



Huntsville Utilities

ELECTRICITY • NATURAL GAS • WATER

ADDENDUM 1

Issue Date: January 9, 2026
IFB Number: IFB 26-025
Project Name: SEWTP Expansion to 24MGD

All questions to be submitted in writing to miranda.duke@hsvutil.org, before the question deadline. All questions below were received in the manner and time in which they were required. Addendums are issued to all prospective companies and shall be an integral part of the bid packet. Prospective bidders must acknowledge each addendum in their bid packet or be considered not responsible with an unacceptable IFB.

Attachment(s): (if any)

1. Pre-Bid Meeting Notes
2. Sample Contract
3. 40 05 00 Piping and Accessories
4. 40 05 63 Valves and Accessories
5. 43 23 31 Vertical Turbine Pumps
6. Pre-bid Meeting Attendee Sign In Sheet



Pre-Bid Meeting Minutes

| | | | |
|--------------------------|--|--------------------|-------------------------|
| Meeting Location: | Southeast WTP - 491 Walker Rd. Grant, AL 35747 | Client: | Huntsville Utilities |
| Meeting Date: | January 7, 2026 at 1:00 p.m. | Project: | SEWTP Expansion |
| Subject: | Pre-Bid Meeting | Project No. | 100325.24 IFB 26-025 |

PURPOSE OF MEETING / INTRODUCTION

The purpose of this meeting is to answer questions and provide clarification on construction requirements, design drawings, and project specifications.

Bidding: Date, Time, Location, and Duration

- Friday, January 23, 2026
- 9:00 a.m. CDT
- Huntsville Utilities Downtown Office - 112 Spragins Street NW., Huntsville, AL 35801
- Project Duration: 90 days per Base Bid. See Bid Description for additional details.
 - The project duration of 90 days begins after all materials and equipment are delivered.
- Liquidated Damages: \$1000/day
- Attendance at the bid opening is not mandatory.
- Approval of bid will be made at the Huntsville Utilities board meeting on February 25th, 2026. The award notification will be sent out later that week.
- All correspondence pertaining to the project must be submitted through Miranda Duke.
- Bid date can be extended by 1-2 weeks if needed. Please make official request to Miranda Duke if desired.

Bid Contents and Formatting

- Bids must have IFB #, Attn: Miranda Duke, and contractors license visible on the outer envelope or box.
- All required forms must be submitted with each bid. See included check list.
- Penciled, unsealed, or late bids will not be accepted.
- An original, copy, and usb drive must be submitted.

Insurance

- The bid award recipient will have 15 days after notification of award to have all required insurance information submitted to Huntsville Utilities.
- See contract documents for required insurance information.

Project Description

This project includes the installation of a new 1000 HP Finish Water pump, a new 400 HP Raw Water pump, provisions for connecting to a 2 MW portable generator at the SEWTP Raw Water intake, and any associated valves, piping, or electrical components.

Summary of Work located in specification section 01 11 00.

Sequence of work: Schedule to be submitted by the contractor and approved by the owner.

- Base Bid 1 – Finished Water Pump Station
- Base Bid 2 – Raw Water Pump Station
 - Base Bid 2 – Additive Alternate
 - Huntsville utilities will decide if the additive alternate work will be done prior to base bid 2 being awarded.
- Base bids 1 and 2 will be awarded separately. HU will choose the lowest bidder for each base bid.
- HU will accept either having a GC and an electrical subcontractor or an electrical contractor and a GC subcontractor.
- If clarification is needed for the electrical work, coordinate with Miranda Duke to contact the primary electrical engineer, Jay Morgan.

Site and Security: Contractor Responsible for maintaining secure job site.

Cut off for questions: January 14, 2026 at 4:00 pm CDT

- Bid applicants can request an extension to the question cut off and bid extension by contacting Miranda Duke.
- Applicants can send questions independently, so do not wait until questions are compiled to send them out.

Site Visit: Onsite visit following today's pre-bid meeting. Additional site visits available. Please schedule through Miranda Duke.

Clarification

- Use of American Products and Steel following AIS and/or BABA is not required.
- Section 40 Specifications will be provided as part of Addendum 1.
- The following VFD Manufacturers are approved by the Owner: Toshiba (Basis of Design), ABB, Danfoss, Eaton, Schneider and Allen Bradley.
 - The selected VFD must meet the performance spec included in the contract documents.
- Addendum No. 1 will be posted following pre-bid meeting.
- The anticipated schedule for completion is as follows:
 - Finished Water Pump Station: Completion by May 1st, 2027
 - Raw Water Pump Station: Completion by May 1st, 2028.

Questions

Why is there a longer lead time on the Raw Water Pump Station?

- The finished water pump station is utilizing spare electrical equipment that is already in place. New equipment must be provided for the Raw Water Pump Station. See drawings and specifications for details.

Will the construction period be dependent on the season or weather conditions.

- No. Construction period is not dependent on season or weather. Notice to proceed will be dictated upon equipment delivery times.

**ATTACHMENT E
SEGMENT 8
CONTRACT**

Project Name and IFB #: IFB 26-025 Southeast Water Treatment Plant Expansion to 24 MGD

Bid Submittal Date: _____ Liquidated Damages: \$ 1,000 / Day

Contract Duration: 90 Days Months Years from Notice to Proceed Date

Contract Amount: \$ _____

Contract Amount (in written form): _____

THIS AGREEMENT, made and entered into BY AND BETWEEN

CONTRACTOR, Party of the First Part, and
City of Huntsville, Alabama, a Municipal Corporation, d/b/a Huntsville Utilities Electric Board and
Huntsville Utilities Natural Gas and Water Board, Party of the Second Part,
hereinafter referred to as the OWNER.

**** WITNESSETH ****

The CONTRACTOR, in consideration of the sum to be paid by the OWNER and of the covenants and agreements herein contained, hereby agrees at its own proper cost and expense to do all the work and furnish all materials, tools, labor, supervision and all appliances, machinery, and appurtenances for the project set forth herein to the extent of the bid made by the CONTRACTOR, all in full compliance with the contract documents referred to herein.

The contract documents shall include but not be limited to the Invitation for Bid, all terms and conditions, qualification forms, pricing proposal forms, signed proposal, scope of work, and any other printed or written explanatory matter thereof, including any and all addenda, as prepared by the OWNER, all of which are made a part of this Contract as if fully and completely set forth herein. All the aforesaid documents are collectively referred to as "Contract Documents".

In consideration of the performance of the work as set forth in these Contract Documents, and subject to adjustments in accordance with the Contract Documents, the OWNER agrees to pay the Contractor and to make payments in the manner and at the times provided in the Contract Documents, based on the prices contained herein. The CONTRACTOR agrees to commence the work to be performed under this agreement on a date to be specified in a written notice by the OWNER or the commencement date of this Contract.

The said CONTRACTOR further agrees to indemnify, hold harmless, and defend the OWNER, the City of Huntsville, members of the Huntsville Utility Boards, or their representatives, employees, agents or servants from and against any and all liability for loss, damages, attorney fees, and expenses which the OWNER, the City of Huntsville, members of the Huntsville Utility Boards, or their representatives, employees, agents or servants, may suffer or be held liable by reason of injury or damage to any person

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or property arising out of or in any manner connected with the operations to be performed under this Contract whether or not due in whole or in part to any act, omission, or negligence of the OWNER, the City of Huntsville, the members of the Huntsville Utility Boards, or to any of their representatives, employees, agents or servants.

The CONTRACTOR must file with the OWNER evidence of adequate insurance for damages to persons and property which may arise out of performance of this Contract, and which is set forth in the Contract Documents and attachments hereto.

No additional work or extra tasks shall be performed unless the same shall be duly authorized by appropriate action by the OWNER in writing.

This Contract does not make either Party the agent or legal representative of the other Party and does not create a partnership or joint venture between the Parties. This Contract is non-exclusive, and OWNER may enter into similar agreements with third parties.

Each Party represents and warrants to the other Party that: (a) it has the full right and authority to enter into, execute, deliver and perform its obligations under this Contract, (b) it will comply with all applicable laws in connection with the obligations under this Contract, and (c) this Contract constitutes a legal, valid and binding obligation of such Party enforceable against such Party in accordance with its terms, subject to the effect of bankruptcy, insolvency, and similar laws affecting the rights and remedies of creditors, and general equitable principles.

Neither Party may transfer or assign, voluntarily or by operation of law, its rights, and obligations under this Contract without the prior written consent of the other Party (such consent not to be unreasonably withheld, conditioned, or delayed).

In the event that either Party becomes subject to bankruptcy or a custodian, receiver, trustee, intervenor, or other officer under the authority of Chapters 7, 9, 11 or 13 of the Bankruptcy Code as defined in the United States Code or any applicable state law within any jurisdiction, whether voluntary or involuntary, or makes an admission or is determined by a court of law to be insolvent, such Party shall be deemed in default of this Contract and either Party shall have the right to terminate this Contract within thirty (30) calendar days of its notification of any bankruptcy proceeding or any admission or judicial determination of insolvency.

In no event will either party be liable to the other party for any indirect, incidental, special, punitive or consequential damages whatsoever, arising out of, or in connection with this contract, including but not limited to, lost profits, lost revenue, loss of goodwill, loss of anticipated savings, or loss of business opportunity incurred or suffered by either party, whether in an action in contract or tort, even if the other party or any other person has been advised of the possibility of such damages.

CONTRACTOR is in default of this Contract if it fails to cure any material breach of any term of this Contract within seven (7) days of receiving written notice of the breach from OWNER; provided that if the breach is not reasonably curable within seven (7) days then the period for cure shall be extended for up to an additional seven (7) days so long as CONTRACTOR is diligently pursuing a cure at the end of the first seven (7) days.

