp.
 - 2.** Ventfabrics, Inc.
 - 3.** Ward Industries, Inc.

Special Specifications

- B.** General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- C.** Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel sheets.
- D.** Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1.** Minimum Weight: 26 oz./sq. yd.
 - 2.** Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3.** Service Temperature: Minus 40 to plus 200 deg F.

2.11 FLEXIBLE DUCTS

- A.** Manufacturers:
 - 1.** Ductmate Industries, Inc.
 - 2.** Flexmaster U.S.A., Inc.
 - 3.** Hart & Cooley, Inc.
 - 4.** McGill AirFlow Corporation.
- B.** Insulated-Duct Connectors: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor barrier film.
 - 1.** Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
 - 2.** Maximum Air Velocity: 2000 fpm.
 - 3.** Temperature Range: Minus 10 to plus 160 deg F.
- C.** Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 through 18 inches to suit duct size.

2.12 DUCT ACCESSORY HARDWARE

- A.** Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.
- B.** Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION

- A.** Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B.** Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel ducts and stainless-steel accessories in stainless-steel ducts.
- C.** Install backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

Special Specifications

- D. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two duct widths from branch takeoff.
- E. Provide test holes at fan inlets and outlets and elsewhere as indicated.
- F. Install fire dampers, with fusible links, according to manufacturer's UL-approved written instructions.
- G. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:
 - 1. Downstream from volume dampers and equipment.
 - 2. Adjacent to fire dampers.
 - 3. To interior of ducts for cleaning; before and after each change in direction, at maximum 50-foot spacing.
 - 4. Upstream of all air flow measuring stations (AFMS).
 - 5. On sides of ducts where adequate clearance is available.
- H. Install the following sizes for duct-mounted, rectangular access doors:
 - 1. One-Hand or Inspection Access: 8 by 5 inches.
 - 2. Two-Hand Access: 12 by 6 inches.
 - 3. Head and Hand Access: 18 by 10 inches.
 - 4. Head and Shoulders Access: 21 by 14 inches.
 - 5. Body Access: 25 by 14 inches.
 - 6. Body Plus Ladder Access: 25 by 17 inches.
- I. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.
- J. Connect diffusers to low pressure ducts with maximum 72-inch lengths of flexible duct clamped or strapped in place.
- K. Connect flexible ducts to metal ducts with draw bands.
- L. Install duct test holes where indicated and required for testing and balancing purposes.

3.2 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Final positioning of manual-volume dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

END

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A.** This Section includes the following:
 - 1.** Centrifugal roof ventilators; Supply and Exhaust
 - 2.** Utility Vent sets; Supply and Exhaust

1.3 PERFORMANCE REQUIREMENTS

- A.** Project Altitude: Base air ratings on actual site elevations.
- B.** Operating Limits: Classify according to AMCA 99.

1.4 SUBMITTALS

- A.** Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:
 - 1.** Certified fan performance curves with system operating conditions indicated.
 - 2.** Certified fan sound-power ratings.
 - 3.** Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 4.** Material gages and finishes, including color charts.
 - 5.** Dampers, including housings, linkages, and operators.
 - 6.** Roof curbs.
 - 7.** Fan speed controllers.
- B.** Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1.** Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
- C.** Coordination Drawings: Show roof penetration requirements and reflected ceiling plans drawn to scale and coordinating roof penetrations and units mounted above ceiling. Show the following:
 - 1.** Roof framing and support members relative to duct penetrations.
 - 2.** Ceiling suspension assembly members.
 - 3.** Size and location of initial access modules for acoustical tile.
 - 4.** Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

- D. Maintenance Data: For power ventilators to include in maintenance manuals specified in Division 1.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.
- C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.
- D. UL Standard: Power ventilators shall comply with UL 705.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fans as factory-assembled unit, to the extent allowable by shipping limitations, with protective crating and covering.
- B. Disassemble and reassemble units, as required for moving to final location, according to manufacturer's written instructions.
- C. Lift and support units with manufacturer's designated lifting or supporting points.

1.7 COORDINATION

- A. Coordinate size and location of structural-steel support members.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL ROOF VENTILATORS

- A. Description: Direct- or belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.
- B. Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.
 - 1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains and grease collector.
 - 2. Hinged Subbase: Aluminum or 316 stainless-steel hinged arrangement permitting service and maintenance.
- C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- D. Drive Assembly resiliently mounted to housing.
- E. Accessories:
 - 1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - 2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
 - 3. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.

