

# LOS RIOS COMMUNITY COLLEGE DISTRICT

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Purchasing Department



Sacramento City College American River College Cosumnes River College Folsom Lake College

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## ADDENDUM NO. 1

ISSUE DATE: January 13, 2017

### ARC East Well Pump Station Improvements

LRCCD BID NO. 17008

Issued By:

LOS RIOS COMMUNITY COLLEGE DISTRICT  
1919 Spanos Court, Sacramento, CA 95825  
Phone (916) 568-3071 Fax (916) 568-3145

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This addendum forms a part to the Contract Documents. The addendum items supersede and supplement all portions of the bidding documents and notes with which it conflicts. All workmanship, materials, appliances and equipment which may be included in the following addendum items shall be of the same relative quality as described for similar work set forth in the general or main specifications of which these addendum items shall be considered a part.

This Addendum has been acknowledged in the space provided on the Bid Form and is considered part of the bid documents.

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This Addendum consists of 33 pages.

- 1. DELETE PROJECT MANUAL LANGUAGE: "WORK TO BE PERFORMED UNDER THE CONTRACT DOCUMENTS REQUIRES A CALIFORNIA STATE LICENSE BOARD GENERAL BUILDING CONTRACTOR (B LICENSE) OR GENERAL ENGINEERING CONTRACTOR (A LICENSE) OR ELECTRICAL CONTRACTOR (C10 LICENSE) OR PLUMBING CONTRACTOR (C36 LICENSE)". REPLACE WITH "WORK TO BE PERFORMED UNDER THE CONTRACT DOCUMENTS REQUIRES A CALIFORNIA STATE LICENSE BOARD**

**GENERAL BUILDING CONTRACTOR (B LICENSE) OR GENERAL ENGINEERING CONTRACTOR (A LICENSE) OR ELECTRICAL CONTRACTOR (C10 LICENSE)”.**

- 2. BERM TO TOE IS DIFFERENT THAN DRAWING. ADDITIONAL SOIL WAS PLACED ON BERM WITH OTHER PROJECTS FOLLOWING CONSTRUCTION OF THE WELL. SOIL WILL NEED TO BE REMOVED AS NEEDED TO CONSTRUCT THE PROJECT LAYOUT ON THE PLANS. SOIL REMOVED FROM BERM MAY BE RESPREAD LOCALLY. BIDDERS SHALL ASSUME THAT ADDITIONAL GRADING WORK TO RESHAPE BERM WILL BE PART OF THE PROJECT.**
  
- 3. QUESTION: IS THIS PROJECT SUBJECT TO THE BUY AMERICA OR BUY AMERICAN MATERIAL REQUIREMENTS FOR STEEL PRODUCTS?**

**RESPONSE: NO**

END OF SECTION.

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## **ARC East Well Pump Station Improvements Bid 17008**

### **Addendum 1**

**Responses by: Pete Tobia, Wood Rodgers**

#### **General Questions/Clarifications:**

1. Q. Drawing sheet C4 shows a 6' high fence with 3 strands of barb wire for 7' high overall height. Specification section 32 3113 pg 2 states an 8' high fence. Which is correct?

Answer: Details on Sheet C4 are correct. Fence to be 6-feet high, with 3-strand barb wire for total height of 7-feet.

2. Q. Drawing sheet C4 states the fence to have slats. Is that with vinyl slats woven into the chain link fabric before installation or after?

Answer: Slats shall be extruded high density polyethylene, and can be either woven into chain link or installed afterwards. Mesh size may be adjusted to accommodate pre-woven slats. Color to be selected by Owner from manufacturer's standard color selections.

3. Q. The specifications 32 3113 pg 3, states the galvanized pipe and frame work to be vinyl coated. Is that correct?

Answer: Pipe and frame work does **not** need to be vinyl coated.

4. Q. The 12" water line that runs from the Hydro pneumatic Tank and ties into the existing 12" line- What type of pipe is this? There is no spec section in the project specification for pipe & valves and nothing noted on the plans for the type of pipe. Please clarify the type of pipe required.

Answer: Refer to Specification Section 33 11 00 WATER DISTRIBUTION PIPING AND VALVES included in this Addendum.