Any and all disputes arising out of this Contract will be governed, construed, and enforced according to

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the laws of the State of Alabama, excluding its conflict-of-law principles. A Party seeking to bring an action relating to the validity, construction, interpretation, and enforcement of this Contract shall institute such action in the Circuit Court of Madison County, Alabama, or the United States District Court for the Northern District of Alabama.

Neither Party will be liable for delays or any failure to perform under this Contract due to causes that prevent the Party from performing its obligations under this Contract by reason of a Force Majeure Event. "Force Majeure Event" means event or circumstance that prevents one Party from performing its obligations under this Contract, which event is not within the reasonable control of, or the result of the negligence of, the claiming Party, and which, by the exercise of commercially reasonable diligence, the claiming Party is unable to overcome or avoid or cause to be avoided, including but not limited to acts of God/nature, fire, explosion, flood, storm or other similar catastrophe, war, revolution, civil commotion, acts of public enemies, terrorism or national emergency, or any law, order, or regulation of the government (or any department, agency, commission, court, or bureau of a government) resulting from the above. The other Party will not be required to perform or resume performance of those of its obligations that correspond to the obligations of the Party excused by Force Majeure Event, until the end of such Force Majeure Event.

The representations, warranties, covenants, and agreements of the Parties set forth in this Contract are not intended for, nor will they be for the benefit of or enforceable by, any third party or Person not a party to this Contract.

Neither Party may use any logo or service mark of the other Party without the express written consent of the other Party.

The waiver by any Party hereto of a breach under any of the provisions of this Contract, or the failure of any Party, on one or more occasions, to enforce any of the provisions of this Contract or to exercise any right or privilege hereunder will not thereafter be construed as a waiver of any subsequent breach or default of a similar nature, or as a waiver of any such provision, right or privilege hereunder. A waiver of any provision of this Contract by a Party must be in writing to be effective and will not be construed as or constitute a waiver of any other provision not expressly stated in the waiver by such Party.

If any provision of this Contract is found unenforceable or invalid, the remainder of this Contract will remain in full force and effect and it, and any related provisions will be interpreted to best accomplish the unenforceable provision's essential purpose.

The terms and provisions contained in this Contract that by their nature and context are intended to survive the performance thereof by the Parties will so survive the completion of performance and termination or early termination this Contract, including, without limitation, provisions for indemnification.

The Contract Documents constitute the entire understanding between the Parties relating to the rights, duties and obligations granted and assumed therein. Any prior agreements, promises, negotiations or representations regarding the subject matter of the Contract Documents are of no force or effect. No alteration, modification, amendment, or variation of the terms of any provision will be valid unless made in writing and signed by duly authorized representatives of CONTRACTOR and OWNER.

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IN WITNESS WHEREOF, the parties hereto have executed this Contract on the day and date first written above in two (2) consecutive counterparts, each of which shall, without proof or accounting for the other counterparts, be deemed as the original Contract.

OWNER:
CITY OF HUNTSVILLE, ALABAMA,
A MUNICIPAL CORPORATION WITHIN
THE STATE OF ALABAMA, d/b/a
HUNTSVILLE UTILITIES

CONTRACTOR:

By: _____

By: _____

Name: _____

Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

Attest: _____

Attest: _____

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SECTION 40 05 00

PIPING AND ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This Section covers the Work necessary to furnish, install, and complete, the plant piping specified herein.

1.2 GENERAL

- A. Like items of material provided hereunder shall be the end products of one (1) manufacturer.
- B. To assure uniformity and compatibility of piping components in grooved end piping systems, fittings and coupling shall be furnished by the same manufacturer.
- C. See CONDITIONS OF THE CONTRACT and Section GENERAL REQUIREMENTS, which contain information and requirements that apply to the work specified herein and are mandatory for this Project.

1.3 SUBMITTALS

- A. In addition to the requirements of Division 1, GENERAL REQUIREMENTS, the following information shall be provided:
 - 1. Shop Drawings:
 - a. For piping systems greater than three (3) inches in diameter, provide double-line Drawings of each piping system to the scale stated on the Contract Drawings, locating each support, identifying the type by catalog number or shop Drawing detail number, and showing anchor locations and identifying them by shop Drawing detail number.
 - b. Detailed information for piping thrust protection systems used at all specified locations, which enable the Engineer to determine the adequacy and acceptability of the system being submitted for review.
 - 2. Manufacturer's written certification that the factory-applied coating system(s) is identical to the requirements specified herein. Where, in the manufacturer's opinion, the coating system(s) exceeds the requirements specified herein, submit complete technical literature of the proposed system(s) to the Engineer for review.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The general materials to be used for the piping systems are shown on the Drawings and listed by service in the Piping Schedule at the end of this section. Specific material requirements are contained herein.

2.2 PIPE IDENTIFICATION PAINTING

- A. All non-submerged or non-buried piping shall be painted, color coded, and labeled as specified in Section PAINTING. Color coding shall be as specified in the Piping Schedule. Submerged piping shall be coated for corrosion protections as specified in Section PAINTING. Buried piping shall receive manufacturer's standard protective coating. Pipes to receive field coatings shall be either non-primed or shop primed according to the required paint system.

2.3 PIPE JOINTS

- A. Pipe joints for exposed piping shall be flanged (or welded as applicable) end for pipe larger than two (2)-inches in diameter and welded (solvent or solder, as applicable) or screwed for smaller piping, except as modified herein.
- B. Pipe joints for buried piping shall be mechanical joint or push-on joint for ductile iron pipe and PVC pipe. Pipe joints for pressure services shall be provided with thrust restraint designed for the test pressures specified in the Piping Schedule. Ductile iron pipe shall be restrained using proprietary restrained joint pipe and fittings. Pressure service PVC pipe shall have solvent welded joints.
- C. Pipe joints for ductile iron shall be flanged or restrained joint and restrained flexible joint as shown on the Drawings.
- D. Pipe joints for steel piping shall be threaded for pipe sizes two (2)-inches and smaller and flanged or welded for pipe larger than two (2)- inches.
- E. Grooved end pipe joints shall be used where required to join to the Owner-furnished package filters. At the Contractor's option, grooved end pipe joints may be used on exposed piping fourteen (14)-inches and smaller. All grooved end joints shall be rigid type, victaulic or equal.

2.4 DUCTILE IRON PIPE

- A. Centrifugally cast, Grade 60-42-10 iron, ANSI A21.51, AWWA C151, cement-mortar lined, Class fifty (50), one hundred-fifty (150) psi minimum working pressure. Buried pipe shall be seal coated in accordance with ANSI 21.4. Non-buried pipe to receive paint for color coding shall be bare or primed for compatibility with the final coating system. Pipe joints shall be as shown on the Drawings.
 - 1. Potable Water: Cement-mortar lined, and seal coated in accordance with ANSI A21.4.
- B. Ductile iron pipe pressure class shall be as follows unless shown or required otherwise.

12" or less – Pressure Class 350

14"-24" - Pressure Class 250

30" and larger – Pressure Class 250

C. Joints shall be as follows unless shown or required otherwise:

1. Typical buried pipe: push-on joint with restraining gaskets as required.
2. Buried 24" and larger: TR-Flex by U.S. Pipe, Flex-Ring by American, or equal.

2.5 DUCTILE IRON FITTINGS

A. Fittings for piping shall be cement-lined cast iron or ductile iron with mechanical joint ends and conforming to AWWA C110 and C111 or C153. Fittings less than twelve (12) inches shall be rated two hundred-fifty (350) psi minimum working pressure and fittings twelve (12) inches and larger shall be rated for one hundred-fifty (250) psi minimum working pressure.

B. Provide PVC adapters as required to connect fittings to PVC pipe.

1. Gray or ductile iron, two hundred-fifty (250) psi minimum working pressure, cement lined and seal-coated (buried applications only). Where taps are shown on fittings, tapping bosses shall be provided. ANSI B16.1 fittings shall be used only for nonstandard fittings not manufactured under ANSI/AWWA C110.
2. Flanged: ANSI/AWWA C110 and ANSI B16.1, faced and drilled one hundred twenty-five (125) pound ANSI standard.
3. Restrained: ANSI/AWWA C110 and ANSI/AWWA C111, American Cast Iron Pipe Company "Lok-Ring" or U.S. Pipe and Foundry TR Flex, or equal.
4. Mechanical Joints: ANSI/AWWA C110, ANSI/AWWA C111, and ANSI/AWWA C153.

C. Flanges:

1. Ductile iron, ANSI A21.15/AWWA C115, threaded, two hundred-fifty (250) psi working pressure, ANSI one hundred twenty-five (125) pound drilling.
2. Flange adapters shall be Series 1000 E-Z Flange as manufactured by EBAA Iron, or equal.

D. Bolts

1. For Class 250 FF Flanges: Carbon steel, ASTM A307, Grade A hex head bolts and ASTM A563, Grade A hex head nuts.
2. For Mechanical Joint: Manufacturer's standard.
3. Gaskets for mechanical or push-on joints shall be rubber, conforming to ANSI A21.11, AWWA C111.

4. Gaskets for flanged joints shall be 1/8-inch thick, red rubber conforming to applicable parts of ANSI B16.21 and AWWA C115, unless otherwise specified. Gasket material shall be free from corrosive alkali or acid ingredients and suitable for use in potable waterlines. Gaskets shall be full-face type and shall be suitable.
- E. Lubricant for mechanical joint end piping shall be manufacturer's standard.

2.6 FABRICATED STEEL PIPE AND FITTINGS

A. Pipe:

1. General: Steel pipe where allowed as an alternate for ductile iron, shall be black or carbon steel meeting the requirements of AWWA C200 and ASTM A139, Grade C, D, or E.
2. Pipe shall be designed for maximum pressure indicated in the piping schedule at end of this Section. Pipe design shall be in accordance with AWWA M-11.
3. Pipe six (6)-inches and larger shall be shop-applied cement mortar lined in accordance with AWWA C205, and exterior coating shall be shop-applied primer as specified in Section PAINTING-WATER PLANTS. Pipe less than six (6)-inches shall be coated with epoxy on the interior and primed as specified on the exterior.