Special Specifications

4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
 5. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.
- F. Roof Curbs: Aluminum steel; mitered and welded corners; 1-1/2-inch- thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.
1. Configuration: Built-in raised cant and mounting flange.
 2. Overall Height: 24 inches.
 3. Pitch Mounting: Manufacture curb for roof slope.
 4. Metal Liner: Aluminum steel.
 5. Mounting Pedestal: Aluminum steel with removable access panel.
- G. Capacities and Characteristics are scheduled on the drawings.

2.2 BELTED VENT SET EXHAUST FANS

- A. Belted vent set exhaust fans shall be Chicago Blower, Buffalo Forge, Acme, Greenheck, Twin Cities, Cook, or approved equal. The fans shall be complete with belt guards, heavy-duty gravity shutters, vari-speed drives, drain holes in scroll, flanged inlet and outlet connections, etc. Motor mounts shall be adjustable for proper alignment and adjustment of belts. Furnish with a factory applied prime coat of paint. Fans shall be AMCA Spark Resistance rated construction.
- B. Housing: Aluminum
- C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- D. Accessories:
1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 2. Disconnect Switch: NEMA3 factory wired, nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
 3. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
- E. All v-belt drives shall be designed for a minimum of 50% overload. Where more than one belt is required, matched sets shall be used. All belt drives shall be furnished with belt guards. Provide spare belt for each fan.
- F. Capacities and Characteristics are scheduled on the drawings.

2.3 MOTORS

- A. Motor Construction: NEMA MG 1, general purpose, continuous duty, Design B.
- B. Enclosure Type: TEFC

2.4 SOURCE QUALITY CONTROL

- A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

- B.** Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 - EXECUTION

3.1 INSTALLATION

- A.** Install fan level and plumb.
- B.** Install units with clearances for service and maintenance.

3.2 CONNECTIONS

- A.** Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section "Air Duct Accessories."
- B.** Install ducts adjacent to power ventilators to allow service and maintenance.
- C.** Ground equipment.
- D.** Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

- A.** Equipment Startup Checks:
 - 1.** Verify that shipping, blocking, and bracing are removed.
 - 2.** Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3.** Verify that cleaning and adjusting are complete.
 - 4.** Verify lubrication for bearings and other moving parts.
 - 5.** Verify that manual and automatic volume control dampers in connected ductwork systems are in fully open position.
 - 6.** Disable automatic temperature-control operators.
- B.** Starting Procedures:
 - 1.** Energize motor and adjust fan to indicated rpm.
 - 2.** Measure and record motor voltage and amperage.
- C.** Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.
- D.** Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E.** Shut unit down and reconnect automatic temperature-control operators.
- F.** Refer to Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.

Special Specifications

- G. Replace fan and motor as required to achieve design airflow.
- H. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

3.4 CLEANING

- A. On completion of installation, internally clean fans according to manufacturer's written instructions. Remove foreign material and construction debris. Vacuum fan wheel and cabinet.
- B. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain power ventilators.
 - 1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
 - 2. Review data in maintenance manuals. "Operation and Maintenance Data."
 - 3. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A.** Section Includes:
 - 1.** Gas-fired, furnaces and accessories suitable for exterior installation.
 - 2.** Air filters.

1.3 SUBMITTALS

- A.** Product Data: For each type of product.
 - 1.** Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B.** Shop Drawings:
 - 1.** Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2.** Include diagrams for power, signal, and control wiring.
- C.** Sample Warranty: For special warranty.
- D.** Operation and Maintenance Data: For each furnace to include in emergency, operation, and maintenance manuals.
 - 1.** In addition to items specified in Section 01730 "Operation and Maintenance Data," include the following:
 - a.** Furnace and accessories complete with controls.
 - b.** Air filter.
 - c.** Air cleaner.
 - d.** UV germicidal light.
 - e.** Humidifier.
 - f.** Ventilation heat exchanger.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A.** Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1.** Disposable Air Filters: Furnish two complete sets.
 - 2.** Fan Belts: Furnish one set for each furnace fan.

1.5 QUALITY ASSURANCE

- A.** ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
- B.** ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."
- C.** Comply with NFPA 70.

1.6 WARRANTY

- A.** Special Warranty: Manufacturer agrees to repair or replace the following components of furnaces that fail in materials or workmanship within specified warranty period:
 - 1.** Warranty Period, Commencing on Date of Substantial Completion:
 - a.** Furnace Heat Exchanger: 10 years.
 - b.** Integrated Ignition and Blower Control Circuit Board: Five years.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A.** Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a qualified testing agency, and marked for intended location and application.
- B.** General Requirements for Noncondensing Gas-Fired Furnaces: Factory assembled, piped, wired, and tested; complying with ANSI Z21.47/CSA 2.3 and NFPA 54.

2.2 GAS-FIRED FURNACES

- A.** Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1.** Adams Manufacturing Company.
 - 2.** Carrier Corporation; a unit of United Technologies Corp.
 - 3.** Reznor
 - 4.** Rheem Manufacturing Company; Heating and Cooling Products.
- B.** Cabinet: Aluminum or stainless steel
 - 1.** Cabinet interior around heat exchanger shall be factory-installed insulation.
 - 2.** Lift-out panels shall expose burners and all other items requiring access for maintenance.
 - 3.** Factory paint external cabinets in manufacturer's standard color.
 - 4.** Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- C.** Fan: Centrifugal, factory balanced, resilient mounted, belt drive.
 - 1.** Special Motor Features: Single speed, premium efficiency.
 - 2.** Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.

Special Specifications

3. Special Motor Features: Electronically controlled motor (ECM) controlled by integrated furnace/blower control.
- D.** Type of Gas: Natural.
- E.** Heat Exchanger: Stainless steel direct fired
- F.** Burner:
1. Gas Valve: 100 percent safety modulating main gas valve, main shutoff valve, pressure regulator, safety pilot with electronic flame sensor, limit control, transformer, and combination ignition/fan timer control board.
 2. Ignition: Electric pilot ignition, with hot-surface igniter or electric spark ignition.
- G.** Gas-Burner Safety Controls:
1. Electronic Flame Sensor: Prevents gas valve from opening until pilot flame is proven; stops gas flow on ignition failure.
 2. Flame Rollout Switch: Installed on burner box; prevents burner operation.
 3. Limit Control: Fixed stop at maximum permissible setting; de-energizes burner on excessive bonnet temperature; automatic reset.
- H.** Furnace Controls: Solid-state board integrates ignition, heat, cooling, and fan speeds; and adjustable fan-on and fan-off timing; terminals for connection to accessories.
- I.** Capacities and Characteristics:
1. Airflow Configuration: Horizontal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A.** Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B.** Examine factory-installed insulation before furnace installation. Reject units that are wet, moisture damaged, or mold damaged.
- C.** Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A.** Install gas-fired furnaces and associated fuel and vent features and systems according to NFPA 54.
- B.** Base and Roof -Mounted Units: Secure units to substrate. Provide optional bottom closure base if required by installation conditions.
 1. Anchor furnace to substrate to resist code-required seismic acceleration.
- C.** Controls: Install thermostats and humidistats at mounting height of 60 inches above floor.
- D.** Wiring Method: Install control wiring in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal control wiring except in unfinished spaces.

- E.** Gas piping installation requirements are specified in Section 231123 "Facility Natural-Gas Piping." Drawings indicate general arrangement of piping, fittings, and specialties. Connect gas piping with union or flange and appliance connector valve.
- F.** Install piping adjacent to equipment to allow service and maintenance.
- G.** Vent Connection, Noncondensing, Gas-Fired Furnaces: Connect Type B vents to furnace vent connection and extend outdoors.
- H.** Connect ducts to furnace with flexible connector. Comply with requirements in Section 233300 "Air Duct Accessories."

3.3 FIELD QUALITY CONTROL

- A.** Perform the following tests and inspections:
 - 1.** Perform electrical test and visual and mechanical inspection.
 - 2.** Operational Test: After electrical circuitry has been energized, start units to confirm proper operation, product capability, and compliance with requirements.
 - 3.** Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
 - 4.** Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B.** Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.

3.4 STARTUP SERVICE

- A.** Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - 1.** Inspect for physical damage to unit casings.
 - 2.** Verify that access doors move freely and are weathertight.
 - 3.** Clean units and inspect for construction debris.
 - 4.** Verify that all bolts and screws are tight.
 - 5.** Adjust vibration isolation and flexible connections.
 - 6.** Verify that controls are connected and operational.
- B.** Adjust fan belts to proper alignment and tension.
- C.** Start unit according to manufacturer's written instructions and complete manufacturer's operational checklist.
- D.** Measure and record airflows.
- E.** Verify proper operation of capacity control device.
- F.** After startup and performance test, lubricate bearings and adjust belt tension.