B. Fittings:

1. Fittings for four (4)-inch diameter and larger shall be fabricated in accordance with AWWA C200 conforming to the dimensions of AWWA C208 or may be fabricated into standard or special pipe lengths. All tees, laterals, and outlets shall be reinforced in accordance with AWWA M-11. Fittings shall be butt-welded or flanged as shown.
2. Fittings for pipe smaller than four (4)-inches diameter shall be threaded, one hundred-fifty (150) pound malleable iron, black, ASTM A197 or ASTM A47 with dimensions meeting the requirements ANSI B16.3.
3. Unions: One hundred-fifty (150) pound malleable iron, black, ASTM A197 or ASTM A47, with dimensions meeting the requirements of ANSI B16.3, and a brass-to-iron seat.

C. Flanges:

1. Flanges shall be slip-on AWWA C207 Class F, faced and drilled one hundred twenty-five (125) pound ANSI standard.
2. Shop lining and coating shall be continuous to end of the pipe or back of flange. Flange faces shall be shop-coated with a soluble rust preventative compound.
3. Gaskets: full face, 1/8-inch thick, red rubber.
4. Bolting: Carbon steel; ASTM A193 grade B7.
5. Provide specially drilled flanges when required for connection to special equipment.

D. Mechanical Couplings:

1. Smith-Blair Style 411 or equal. Where tied joints are required, couplings shall be harnessed to resist the maximum pressure in accordance with AWWA M11. Pipe ends for mechanical couplings shall conform to AWWA C200. Shop applied outside coating shall extend as required for field assembly of the mechanical coupling or to the harness lugs or rings. Harness lugs or rings shall be coated with one (1) shop coat of primer compatible with exterior coating and field joint coating materials as specified in Section PAINTING. The inside lining shall be continuous to the end of the pipe. For threaded piping, use ASTM 197 or ASTM A47 malleable iron with dimensions conforming to ANSI B16.3.
- E. Flange Coupling Adapter:
1. Mega Flange Series 2100 or equal. Shop applied outside coating shall extend as required for field assembly of the flange adaptor or to the harness lugs or rings. Harness lugs or rings shall be coated with one (1) shop coat of primer compatible with exterior coating and field joint coating materials as specified in Section PAINTING.
- F. Joints:
1. Butt welded, flanged or threaded as follows:
 - a. Two (2)-inch and smaller: threaded with teflon tape as thread lubricant.
 - b. 2½-inch and larger: butt-welded, flanged as shown.
 2. Provide thredolets for all taps.
 3. Provide dissimilar metal flange insulating kits at all steel-to-ductile iron connections.

2.7 SAMPLE PORTS

- A. Brass Cocks, Stops, and Clamps.
1. Corporation cocks shall be 1-inch unless shown otherwise on the Drawings. Cocks shall be brass, complying with AWWA C800 and equal to Mueller H-15000 for copper tubing and Mueller H-15008 for plastic tubing.
 2. Curb stops shall be 1-inch with full opening unless shown otherwise on the Drawings. Stops shall be brass, complying with AWWA C800 and equal to Ford B-43-232W with lock out wing.
 3. 1" Services shall be tapped directly onto main for pipe sizes 6" and larger.
- B. B. Copper tubing shall conform to Federal Specifications WW-T-799, Type K. Size shall be 1-inch unless shown otherwise on the Drawings.

2.8 CARBON STEEL PIPE AND FITTINGS

- A. Pipe shall be carbon steel, seamless or electric resistance welded, ASTM A53, Grade B or ASTM A106, Grade B. Pipe wall thickness for two (2)-inch and smaller shall be Schedule 80, pipe wall thickness for 2½- inch and larger shall be Schedule 40.
- B. Joints for two (2)-inch and smaller shall be threaded, all joints 2½-inch and larger shall be welded or flanged where required for connections to equipment.
- C. Fittings for pipe two (2)-inch and smaller shall be threaded, one hundred-fifty (150) pound malleable iron, ASTM A197 or ASTM A47, dimensions conforming to ANSI B16.3. Fittings for pipe larger than two (2) inch shall be butt-welded, carbon steel, ASTM A234, Grade WPB, meeting the requirements of ANSI B16.9, to match pipe wall thickness. Unions shall be three-hundred (300) pound malleable iron, ASTM A197 or ASTM A47, dimensions conforming to ANSI B16.3, brass to iron seat.
- D. Branch connections for pipe two (2)-inch and smaller shall be screwed tees, as specified above for fittings. Larger than two (2)-inches shall be standard weight forged steel, ASTM A105, Grade II, commercial welding branch fittings with butt-welded outlet. Straight or reducing tees shall be as specified above for fittings.
- E. Flanges shall be ASTM A181, Class 60 slip-on or welding neck type, face and drilled one hundred-fifty (150) pound, 1/16-inch raised face, ANSI B16.5 Standard, or AWWA C207, Class D hub, faced and drilled one hundred twenty-five (125) pound flat-face, ANSI B16.1 Standard. Provide welding neck flanges when abutting butt weld fittings. Welding neck bore shall match pipe ID. Machine off the raised face of steel flange when mating with a cast iron flat face flange.
- F. Bolting shall be carbon steel, ASTM A193, Grade B7 studs and ASTM A194, Grade 2H hex head nuts.
- G. Gaskets shall be 1/16-inch thick compressed nonasbestos composition flat ring type.
- H. Thread lubricant shall be teflon tape or joint compound that is insoluble in water.

2.9 POLYVINYL CHLORIDE (PVC) PIPE (PRESSURE SERVICE)

- A. PVC pipe for pressure service shall be Schedule 80, Type I, Grade 1, or Class 1254-B, conforming to ASTM D1784 and ASTM D1785.
- B. Joints shall be socket-welded or threaded, except where connecting unions, valves, and equipment with flanged connections that may require future disassembly. Flanges shall be one (1) piece, molded hub type flat faced, one hundred twenty-five (125) pound Standard. Gaskets shall be full-face, 1/8 inch thick fabricated from ethylene propylene rubber (EPR).
- C. Fittings shall be Schedule 80 as specified above, conforming to the requirements of ASTM D2467 for socket type.
- D. All socket connections shall be joined with PVC solvent cement conforming to ASTM 2564. Manufacture and viscosity shall be as recommended by the pipe and fitting manufacturer to assure compatibility.

2.10 COPPER PIPE

- A. Pipe shall be seamless copper, ASTM B88, Type L hard drawn. Tubing for lines smaller than ½-inch shall be Type K soft copper, ASTM B88, with commercially pure wrought copper solder joint fittings.
- B. Fittings shall be commercially pure wrought copper, socket, joint, ASTM B75, dimensions conforming to ANSI B16.22.
- C. Solder shall be 95-5 wire solder, ASTM B32, Grade TA. Do not use cored solder.

2.11 FLEXIBLE CONNECTIONS TO EQUIPMENT

- A. Pump seal water lines and drains, hydraulic lines to valves and their drains, and air line connections to equipment must have the flexibility to isolate equipment vibration.

2.12 PIPING SUPPORT SYSTEMS

A. General:

1. Piping shall be supported, in general, as described hereinafter and as shown by the pipe support details on the Drawings. Manufacturers' catalog figure numbers are typical of the types and quality of standard pipe supports to be employed.
2. No attempt has been made to show all required pipe supports in all locations, either on the Drawings or in the details. The absence of pipe supports and details on any Drawings shall not relieve the Contractor of the responsibility for providing them throughout the facility.
3. All submerged piping supports, guides, and fasteners or those installed below wet wall tops shall be type 316 stainless steel.
4. All support anchoring devices, including anchor bolts, inserts and other devices used to anchor the support onto a concrete base, roof, wall or structural steel works, shall be of the proper size, strength and spacing to withstand the shear and pullout loads imposed by loading and spacing on each particular support.
5. Where piping connects to equipment it shall be supported by a pipe support and not by the equipment. All piping shall be supported in a manner which will prevent undue strain on any valve, fitting, or piece of equipment. In addition, pipe supports shall be provided at changes in direction or elevation, adjacent to flexible couplings, and where otherwise shown.
6. Pipe support system components shall withstand the dead loads imposed by the weight of the pipes filled with water, plus any insulation. Commercial pipe supports and hangers shall have a minimum safety factor of five (5).

2.13 INSULATION AND HEAT TRACING

- A. Insulation on all exposed heater/ heat exchanger piping within the digester gallery shall be polyisocyanurate equal to Trymer 2000 XP as manufactured by ITW, or equal. Insulation thickness shall be 1 inch unless otherwise recommended by manufacturer for service application.
- B. Insulation on aboveground piping shall be covered with minimum 0.016-inch thick aluminum jacket. The jacket shall be held in place by a continuous friction type joint, providing a positive weatherproof seal over entire length of jacket. The circumferential joints shall be secured with preformed snap straps containing weatherproof sealant. Cover outdoor fittings with matching preformed aluminum jackets, two (2) piece elbows and flange covers, secured with stainless steel bands. Fitting covers shall be as manufactured by Childers, Papco, or equal.
- C. Heat Tracing: Furnish self-limiting one hundred-twenty (120) volt electrical heating strip for exterior exposed pipes two (2)-inches and smaller. System shall be thermostatically controlled and guaranteed by the manufacturer for a period of two (2) years. System shall be listed by

Underwriter Laboratories as a self-limiting pipe tracing material for freeze protection application in ordinary locations. Heat tracing shall be manufactured by Smith-Gates Corporation, Chemlex Corporation, or equal.

PART 3 - EXECUTION

3.1 WELDING STEEL PIPE

- A. General: In accordance with the latest edition of Section IX, ASME Boiler and Pressure Vessel Code.
- B. Welding Procedure Specifications:
 - 1. Qualify all welding procedure specifications prior to fabrication in accordance with the ASME Boiler and Pressure Vessel Code, Section IX.
 - 2. Identify all welding procedure Specifications by number and reference the procedure number on all fabrication Drawings.
- C. Welding and Welding Operators:
 - 1. Qualify all welders and welding operators prior to fabrication in accordance with ASME Boiler and Pressure Vessel Code, Section IX.
 - 2. Include qualifications for all welding positions to be employed in the fabrication.
- D. Materials:
 - 1. Use welding products within the limits recommended by their manufacturers.
 - 2. Keep electrodes, filler wires, and fluxes clean, dry, and properly stored according to manufacturer's recommendations. Do not use electrodes, filler wires, or fluxes that are damp, greasy, or oxidized.
 - 3. Do not use backing rings.
 - 4. Consumable inserts may be used if included in the qualified welding procedure specification. Match the chemistry of the consumable insert with the base metal and weld metal chemistry.

3.2 FABRICATION OF STEEL PIPE

- A. End Preparation:
 - 1. Machine shaping of pipe ends is the preferred method.
 - 2. Oxygen or arc cutting is acceptable only if the cut is smooth and true and all slag is removed either by chipping or grinding.
 - 3. Beveled Ends for Butt Welding: Meet the requirements of ANSI B16.25.

- B. Cleaning: After completion of shop or field fabrication and after erection, clean all piping inside and outside to remove all loose scale, weld spatter, dirt, loose debris, and foreign material.
- C. Alignment and Spacing:
 1. Align ends to be joined within existing commercial tolerances on diameters, wall thickness, and out-of-roundness.
 2. Root Opening of the Joint: As stated in the welding procedure Specification.

3.3 CORROSION PROTECTION

- A. Install coating as specified in Section PAINTING.

3.4 EXAMINATION, INSPECTION, AND TESTING OF STEEL WELDING

- A. Required Examinations:
 1. Perform examination in accordance with the ANSI Code for Pressure Piping B31.3 (Piping Code).
 2. Perform examination for every pipe thickness and for each welding procedure, progressively, for all piping covered by this Section.

3.5 PIPE PREPARATION AND HANDLING - GENERAL

- A. Each pipe and fitting shall be carefully inspected before the exposed pipe or fitting is installed. The interior and exterior protective coating shall be inspected, and all damaged areas patched in the field with material similar to the original. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.
- B. Use proper implements, tools, and facilities for the safe and proper protection of the pipe. Carefully handle pipe in such a manner as to avoid any physical damage to the pipe. Do not drop or dump pipe.
- C. Care shall be taken not to damage linings when handling pipe.

3.6 CUTTING PIPE

- A. Cut pipe with milling type cutter, rolling pipe cutter, or abrasive saw cutter. Do not flame cut.
- B. Dress cut ends of pipe in accordance with the type of joint to be made. Dress cut ends of mechanical joint pipe to remove sharp edges or Projections which may damage the rubber gasket. Dress cut ends of push-on joint pipe by beveling, as recommended by the pipe manufacturer. Dress cut ends of pipe for flanged coupling adapters as recommended by the manufacturer.

3.7 FABRICATION OF FLANGED PIPE - GENERAL

- A. Flanged ductile iron pipe and steel pipe shall be fabricated in the shop, not in the field, and delivered to the job site with flanges in place and properly faced. Threaded flanges shall be

individually fitted and machine tightened on matching threaded pipe by the manufacturer. Flanges for ductile iron shall be faced after fabrication in accordance with ANSI A21.15/AWWA C115.

3.8 JOINTING PIPE - GENERAL

- A. Flanged: Prior to connecting flanged pipe, the faces of the flanges shall be thoroughly cleaned of all oil, grease, and foreign material. The rubber gaskets shall be checked for proper fit and thoroughly cleaned. Care shall be taken to assure proper seating of the flange gasket. Bolts shall be tightened so the pressure on the gasket is uniform. Torque-limiting wrenches shall be used to ensure uniform bearing insofar as possible. If joints leak, the gaskets shall be removed and reset and bolts re-tightened.
- B. Mechanical and Push-on Joint: Join pipe with mechanical or push-on type joints in accordance with the manufacturer's recommendations. Provide all special tools and devices, such as special jacks, chokers, and similar items required for proper installation. Lubricant for the pipe gaskets shall be furnished by the pipe manufacturer, and no substitutes will be permitted under any circumstances. Thrust restraint of pressure and gravity piping shall be as specified herein and as shown in the Drawings.

3.9 PIPE INSTALLATION

- A. Handling Material: Provide and use proper implements, tools, and facilities for the safe and proper prosecution of the Work. Lower all pipe, fittings, and appurtenances into the trench, piece by piece, by means of a crane, slings, or other suitable means and in such a manner as to prevent damage to the pipeline materials and protective coatings and linings. Do not drop or dump pipeline materials into the trench.
- B. Cleaning Pipe and Fittings: Remove all dirt, blisters, lumps, and excess coating from the bell and spigot ends of each pipe. Wipe the outside of the spigot and the inside of the bell until joints are clean, dry, and free from oil and grease before the pipe is laid.
- C. Cutting Pipe: Cut pipe for inserting valves, fittings, or closure pieces in a neat and workmanlike manner without damaging the pipe or lining and so as to leave a smooth end at right angles to the axis of the pipe or leaving a beveled end as recommended by the manufacturer. Dress cut ends to remove sharp edges or projections which may damage the rubber gasket.
- D. Laying Pipe: Unless otherwise directed, lay pipe with bell end facing in the direction of the laying. For lines on an appreciable slope, face bells upgrade at the discretion of the Engineer. Pipelines intended to be straight shall not deviate from the straight line at any joint in excess of one (1) inch. Wherever it is necessary to deflect from a straight line, the maximum deflection per joint shall be as recommended by the pipe manufacturer.
- E. Joining Push-On Joint Pipe: Lay and join pipe in strict accordance with the manufacturer's recommendations. Provide all special tools and devices, such as special jacks, chokers, and similar items required for the installation. Lubricant for the pipe shall be furnished by the pipe manufacturer.
- F. Joining Mechanical Joint Pipe and Fittings: Install in accordance with manufacturer's recommendations. After cleaning ends and gasket, slip the gland and gasket on the plain end,

lubricating if necessary to facilitate sliding the gasket into place. Guide the end of the pipe into the bell of the pipe previously laid, locating the spigot centrally in the bell. Place the gasket into position and insert the bolts in the holes. When tightening bolts, bring the gland up toward the flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. Tighten all nuts progressively at a time. Do not overstress bolts to compensate for poor alignment. If effective sealing is not attained at the maximum torque, disassemble the joint and reassemble after cleaning.

3.10 INSTALLATION OF FLEXIBLE COUPLINGS AND FLANGED ADAPTERS

- A. Prior to installation, thoroughly clean oil, scale, rust, and dirt from the pipe to provide a clean seat for the gasket. Care shall be taken that the gaskets are wiped clean before they are installed. If necessary, gaskets may be lubricated with soapy water or manufacturer's standard lubricant before installation on the pipe ends. Install in accordance with the manufacturer's recommendations. Bolts shall be tightened progressively, drawing up bolts on opposite sides a little at a time until all bolts have a uniform tightness. Workmen tightening bolts shall use torque limiting wrenches.

3.11 INSULATION

- A. All piping shall be insulated in accordance with manufacturer's instructions including types of insulating cements, lagging adhesives, and weather-proof mastics.
- B. All insulation shall be applied over clean, dry surfaces with all joints butted firmly together, but not until piping system has been pressure tested and any leaks corrected. Insulation shall not extend beyond flanges nor cover nameplates or code inspection stamps. Insulation shall run continuous through wall openings, ceiling openings, and pipe sleeves, unless otherwise noted.
- C. Insulate all valve bodies, flanges, and pipe couplings. Provide removable insulation sections on all devices that require access for maintenance of equipment or removal.
- D. Finished appearance of all insulation shall be smooth and continuous. Provide coating of insulated cement where needed to obtain this result. Joints shall be lapped and the integrity of vapor seals maintained in strict accordance with manufacturer's instructions. Staples and screws shall not be used to secure components of systems that are vapor sealed.

3.12 INTERIM CLEANING

- A. Care shall be exercised during fabrication to prevent the accumulation of weld rod, weld spatter, pipe cuttings and filings, gravel, cleaning rags, etc. within piping sections. All piping shall be examined to assure removal of these and other foreign objects prior to assembly. Shop cleaning may employ any conventional commercial cleaning method if it does not corrode, deform, swell, or otherwise alter the physical properties of the material being cleaned.

3.13 PIPE INSTALLATION

- A. Handling Material: Provide and use proper implements, tools, and facilities for the safe and proper prosecution of the Work. Lower all pipe, fittings, and appurtenances into the trench, piece by piece, by means of a crane, slings, or other suitable means and in such a manner as to

prevent damage to the pipeline materials and protective coatings and linings. Do not drop or dump pipeline materials into the trench.