3.5 ADJUSTING

- A.** Adjust initial temperature and humidity set points.
- B.** Set controls, burner, and other adjustments for optimum heating performance and efficiency. Adjust heat-distribution features, including shutters, dampers, and relays, to provide optimum heating performance and system efficiency.

3.6 CLEANING

- A.** After completing installation, clean furnaces internally according to manufacturer's written instructions.
- B.** Install new filters in each furnace within 14 days after Substantial Completion.

3.7 DEMONSTRATION

- A.** Train Owner's maintenance personnel to adjust, operate, and maintain condensing units.

END

DEDICATED OUTDOOR-AIR UNITS
Special Specification Section SS237433

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A.** This Section includes split-system dedicated outdoor air units consisting of evaporator-fan and compressor indoor equipment and condenser components in the outdoor unit. Units are designed for concealed mounting, and may be connected to ducts. Units to be provided with the following components and accessories:
 - 1.** Direct-expansion cooling.
 - 2.** Heat-pump refrigeration components.
 - 3.** Hot-gas reheat.
 - 4.** Electric-heating coils.
 - 5.** Hot gas bypass control

1.3 SUBMITTALS

- A.** Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B.** Shop Drawings: Diagram power, signal, and control wiring.
- C.** Samples for Initial Selection: For units with factory-applied color finishes.
- D.** Field quality-control test reports.
- E.** Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.
- F.** Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A.** Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
- B.** Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C.** ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
- D.** ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.5 COORDINATION

- A.** Coordinate size and location of concrete bases for units. Cast anchor-bolt inserts into bases.
- B.** Coordinate size, location, and connection details with equipment supports, and wall penetrations.

1.6 WARRANTY

- A.** Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
 - 1.** Warranty Period: Five years from date of Substantial Completion.

1.7 EXTRA MATERIALS

- A.** Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1.** Filters: One set of filters for each unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A.** Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1.** Aeon
 - 2.** Addison
 - 3.** Desert Aire
 - 4.** United Coolair

2.2 FLOOR-MOUNTING, EVAPORATOR-FAN COMPONENTS

- A.** Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect.
 - 1.** Construction: Double wall
 - 2.** Exterior casing material: Galvanized steel with Painted finish.
 - 3.** Interior casing material: Stainless steel.
 - 4.** Insulation: Glass-fiber
 - a.** Thickness: 1 inch
 - 5.** Drain Pans: stainless steel, with connection for drain; insulated and complying with ASHRAE 62.1-2004.
 - 6.** Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
- B.** Cabinet Surface Condensation:
 - 1.** Cabinet shall have additional insulation and vapor seals if required to prevent condensation on the interior and exterior of the cabinet.

Special Specifications

2. Portions of cabinet located downstream from the cooling coil shall have a thermal break at each thermal bridge between the exterior and interior casing to prevent condensation from occurring on the interior and exterior surfaces. The thermal break shall not compromise the structural integrity of the cabinet.
 - C. Refrigerant Coil: Minimum 6 row copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
 - D. Type of Gas: Natural.
 - E. Heat Exchanger: Stainless steel.
 - F. Burner:
 1. Gas Valve: 100 percent safety modulating main gas valve, main shutoff valve, pressure regulator, safety pilot with electronic flame sensor, limit control, transformer, and combination ignition/fan timer control board.
 2. Ignition: Electric pilot ignition, with hot-surface igniter or electric spark ignition.
 - G. Gas-Burner Safety Controls:
 1. Electronic Flame Sensor: Prevents gas valve from opening until pilot flame is proven; stops gas flow on ignition failure.
 2. Flame Rollout Switch: Installed on burner box; prevents burner operation.
 3. Limit Control: Fixed stop at maximum permissible setting; de-energizes burner on excessive bonnet temperature; automatic reset.
 - H. Combustion-Air Inducer: Centrifugal fan with thermally protected motor and sleeve bearings prepurges heat exchanger and vents combustion products; pressure switch prevents furnace operation if combustion-air inlet or flue outlet is blocked.
 - I. Furnace Controls: Solid-state board integrates ignition, heat, cooling, and fan speeds; and adjustable fan-on and fan-off timing; terminals for connection to accessories.
 - J. Vent Materials: Type B listed metal vents.
 - K. Forward-Curved Fan Type: Centrifugal; statically and dynamically balanced.
 1. Fan Wheel Material: Galvanized steel, mounted on solid-steel shaft.
 2. Belt drive
 - L. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
 1. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
 - M. Filters: Disposable, with ASHRAE 52.2 MERV rating of 6 or higher.
- 2.3 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS**
- A. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