- B. **Cleaning Pipe and Fittings:** Remove all dirt, blisters, lumps, and excess coating from the bell and spigot ends of each pipe. Wipe the outside of the spigot and the inside of the bell until joints are clean, dry, and free from oil and grease before the pipe is laid.
- C. **Cutting Pipe:** Cut pipe for inserting valves, fittings, or closure pieces in a neat and workmanlike manner without damaging the pipe or lining and so as to leave a smooth end at right angles to the axis of the pipe or leaving a beveled end as recommended by the manufacturer. Dress cut ends to remove sharp edges or projections which may damage the rubber gasket.
- D. **Laying Pipe:** Unless otherwise directed, lay pipe with bell end facing in the direction of the laying. For lines on an appreciable slope, face bells upgrade at the discretion of the Engineer. Pipelines intended to be straight shall not deviate from the straight line at any joint in excess of one (1) inch. Wherever it is necessary to deflect from a straight line, the maximum deflection per joint shall be as recommended by the pipe manufacturer.
- E. **Joining Push-On Joint Pipe:** Lay and join pipe in strict accordance with the manufacturer's recommendations. Provide all special tools and devices, such as special jacks, chokers, and similar items required for the installation. Lubricant for the pipe shall be furnished by the pipe manufacturer.
- F. **Joining Mechanical Joint Pipe and Fittings:** Install in accordance with manufacturer's recommendations. After cleaning ends and gasket, slip the gland and gasket on the plain end, lubricating if necessary to facilitate sliding the gasket into place. Guide the end of the pipe into the bell of the pipe previously laid, locating the spigot centrally in the bell. Place the gasket into position and insert the bolts in the holes. When tightening bolts, bring the gland up toward the flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. Tighten all nuts progressively at a time. Do not overstress bolts to compensate for poor alignment. If effective sealing is not attained at the maximum torque, disassemble the joint and reassemble after cleaning.

3.14 HYDROSTATIC TESTING

- A. **General:** Make pressure and leakage tests on all newly laid pipe. The Contractor shall provide all necessary equipment and material, make all taps in the pipe as required, and conduct the tests. The Engineer will monitor and witness the tests before the installed pipe is approved. Pressure tests must be completed before payment is made for that section of pipe.
- B. **Test Pressure:** Each section of pipe shall be slowly filled with water to the test pressure of 150 psi. Pressure shall be applied by a motor-driven pump. The test duration shall be six (6) hours for covered pipe and three (3) hours for uncovered pipe. The Contractor shall provide a pressure chart recorder for the duration of each test.
- C. **Procedure:** Before applying the specified test pressure, all air shall be expelled from the pipe. If necessary, taps shall be made at points of highest elevation and plugged afterward. At the end of the test period, the Contractor will inject a sufficient quantity of water into the pipe section to re-establish the specified pressure. The Contractor shall provide suitable means to

determine the quantity of water lost by leakage during the test. The Engineer must witness the quantity of water leakage and pressure recording and sign both before approving the test.

- D. Allowable Leakage: Exposed piping shall not have any visible leakage. For buried pipelines less than 500 LF the allowable leakage shall be zero (0) gallons. For lengths more than more than 500 LF the allowable leakage shall be less than the amount determined by the following formula:

$$L = \frac{(10) D L_e}{126720}$$

Where L = Allowable leakage, gallons per hour

D = Nominal diameter of pipe, inches

L_e = Length of pipe, feet

- E. Allowable Loss of Pressure: The maximum allowable drop in pressure from the test pressure shall be no greater than five (5) percent of the test pressure.
- F. Correction of Excessive Leakage: Should any test of pipe disclose leakage greater than that allowed, locate and repair the defective joints or pipe until the leakage of a subsequent test is within the specified allowance.

3.15 DISINFECTION

- A. General: After pipelines, valves, fittings, and appurtenances have been installed and tested, they shall be disinfected in accordance with AWWA C651 or as modified by any governing agency having jurisdiction. The Contractor shall provide all equipment and materials necessary to adequately disinfect all facilities.
- B. Flushing: Before sterilizing, flush all foreign matter from the line. Flushing velocities shall be at least 2.5 feet per second. For large diameter pipelines where it is impractical to flush the pipe at this velocity, clean the pipeline in place from the inside by brushing, sweeping and swabbing, then flush the line at a lower velocity.
- C. Disinfection: Disinfect with a chlorine solution having a free chlorine residual of fifty (50) ppm. The solution shall be injected into the pipe through a corporation stop or suitable tap in the top of the pipeline. Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the existing water mains or so that contaminated water does not enter any disinfected mains.
- D. Retention Period: The chlorine solution shall remain in the pipeline for twenty-four (24) hours or long enough to destroy all nonspore-forming bacteria, whichever is greater. Operate all valves, hydrants, and other appurtenances during disinfection to assure that the chlorine solution is dispersed into all parts of the line, including dead ends, new services, and similar areas that otherwise may not receive the solution. After the retention period is complete, flush the chlorinated solution from the line until a chlorine residual of 0.2 ppm has been achieved.

- E. Bacteriological Samples: After flushing, collect a minimum of two (2) water samples for bacteriological analysis at a rate of at least one (1) per mile of water main disinfected and submit to a laboratory certified by ADEM. Where new connections to existing piping are made, at least one (1) sample per affected area of the system shall be collected and analyzed. All samples shall indicate absence of Total and Fecal Coliform. Contractor shall repeat disinfection procedure until satisfactory results have been obtained. The bacteriological results shall be sent directly to the Engineer.

3.16 PAINTING

- A. All exposed, non-insulating piping, valves, and accessories shall be painted as specified in Section PAINTING and as directed by the Engineer. Colors shall be selected by the Owner according to submitted color charts.

END OF SECTION

SECTION 40 05 63

VALVES AND ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This Section covers the Work necessary for furnishing and installing the various valves in the plant piping systems.

1.2 GENERAL

- A. Like items of equipment specified herein shall be the end products of one (1) manufacturer in order to achieve standardization for operation, maintenance, spare parts, and manufacturer's service.
- B. See CONDITIONS OF THE CONTRACT and Section GENERAL REQUIREMENTS, which contain information and requirements that apply to the work specified herein and are mandatory for this Project.

1.3 SUBMITTALS DURING CONSTRUCTION

- A. Submittals during construction shall be made as required in Section GENERAL REQUIREMENTS. In addition, the following specific information shall be provided:
 - 1. Valve type number.

1.4 MANUFACTURER'S SERVICE

- A. The Contractor shall provide for and receive the services of a qualified manufacturer's representative for power-actuated valves.
- B. The representatives(s) shall be present at the job site and/or classroom designated by the Owner for the minimum man-days listed for the services identified hereunder, travel time excluded:
 - 1. ½ man-day for training the Owner's personnel in the operation and maintenance of the equipment.
- C. Startup services and training of the Owner's personnel shall be at such times as requested by the Owner.
- D. See Section GENERAL REQUIREMENTS.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All valves shall be complete with all necessary operators, handwheels, operating nuts, wrenches, and other accessories or appurtenances, which are required for the proper completion of the Work. Operators and other accessories shall be sized and furnished by the valve supplier and factory mounted.
- B. Valves shall be suitable for the intended service. Renewable parts including discs, packing, and seats shall be of types recommended by valve manufacturer for intended service, but not of a lower quality than specified herein.
- C. Valves shall be suitable for the exposure they are subject to, buried, interior or exterior, as applicable.
- D. Unless otherwise shown, valves shall be the same size as the adjoining pipe.
- E. All units shall have the name of the manufacturer and the size of the valve cast on the body or bonnet or shown on a permanently attached plate in raised letters.
- F. For the purpose of designating the type and grade of valve desired, a manufacturer's name and list or figure number is given in the following Specifications. Valves of equal quality by other manufacturers will be considered in accordance with the GENERAL CONDITIONS.

2.2 VALVE TYPES

- A. Valve types are specified on the Drawings.

2.3 DESIGN FEATURES

- A. Brass and Bronze Components:
 - 1. Brass and bronze components of valves and appurtenances which have surfaces in contact with the water shall be alloys containing less than sixteen (16)% percent zinc and two (2%) percent aluminum.
 - 2. Approved alloys are of the following ASTM designations:
 - a. B61, B62, B98 (Alloy UNS No. C65100, C65500, or C66100), B139 (Alloy UNS No. C51000), B584 (Alloy UNS No. C90300 or C94700), B164, B194, and B127 and C995.
 - b. Stainless steel Alloy 18-8 may be substituted for bronze at the option of the manufacturer and with the approval of the Engineer.
 - 3. All gland bolts on iron body valves shall be bronze and shall be fitted with brass nuts.
 - 4. Valve ends shall be as specified, as shown on the Drawings, and to suit the adjacent piping.

2.4 VALVE OPERATORS

- A. General: All valves shall be equipped with operators. The valve operator types, as specified herein, describe only the general characteristics of the operator. The operator shall be compatible with the valve that it will be used with and shall be of the same manufacturer, or a product that is recommended by the valve manufacturer. All valve operators shall open by turning counterclockwise.
- B. Manual Operators:
 - 1. General: Manual handwheel operators shall be provided unless otherwise shown or specified. Ferrous handwheels shall be painted red or as selected by the Owner.
 - 2. Buried Operators: Buried service operators on valves larger than 2½-inches shall have a two (2)-inch AWWA operating nut. All moving parts of the valve and operators shall be enclosed in the housing to prevent contact with the soil. Buried service operators 12” and larger shall be provided with geared, side mounted operators sized to operate the valve at the rated working conditions of the valve.
- C. Electric Operators:
 - 1. The operators shall be power-actuating devices in accordance with AWWA C540 and as specified herein. Manufacturer shall provide certified drawings and affidavits of compliance as specified in AWWA C540.
 - 2. Actuators shall be furnished and sized for service shown and shall be factory mounted. They shall be sized to produce 1-1/2 times the required operating torque, but the stall torque of the motor shall not exceed the torque capacity of the valve.
 - 3. Motors shall be sized for continuous duty. Actuators shall operate the valve from fully closed to fully open or the reverse in ten (10) to sixty (60) seconds.
 - 4. Actuators shall be permanently lubricated at the factory. Gear train shall be self locking.
 - 5. Actuator controls shall be integral, operating one hundred-twenty (120)-volt, single-phase, sixty (60)-Hz ac power. Actuators shall be furnished with integral manual override. Actuator shall be furnished with integral manual travel stops and adjustable limit switches.
 - 6. Enclosures shall be NEMA 4 Watertight. (Hard anodized aluminum with epoxy coating preferred).
 - 7. Actuators shall be Beck with worm gear drive, or approved equal.

2.5 ACCESSORIES

- A. Tagging: Each valve shall be provided with a 1½-inch minimum diameter heavy brass or stainless steel tag. The tags shall be attached to the valve with key rings so that ring and tag cannot be removed. The numbers and letters shall be of block type, with ¼-inch high numbers and letters stamped thereon.

- B. Valve Boxes: Valve boxes shall be cast iron two (2) piece adjustable heavy roadway type with 5 ¼ inch diameter and appropriate length for the installation. Include cast iron lid with the work “Water” cast into the top of the lid. Extension pieces, if required, shall be the manufacturer’s standard type.
- C. T-Handled Operating Wrenches: Provide one (1) galvanized and/or painted operating wrench, four (4) feet total length, Mueller No. A-24610, Clow No. F-2520, or equal.
- D. Floor Stands and Extension Stems: When required by the installations, floor stands and extension stems shall be provided for operation of valves. Floor stands shall be of the rising stem, indicating type, complete with all necessary steel extensions stems, couplings, handwheels, stem guide brackets, and special yoke attachments as required by the valves and recommended and supplied by the stand manufacturer. Stem guides shall be spaced so that the stem L/R ratio does not exceed two-hundred (200). Provide all necessary anchor bolts in Type 316 stainless steel. Floor stands shall be cast iron base type, as manufactured by Clow Corporation; Mueller Company, or equal. All handwheels shall turn counterclockwise to open the valves.

2.6 VALVES

- A. Rubber Seated Flow Control Ball Valves:
 1. Rubber seated ball valves 4”-54” for vertical turbine pumps shall be flanged end, AWWA Class 150, ductile iron bod. Flow area for the valve shall be 100% clear bore with no seat hardware in the flow stream when fully open.
 2. The valves shall be designed, manufactured and tested in accordance with American Water Works Association Standard ANSI/AWWA C507. The valves shall be certified to be Lead-Free in accordance with NSF/ANSI 372. 2.3 Manufacturer shall have a quality management system that is certified to ISO 9001 by an accredited, certifying body.
 3. The valve shall be constructed with a two-piece body rated for 150 psi and with end flanges in full conformance with ANSI B16.1 Class 150 as sufficient for the intended use. The main body section and end piece shall contain integrally cast support feet and lifting lugs. The valve port shall be a 100% clear bore equal to the nominal valve size with no seat hardware in the flow stream when fully open. Double resilient seats shall provide drop-tight service and shall be located on the ball and mechanically retained with a stainless steel retaining ring and stainless steel nylok cap screws, which shall pass through both the resilient seat and the retaining ring. The retaining ring shall be continuous or investment cast with overlapping sections, serrated grooves and shoulders. The resilient seat shall be field adjustable and replaceable without removing the valve from the pipeline and mate to a continuous 316 stainless steel body seat ring. Valve shafts shall be inserted into blind hubs in the ball and locked to the ball with taper pins retained with stainless steel jam bolts. The shaft shall be sealed with resilient grit seals in the body bores. Teflon-lined, fiberglass-backed sleeve bearings shall be located in the body hubs. An adjustable thrust bearing shall be provided to center the ball in the body. Shaft seals shall be of the V-type and shall be replaceable without removal of the valve from the line or the shaft from the valve.
 4. Rubber Seated Flow Control Ball Valves shall be manufactured Val-Matic or equal.

- B. Butterfly Valves:

Flanged/Wafer Service:

1. Butterfly valves shall be short body flanged end or wafer 1 type, AWWA C504, Class 150B. Valve shall be suitable for very infrequent operation after extended periods of inactivity. Seats that are vulcanized to the valve body shall have the adhesive integrity of the bond between seat and body assured by sample testing with a minimum seventy-five (75) pound pull in accordance with ASTM D429, Method B. Stuffing box shaft seals are not acceptable. Operators shall be capable of developing the full torque listed with AWWA C504. An affidavit shall be furnished from the manufacturer certifying that valves comply with all provisions of AWWA C504. Handwheel operators shall be provided for all valves, unless shown otherwise. The interior of the valve shall be coated with an NSF/ANSI 61 approved fusion bonded epoxy coating. The exterior shall be coated with Tnemec N140 primer so it can be field painted by contractor to match pipe gallery. Valves shall be Dezurik, Val-matic or approved equal.

C. Gate Valves:

1. Resilient seated gate valves 3 inches through 12 inches for exposed water service shall be iron body, resilient seated, bronze-mounted valves with flanged ends and nonrising stem in accordance with AWWA C509, rated for 250 psi cold water. Valves shall be full port and fusion epoxy-coated inside, the exterior shall be coated with Tnemec N140 primer so it can be field painted by contractor to match pipe gallery. Coating shall meet the requirements of AWWA C550. Valves shall be M&H Style 3067, American Flow Control, or equal.
2. Resilient seated gate valves 16 inches through 48 inches for exposed water service shall be iron body, resilient seated, bronze-mounted valves with flex ring ends and nonrising stem, rated for 250 psi cold water. Valves shall be full port and fusion epoxy-coated inside, the exterior shall be coated with Tnemec N140 primer so it can be field painted by contractor to match pipe gallery. Coating shall meet the requirements of AWWA C550. Buried valves larger than 16 inches shall be equipped with side bevel gear actuators. Valves shall be American Flow Control Series 2500, or equal.

D. Weighted Check Valve

1. This specification covers the design, manufacture, and testing of 2 in. (50 mm) through 48 in. (1200 mm) Swing Check Valves suitable for cold working pressures of 250 psig. The Swing Check Valve shall be of the full waterway body type, with a domed access cover and vent port. The check valve shall be capable of accepting air cushion, lever and weight or lever and spring.
2. Valves shall be designed, manufactured and tested in accordance with American Water Works Association Standard ANSI/AWWA C508 and in accordance with Manufacturers Standardization Society Standard Practice MSS SP-71 or MSS SP-136. The valves used in potable water service shall be certified to NSF/ANSI 61, Drinking Water System Components - Health Effects, and certified to be Lead-Free in accordance with NSF/ANSI 372. Manufacturer shall have a quality management system that is certified to ISO 9001 by an accredited, certifying body.

3. Valves shall be provided with flanges drilled in accordance with ASME B16.1, Class 125 iron flanges or ASME B16.42, Class 150 for ductile iron flanges.
4. Valve body shall be full flow equal to nominal pipe diameter area at all points through the valve and shall be equipped with a threaded adjustable open stop. The body seat shall be O-ring sealed and field replaceable without removing the valve from the line. The end flanges shall contain integrally case mounting pads. The top access port shall be full size, allowing removal of the disc without removing the valve from the line. The access cover shall be domed in shape to provide flushing action over the disc for operating in lines containing high solids content. The disc shall be of one-piece construction and connected to the shaft with a disc arm and two pivot pins to provide pivot action to allow self-adjusting seating at all pressures. 14" and larger discs shall be convex shape for lift, stabilization and strength. The disc seat shall be resilient with integral O-ring type sealing surface for drop tight shut-off at high and low pressures and for easy replacement in the field without removing the valve from the line. Shaft seals shall consist of V-type packing in a fixed gland with an adjustable follower designed to prevent over compression of the packing and to meet design parameter of the packing manufacturer. Removable, slotted shims shall be provided under the follower flanges to provide for adjustment and prevent overloading of the packing. The valve shall be factory equipped with a lever, weight, and spring assembly. The lever shall be equipped with three holes for adjusting the bolted weight assembly. When the valve is closed, the lever and weight shall be located 30 degrees below horizontal.
5. The valve body, cover and disc shall be constructed of ASTM A536 Grade 65-45-12 ductile iron for sizes 2 in. (50 mm) through 48 in. (1200 mm) The interior of the valve shall be coated with an NSF/ANSI 61 approved fusion bonded epoxy coating. The exterior shall be coated with Tnemec N140 primer so it can be field painted by contractor to match pipe gallery.
6. The removable body seat shall be constructed of ASTM A276, Type 304 stainless steel. 5.4 The removable resilient seat shall be precision molded Buna-N (NBR), ASTM D2000-BG or EPDM. disc arm and external levers shall be ductile iron.
7. Weighed check valves shall be manufactured by Val-Matic or approved equal.

E. Air Vacuum/Release Valves:

1. Sizes 1/2" (15mm) through 6" (150mm): shall be suitable for clean or raw water service with pressures up to 740 psig. Orifices shall be sized to accommodate the operating conditions of the intended vertical turbine pump.
2. Air Release Valves shall be automatic float operated valves designed to release accumulated air from a piping system while the system is in operation and under pressure. The capacity and pressure rating of the valve is dependent on the diameter of the precision orifice in the cover. A large inlet connection is required for proper air and water exchange.
3. Valves shall be manufactured and tested in accordance with American Water Works Association (AWWA) Standard C512. Valves used in potable water service shall be certified to NSF/ANSI 61 Drinking Water Standards.

4. Valves 3 in. (76mm) and smaller shall be threaded with NPT inlets and outlets. The body inlet connection shall be hexagonal for a wrench connection. Larger valves shall have ANSI Class 125 flanged inlets. The valve shall have two additional NPT connections for the addition of gauges, testing, and draining.
5. The cover shall be bolted to the valve body and sealed with a flat gasket. Resilient seats shall be replaceable and provide drop tight shut off to the full valve pressure rating. Floats shall be unconditionally guaranteed against failure including pressure surges. Mechanical linkage shall provide sufficient mechanical advantage so that the valve will open under full operating pressure. Simple lever designs shall consist of a single pivot arm and a resilient orifice button. Compound lever designs shall consist of two levers and an adjustable threaded resilient orifice button.
6. The valve body and cover shall be constructed of ASTM A126 Class B cast iron for working pressures up to 300 psig. Higher pressure rated valves shall be constructed of ASTM A536 Grade 65-45-12 ductile iron. The orifice, float and linkage mechanism shall be constructed of Type 316 stainless steel. Non-metallic floats or linkage mechanisms are not acceptable. The orifice button shall be Viton for simple lever valves and Buna-N for compound lever designs.
7. Bronze components meet current lead-free requirements.
8. Valve to be manufactured by Val-Matic or approved equal.
9. Valve shall be installed with gate valve sized equal to the main orifice size. Valve shall be wheel operated.
10. Valves shall vent to the clearwell. Discharge vents shall be equal size as the valve orifice. Vent pipe shall be Galvanized Steel Pipe with flanges or unions suitable for disassembly.