Special Specifications

- B.** Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - 1.** Compressor Type: Scroll.
 - 2.** Refrigerant: R-410A.
- C.** Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
- D.** Heat Pump Components: Reversing valve and low-temperature air cut-off thermostat.
- E.** Fan: Aluminum-propeller type, directly connected to motor.
- F.** Motor: Permanently lubricated, with integral thermal-overload protection.
- G.** Low Ambient Kit: Permits operation down to 45 deg F.
- H.** Mounting Base: Polyethylene.
- I.** Minimum Energy Efficiency: Comply with ASHRAE/IESNA 90.1-2004, "Energy Standard for Buildings except Low-Rise Residential Buildings."

2.4 ACCESSORIES

- A.** Equipment to operate on a standalone basis controlling to a constant discharge air volume and an adjustable discharge air temperature of 55 deg F. and 65 deg F as reset by outside air temp.
- B.** Control Module: Unit-mounted digital panel with touchpad temperature control and touchpad for heating, cooling, and fan operation. Include the following features:
 - 1.** Low Ambient Lockout Control: Prevents cooling-cycle operation below 40 deg F outdoor air temperature.
- C.** Thermostat: Low voltage with subbase to control compressor and evaporator fan with the following features:
 - 1.** Fully Programmable to discharge air temperature.
 - 2.** Compressor time delay.
 - 3.** 24-hour time control of system stop and start.
 - 4.** Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
 - 5.** Fan-speed selection, including auto setting.
- D.** Automatic-reset timer to prevent rapid cycling of compressor.
- E.** Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.
 - 1.** Minimum Insulation Thickness: 1 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION

- A.** Install units level and plumb.

Special Specifications

- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install ground-mounting, compressor-condenser components on 4-inch- thick, reinforced concrete base; 4 inches larger on each side than unit. Coordinate anchor installation with concrete base.
- D. Install ground-mounting, compressor-condenser components on polyethylene mounting base.
- E. Install compressor-condenser components on restrained, spring isolators with a minimum static deflection of 1 inch.
- F. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to unit to allow service and maintenance.
- C. Duct Connections: Duct installation requirements are specified in Division 23 Section "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Air Duct Accessories."
- D. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- E. Electrical Connections: Comply with requirements in Division 26 Sections for power wiring, switches, and motor controls.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.

3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

- A.** Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units. Refer to Division 01 Section "Demonstration and Training."

END

SPLIT-SYSTEM AIR-CONDITIONERS
Special Specification Section SS238127

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A.** This Section includes split-system air-conditioning and heat pump units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed or concealed mounting and may be connected to ducts.

1.3 SUBMITTALS

- A.** Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B.** Shop Drawings: Diagram power, signal, and control wiring.
- C.** Samples for Initial Selection: For units with factory-applied color finishes.
- D.** Field quality-control test reports.
- E.** Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.
- F.** Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A.** Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
- B.** Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C.** ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
- D.** ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.5 COORDINATION

- A.** Coordinate size and location of concrete bases for units. Cast anchor-bolt inserts into bases.
- B.** Coordinate size, location, and connection details with equipment supports, and wall penetrations.

1.6 WARRANTY

- A.** Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
 - 1.** Warranty Period: Five years from date of Substantial Completion.

1.7 EXTRA MATERIALS

- A.** Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1.** Filters: One set of filters for each unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A.** Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1.** Aeon
 - 2.** Carrier Air Conditioning; Div. of Carrier Corporation.
 - 3.** Lennox Industries Inc.
 - 4.** Trane Company (The);
 - 5.** York International Corp.