PART 3 - EXECUTION

3.1 GENERAL

- A. Bolt holes of flanged valves shall straddle the vertical centerline of the pipe run. Prior to installing flanged valves, the flange faces shall be thoroughly cleaned. After cleaning, insert gasket and bolts, and tighten the nuts progressively and uniformly. If flanges leak under pressure, loosen or remove the nuts and bolts, reset or replace the gasket, retighten and/or reinstall the nuts and bolts, and retest the joints. Joints shall be watertight at test pressures before acceptance.
- B. Thoroughly clean threads of screwed joints by wire brushing, swabbing, or other approved methods. Apply approved joint compound to threads prior to making joints. Joints shall be watertight at test pressures before acceptance.

3.2 PLACING

- A. Generally, unless otherwise indicated on the Drawings, all valves installed in horizontal runs of pipe shall be installed with their operating stems horizontal. If adjacent piping prohibits this, the stems and operating handwheel shall be installed above the valve horizontal centerline as

close to horizontal as possible. Valves installed in vertical runs of pipe shall have their operating stems oriented to facilitate the most practicable operation.

3.3 TESTING

- A. Valves shall be tested at the same time that the adjacent pipeline is tested. Joints shall show no visible leakage under test. Repair joints that show signs of leakage prior to final acceptance. If there are any special parts of control systems or operators that might be damaged by the pipeline test, they shall be properly protected. The Contractor will be held responsible for any damage caused by the testing.
- B. If requested by the Engineer, the valve manufacturer shall furnish an Affidavit stating the materials options furnished and/or that he has complied with these and other referenced Specifications.

END OF SECTION

SECTION 432331

VERTICAL TURBINE PUMP

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following water supply and treatment pumps for use in water and treatment plants and systems:

1. Finished Water Pump (Vertical Turbine)
2. Raw Water Pump (Vertical Turbine)

1.2 SUBMITTALS

- A. Product Data:

1. Make, model, weight, and horsepower of each equipment assembly.
2. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
3. Performance data curves showing head, capacity, horsepower demand, and pump efficiency over the entire operating range of the pump, from shutoff to maximum capacity. Indicate separately the head, capacity, horsepower demand, overall efficiency, and minimum submergence required at the guaranteed point.
4. Speed curves
5. Critical Speed calculations
6. Complete pump FEA
7. Complete motor nameplate data, as defined by NEMA.
8. Factory finish system.
9. Special shipping, handling, protection, and storage instructions.
10. Manufacturer's printed installation instructions.
11. Suggested spare parts list.
12. List of any special tools, materials, or supplies required for maintenance of pump.
13. Operation and Maintenance Manual

B. Shop Drawings:

1. Detailed mechanical and electrical drawings showing the equipment size, dimensions, and locations of connections and weights of associated equipment.
2. Power and control wiring diagrams.

C. Quality Control Submittals:

1. All factory testing shall conform to the most current edition of the Hydraulic Institute Standards. All pump performance testing shall be performed at the manufacturer's facility. A factory certified performance test per Hydraulic Institute test standard, ANSI/HI 14.6 Acceptance Grade 1U shall be conducted prior to shipment.
2. Performance testing shall be non-witnessed and performed on the fully assembled unit with job motor. The test shall cover seven points including the design point (HI 14.6). The design point shall be used for any performance evaluation.
3. Hydrostatic testing shall be non-witnessed in compliance with HI14.6. Hydro testing is to be performed on the pressure containing components including the bowl assembly, column and discharge head. Certified test results shall be provided for record purposes prior to shipment.
4. A standard 10 business days' notice shall be given to the engineer before starting any witness testing. The manufacturer shall not be responsible for expenses including, but not limited to travel, food, and lodging to observe all witness testing.
5. A written approval for all witness testing is required prior to release for shipment. All non-witness testing shall require written prior to release for shipment.
6. Field/functional testing will be performed by the contractor to insure proper mechanical operation at the jobsite. All testing data to be used for evaluation shall be performed at the pump manufacturer's facility.
7. Motor tests and test reports shall be provided as required in accordance with the motor specification. At a minimum all motors shall have a short commercial test performed on them.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Retain shipping flange protective covers and protective coatings during storage.
- B. Protect bearings and couplings against damage.

1.4 WARRANTY

- A. The manufacturer shall warrant their pumps to be free of defects in quality and workmanship only for a period of one year after start-up or (18) months from shipment.

PART 2 - PRODUCT

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Raw Water Pumps (Vertical Turbine)
 - a. Xylem/ Goulds Water Technology
 - b. Peerless
 - 2. Finished Water Pumps (Vertical Turbine)
 - a. Xylem/ Goulds Water Technology
 - b. Peerless

2.2 PUMPS GENERAL

- A. Pumps should be well designed and of rugged construction and especially adapted to secure maximum economy in both power and maintenance under continuous operation and under the service conditions specified.
- B. No consideration will be given to equipment which has not demonstrated its reliability and efficiency through results obtained from operation of similar units of approximately the same capacity and type under similar conditions.
- C. The general design shall be such that the components can be easily disassembled; that replacement parts are of standard design and readily available; and that all components and parts are suitable for the service required.
- D. Coordinate pump requirements with drive manufacturer
- E. The total dynamic heads, given on the attached data sheets, have included approximate losses in the pumps. Exact allowances for such losses shall be made by the pump manufacturer; amounts of such losses shall be stated so the adjustments can be made, if required. The statements of losses in the pump shall be in the form of a written report and such report shall be furnished to the Engineer.
- F. The manufacturer's representative shall make a thorough analysis of the proposed pump installations with respect to physical locations of pumps, configurations of suction and discharge piping, elevations of piping, pump mounting and any other features or factors that might directly or indirectly affect the operation and/or performance of the pumps proposed to be furnished by the particular manufacturer.
- G. The analysis of operating conditions shall be in the form of a written report and such report shall be furnished to the Engineer as part of the pump submittal.
- H. The materials for construction shall be generally as hereinafter specified. It is recognized that the standard metallurgy of a particular pump manufacturer may vary from that specified, but the quality of materials shall, however, equal or exceed that specified; and the assembly of materials

shall result in a product equal to or exceeding all the requirements of these Specifications. If differing materials are used, a written report shall be given to the engineer stating equal or exceeding the requirements.

- I. The manufacturer shall determine the maximum down thrust for the particular pump offered and shall provide thrust bearing capacity for handling the maximum down thrust with ample safety factor.
 - 1. Safety factor shall be based upon the ratio of anticipated thrust to standard thrust and average life expectancy of five years operation at twenty-four (24) hours per day.
 - 2. The manufacturer shall also determine for the particular pump offered the magnitude of the initial or momentary up thrust and shall provide protection to counteract the net positive up thrust.
 - 3. If continuous up thrust protection should be necessary, protection shall be provided by duplex bearings in the thrust location.
- J. Pump Mounting: Pumps shall be provided with a carbon steel sole plate and mounted on reinforced concrete pads doweled into the floor. Supplier shall confirm size requirements for pad with manufacturer and in no case shall there be less than 2-inches clearance/coverage between edge of anchor bolts and edge of pad. Mounting pads shall be of such heights as will set the centerlines of the pumps discharge ports at the necessary elevations. The sole plate shall be supplied with stainless steel anchor bolts supplied by the contractor.

2.3 VERTICAL TURBINE PUMPS (Open Lineshaft)

- A. Stated total dynamic head (TDH) includes lift and all system pressure. Pump manufacturers shall include pump's internal losses. The TDH design values below are measured at the discharge head and not the bowl assembly.
- B. Finished Water Pump shall be Goulds 24GHXC 4 Stage or Peerless 26HXB/LC 3 Stage.
- C. Raw Water Pump shall be Goulds 24GLC 2 Stages or Peerless 20HH/HCF 3 Stage.

FINISHED WATER PUMP

- 1. Number of required units: 1
- 2. Condition "A" (Design Point),
GPM: 10,000 GPM
TDH, head in feet: 300.0' TDH
- 3. Driver horsepower: 1,000 Hp
- 4. Minimum bowl efficiency,
Percent (design point): 82.00%
- 5. Maximum pump operating speed: 1,195 RPM
- 6. NPSHR at design not to exceed: 28.1'

RAW WATER PUMP

1. Number of required units: 1
2. Condition "A" (Design Point),
GPM: 8,400 GPM
TDH, head in feet: 140.0' TDH
3. Driver horsepower: 400 Hp
4. Minimum bowl efficiency,
Percent (design point): 81.5%
5. Maximum pump operating speed: 1,190 RPM
6. NPSHR at design not to exceed: 24.2'
7. Condition "A" as listed above is the design point and will be used for any performance evaluation in accordance with the 1U grade standards of the Hydraulic Institute.
8. The pump horsepower requirements for any point on the curve shall not utilize the service factor nor exceed the motor nameplate horsepower rating.