2.2 CEILING-MOUNTED, EVAPORATOR-FAN COMPONENTS

- A.** Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect.
 - 1.** Construction: Single wall with fiberglass insulation.
 - 2.** Exterior casing material: Galvanized steel with Painted finish.
 - 3.** Interior casing material: Stainless steel.
 - 4.** Insulation: Glass-fiber
 - a.** Thickness: 1 inch
 - 5.** Insulation: Faced, glass-fiber, duct liner.
 - 6.** Drain Pans: Galvanized steel, with connection for drain; insulated and complying with ASHRAE 62.1-2004.
 - 7.** Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
- B.** Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
- C.** Type of Gas: Natural.
- D.** Heat Exchanger: Stainless steel.
- E.** Burner:

Special Specifications

1. Gas Valve: 100 percent safety modulating main gas valve, main shutoff valve, pressure regulator, safety pilot with electronic flame sensor, limit control, transformer, and combination ignition/fan timer control board.
 2. Ignition: Electric pilot ignition, with hot-surface igniter or electric spark ignition.
- F. Gas-Burner Safety Controls:**
1. Electronic Flame Sensor: Prevents gas valve from opening until pilot flame is proven; stops gas flow on ignition failure.
 2. Flame Rollout Switch: Installed on burner box; prevents burner operation.
 3. Limit Control: Fixed stop at maximum permissible setting; de-energizes burner on excessive bonnet temperature; automatic reset.
- G. Combustion-Air Inducer:** Centrifugal fan with thermally protected motor and sleeve bearings prepurges heat exchanger and vents combustion products; pressure switch prevents furnace operation if combustion-air inlet or flue outlet is blocked.
- H. Furnace Controls:** Solid-state board integrates ignition, heat, cooling, and fan speeds; and adjustable fan-on and fan-off timing; terminals for connection to accessories.
- I. Vent Materials:** Type B listed metal vents.
- J. Forward-Curved Fan Type:** Centrifugal; statically and dynamically balanced.
1. Fan Wheel Material: Galvanized steel, mounted on solid-steel shaft.
 2. Belt drive with VFD.
- K. Fan Motors:** Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
1. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
- L. Filters:** Disposable, with ASHRAE 52.2 MERV rating of 6 or higher.
- 2.3 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS**
- A. Casing:** Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
- B. Compressor:** Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
1. Compressor Type: Scroll.
 2. Refrigerant: R-410A.
- C. Refrigerant Coil:** Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
- D. Heat Pump Components:** Reversing valve and low-temperature air cut-off thermostat.
- E. Fan:** Aluminum-propeller type, directly connected to motor.

- F.** Motor: Permanently lubricated, with integral thermal-overload protection.
- G.** Low Ambient Kit: Permits operation down to 45 deg F.
- H.** Mounting Base: Polyethylene.
- I.** Minimum Energy Efficiency: Comply with ASHRAE/IESNA 90.1-2004, "Energy Standard for Buildings except Low-Rise Residential Buildings."

2.4 ACCESSORIES

- A.** Equipment operating sequences are specified in Division 23 Sections "Sequence of Operations for HVAC Controls."
- B.** Control Module: Unit-mounted digital panel with touchpad temperature control and touchpad for heating, cooling, and fan operation. Include the following features:
 - 1.** Low Ambient Lockout Control: Prevents cooling-cycle operation below 40 deg F outdoor air temperature.
 - 2.** Heat-Pump Ambient Control: Field-adjustable switch changes to heat-pump heating operation above 40 deg F and to supplemental heating below plus 25 deg F.
 - 3.** Reverse-Cycle Defrost: Solid-state sensor monitors frost buildup on indoor and outdoor coil and reverses unit to melt frost.
- C.** Thermostat: Low voltage with subbase to control compressor and evaporator fan with the following features:
 - 1.** Fully Programmable to time of day and day of the week
 - 2.** Compressor time delay.
 - 3.** 24-hour time control of system stop and start.
 - 4.** Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
 - 5.** Fan-speed selection, including auto setting.
- D.** Automatic-reset timer to prevent rapid cycling of compressor.
- E.** Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.
 - 1.** Minimum Insulation Thickness: 1 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION

- A.** Install units level and plumb.
- B.** Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C.** Install ground-mounting, compressor-condenser components on 4-inch- thick, reinforced concrete base; 4 inches larger on each side than unit. Coordinate anchor installation with concrete base.
- D.** Install ground-mounting, compressor-condenser components on polyethylene mounting base.

Special Specifications

- E. Install compressor-condenser components on restrained, spring isolators with a minimum static deflection of 1 inch.
- F. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to unit to allow service and maintenance.
- C. Duct Connections: Duct installation requirements are specified in Division 23 Section "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Air Duct Accessories."
- D. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- E. Electrical Connections: Comply with requirements in Division 26 Sections for power wiring, switches, and motor controls.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.

3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units. Refer to Division 01 Section "Demonstration and Training."

END