D. Discharge Head Assembly:

1. The discharge head shall be fabricated steel type "F"
2. For above ground service, the discharge head shall be fitted with a flanged discharge connection. The flange shall be a 150 LB R.F. ANSI flange for fabricated steel heads. The discharge head shall be designed to carry the entire weight of the complete pump and driver without distortion when spanning an opening of sufficient size to permit removal of the complete pump assembly. The discharge head shall be provided with a coupling guard. Lifting lugs shall be provided as standard. Shall be fabricated from ASTM A36/53 Steel. All discharge heads shall incorporate a quad style design located 90° apart connecting the motor mounting flange to the head base plate.
3. Shall be accurately machined to be free of blow holes, sand holes, and other detrimental defects.
4. Discharge nozzle shall provide smooth flow transition from the head cavity via a 3-segmented mitered elbow design.
5. Discharge outlet shall be flanged and drilled ANSI B16.1 Class 150 and shall be tapped 1/2" NPT for connection of a pressure gauge.
6. Head design shall permit the drive shaft to be coupled to the motor shaft above the stuffing incorporated in the head using a threaded coupling.
7. The head shaft shall be 416 Stainless Steel and shall be turned and ground. The head shaft or top shaft shall not exceed 10 feet in length. The pump manufacturer shall include a method of adjusting the impellers at the top of the head shaft.
8. All head bolting shall be stainless steel.
9. Stuffing Box

- a. Discharge head shall be sealed from the pump product by means of a cartridge mechanical seal. The seal shall be certified by NSF61 and have corresponding construction suitable for potable water. Mechanical seal shall be manufactured by Chesterton or John Crane.
- b. Pump shall be coupled to the VSS motor by means of an adjustable spacer type coupling made of 400 series stainless steel. The coupling shall provide the means to remove the mechanical seal without the need for removing the motor. The fabricated head shall be designed to accept this style coupling.

E. Column Assembly:

1. Steel pipe (ANSI/ASTM A 53, Grade B, weight not less than schedule 30).
2. The column shall include flanged connections and shall be of open design with product lubrication.
3. Column pipe shall be furnished in interchangeable sections that do not exceed 5 feet in length. The top and bottom column sections shall not exceed 5 feet in length. The ends of each section shall be machined parallel.
4. Column pipe total length shall be such that the suction opening for the pump bowls is as listed in plan set drawings.
5. The bearing spacing shall be selected to ensure operation at a minimum of 25% above or below the first critical speed. This is to be verified with critical speed calculations specific to the pump units supplied for the job. Bearing spacing shall not exceed 5 feet. Pump manufacturer shall supply the shaft critical calculation report as part of the pump submittal package.
6. The column shall be designed with weld in bearing retainers. The interior of the column shall be free of offsets, burrs, discontinuities and irregularities. Bearings material shall be vesconite.
7. All column bolting shall be stainless steel.

F. Line Shafting:

1. Lineshaft shall be 416 Stainless Steel.
2. Size shall be no less than that determined by ANSI/AWWA specification E101, section A4.15, line shaft selection and shall be such that elongation due to hydraulic thrust will not exceed the actual clearance of the impellers in the pump bowl.
3. The lineshaft shall be 416 stainless steel and of adequate size to transmit the full power of the pump without slip, excessive vibration or elongation, and shall have threaded joints. Lineshaft lengths shall not exceed 5 feet. The lineshaft shall have left hand threads that tighten during pump operation.
4. Ends of shafting shall be machined square to axis of shaft for butt fit, threaded and designed with a safety factor of 1.5 times the shaft safety factor.

5. Lineshaft shall be furnished in interchangeable sections not over 5 feet in length.
6. Lineshaft shall be coupled using 410SS threaded couplings.

G. Bowl Assembly:

1. The suction bowl shall be designed to provide conservative entrance velocities and direct the flow to the first stage impeller. The inner surface of the suction bowl shall be smooth and free of sharp projections which could cause turbulence or cavitation. The suction casing shall be designed to house the suction bell bearing by means of four vanes.
2. The bowls shall be smooth and free of sharp projections and shall have register fits for alignment and be connected by flanged and bolted construction. Bowl sizes 6" to 15" shall be porcelain enameled on the bowl interior. Bowl sizes 16" and larger shall be epoxy-lined.
3. All bowl bolting shall be stainless steel.

H. Impellers:

1. Shall be enclosed type, constructed of nickel aluminum bronze, accurately cast, machined, filed and polished; and impellers shall be statically and dynamically balanced. Impeller material shall be the following for each set of pumps:
 - a. Finished Water: Nickel Aluminum Bronze C95800
 - b. Raw Water: Nickel Aluminum Bronze C95800
2. Impellers shall be enclosed type.
3. Split Rings and Keys, Bolts and Nuts shall be stainless steel ANSI/ASTM A 582-80 Type 303 or Type 416, or ANSI/ASTM A276-81a Type 303 or Type 416.
4. Impeller shafting shall be stainless steel ANSI/ASTM A314-81 Type 410 or Type 416.

I. Drive Motor:

1. Shall be weather-protected (Type WPI) machines, vertical solid shaft, heavy duty squirrel cage induction type.
2. Temperature rise at maximum load shall not be greater than Class F Limits
3. Insulation shall not be less than Class F with copper magnet wire (Class H minimum).
4. The motors shall be guaranteed to continuously carry 115% of rated load without development of injurious heating, and shall be capable of operation on 4160 V, 3 Ø, 60 Hz.
5. Thrust bearing shall be designed to carry the weight of all rotating parts plus the maximum hydraulic thrust load which may occur.
6. Motor efficiency shall conform to "NEMA Premium", Inverter Duty, values for

horsepower, speed, and enclosure, and motor shall be equipped with non-reversing ratchet.

7. The design and manufacture of the motors shall be in compliance with the General Specifications of the IEEE and with NEMA Standards.
8. Motors for each pump shall be provided with integral condensation heaters to prevent corrosion. Motors for use with VFDs shall be provide with shaft grounding ring and insulated bearings. Motor shall have a separate tag that reads inverter duty rated.
9. Acceptable manufacturers:
 - a. G.E.
 - b. U.S. Motors

J. Pump Vibration:

1. The completed installation of pump and driver shall be smooth-running and vibration free.
2. Pump manufacturer shall perform Finite Element Analysis on the complete pump unit including the bowl assembly, column assembly, head assembly and motor as part of the submittal package.
3. Vibration testing shall be in accordance with HI 2009 standards and measured at the pump/motor interface.
4. The contractor shall coordinate the vibration testing for attendance by the Engineer and shall provide the Engineer with a complete written summary of the test procedures and results. The field vibration testing shall be completed by a 3rd party company.
5. Permanent vibration monitors shall be Metrix Model 440 or equal.

K. Coating:

1. The bowl assembly exterior shall be coated with Tnemec 21; minimum dry film thickness 10 mils.
2. The column assembly interior and exterior shall be coated with Tnemec 21; minimum dry film thickness 10 mils. The head assembly interior shall be coated with Tnemec 21; minimum dry film thickness 10 mils. The head assembly exterior and sole plate shall be coated with Tnemec N140 primer so the head can be field painted by contractor to match pipe gallery.
3. EXECUTION

2.4 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions.

- B. Level base by means of steel wedges. Wedge taper not greater than 1/4 inch per foot. Wedging should be done so that there is no deformation of base plate and base plate assembly should be level upon completion of anchor bolt tightening.
- C. Adjust pump assemblies so that the driving units are properly aligned, plumb, and level with the driven units and all connected shafts and couplings.
- D. Upon completion of leveling of base plate and setting of pump and appurtenances, fill void with grout as specified in these Specifications. After the grout has set, remove steel wedges and fill wedge void with grout.
- E. Discharge piping shall be connected without placing any strain on the pump flanges.
- F. Suppliers are responsible for any piping modifications necessary to install the new pump.

2.5 FIELD FINISHING

- A. Provide sufficient paint to touch up pump as necessary after installation.

2.6 START-UP ASSISTANCE AND TRAINING

- A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:
 - 1. The pump supplier shall have a manufacture certified service technicians within 200 miles of the installation site.
 - 2. Factory authorized service representatives of the pump manufacturer shall perform all necessary on-site assistance for installation supervision.
 - 3. Train Owner's maintenance personnel on procedures and schedules related to troubleshooting, servicing, and preventive maintenance.
 - 4. Schedule training with Owner with at least seven days' advance notice.

END OF SECTION

pg. 1

491 Walker Rd. Grant, AL 35747

January 7, 2020
1pm

Huntsville Utilities IFB 26-025 SEWTP Expansion Attendee Listing - Prebid Meeting

| Company | Contact/Name | Email | Initial | Attendee Name/Email |
|-----------------------------|-------------------|-----------------------------------|---------|--|
| Blackridge Research | Helan Emagulate | helan@blackridgeresearch.com | | |
| Bowen Engineering Corp | Colton Motz | cmotz@bowensqp.com | CM | |
| Cleary Construction | Robbie Butler | robbiebutler@clearyconst.com | | |
| Craig Construction | Jesse Rutherford | jrutherford@bhccraigconst.com | BS | Brook Jones - bjones@bhccraigconst.com |
| Haren Construction ✓ | Samantha Nelson | snelson@harenconstruction.com | | |
| ICS, Inc. | Scotty Morgan | scottymorganics@windstream.net | SM | |
| J&P Construction | Robert Meriwether | rmeriwether@jandpconstruction.com | | |
| John Plott Company | Andrew Harshman | aharshman@jplott.com | JD | John Plott |
| Mark Johnson Construction ✓ | Forrest Pearson | forrest@mjohnsonconstruction.com | MP | |
| Mastin's Electric | Bryant Mastin | bryantmastin@mastinsinc.com | BM | |
| Max Foote Construction | Phillip Irvine | pei@bhm.maxfoote.com | | |
| Morgan Contracting | Austin Olhasso | aolhasso@morgan1.com | | |
| P.F. Moon | Josh Moon | josh@pfmoon.com | | |
| Taylor Corporation | Isaiah Ware | isaiah@taylorcorporation.com | CB | Casey Barker - casey@taylorcorporation.com |
| Templeton & Associates | James DeLoach | James@templeton-associates.com | JD | |
| Taylor+Miree Construction | Cole Taylor | cole@taylor-miree.com | MT | |
| JH Wright | Kyle Martin | kmartin@jhwright.com | | |
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