5. Q. On sheet M-2, the Air Compressor is shown mounted on the top of the Hydro pneumatic tank. Sheet E-2 shows a separate pad for the Air Compressor. Please clarify & advise of make & model of Air Compressor.

Answer: Air Compressor is mounted on top of the Hydro pneumatic Tank. No separate pad is needed. Air Compressor is specified in Section 43 4113.2.3.A.6.

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Air compressor requires 120V. See "Changes to Drawings" in this Addendum for changes to Electrical Drawings.

6. Q. Sheet M-2 list the maximum allowable design pressure at 203 PSIG @ 140 F. and list the pressure relief setting at 178 PSIG and Specification Section 43 4113 page 3 paragraph 2.2.A.2 list the design pressure at 100 PSIG@ 120 F and full vacuum. Please clarify.

Answer: The maximum allowable working pressure (MAWP) is the design pressure requirement for the Hydropneumatic Tank as stated on Drawing M-2, not to be confused with operating pressures or design pressures of other items. Pressure relief shall be set below this at 178 PSIG to protect the tank. See revision to Section 43 4113.2.2.A.2 issued in this Addendum for additional clarification.

7. Q. Specification 43 4113 page 3 paragraph 2 specifies full vacuum. But paragraph 4.h specifies 18 x 24 elliptical manways which by their design will not hold any vacuum pressure. In fact they use the internal pressure to seal.

Answer: The tank must be designed to withstand full vacuum without collapse. However, the manway seals do not need to withstand vacuum pressure.

8. Q. The tank manufacturers will not give a 20 year warranty.

Answer: See revision to Section 43 4113.1.5.A issued in this Addendum for additional clarification.

9. Q. Sheet M-1 Detail 2 shows a water Pre-Lube system for the Well Pump. Specification Section 11 9310 2.2.A page 119310-6 "Line Shaft Lubrication" calls for oil lubrication and also in 2.3.J. Please clarify.

Answer: Pump is open line shaft which requires water lubrication and is not oil-lubed. See revised Section 11 93 10 issued in this Addendum for additional clarification.

10. Q. On sheet P-2, the Pre-Lube is shown coming off the 12" Well Discharge piping and on Sheet C-3, it is shown coming off the 12" pipe after the Hydropneumatic tank. Please clarify the location the Pre-Lube is to come from.

Answer: Pre-lube routing source shall be as shown on Drawing C-3.

11. Q. On sheet P-2, there is a 3/8" tubing/2" C W line coming off the Pressure Gauge (PI) that shows it running to a Raw Water Sample. There is no Raw Water Sample on the plans or called out in then Specifications. Please clarify.

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Answer: See “Changes to Drawings” in this Addendum.

12. Q. On sheet M-1 detail 2, there is a Solenoid & Flow Switch. Please advise make & model for these.

Answer: See “Changes to Drawings” in this Addendum.

13. Q. On sheet M-1 Mechanical Layout- Elevation, Note 1 calls for an enclosure over the well pump. There is no manufacturer given. Please advise if there is a manufacturer we are to use.

Answer: Refer to Section 11 61 13 for enclosure requirements and manufacturer information.

14. Q. Please provide specification for the chemical enclosure.

Answer: Refer to Section 13 34 26 Fiberglass Reinforced Polymer (FRP) Shelter.

15. Q. Projects drawings page E-9: there seems to be a possible misnumbering of IO points. E.g. Analog Inputs call out “253 from control diagram at right”, but that diagram does not seem to have the “253”.

Answer: The Facility Controller Analog Inputs diagram identifies loop power terminals for 2 wire analog instruments as “253” and “253N”. These should be “263” and “263N” as shown in the Facility Control Panel Control Diagram on the far right of the drawing (rungs 092, 093, and 094).

16. Q. F-3500 Magmeter has an analog output and a pulse output. Page E-13 seems to show only one connection from F-3500 to the Control panel, two are needed.

Answer: See “Changes to Drawings” in this Addendum.

17. Q. P-2 shows a check valve on the 6” PTW to waste line. Please provide a location and specification.

Answer: The 6” PTW line has a 6” gate valve, and no check valve. Well discharge valving and piping shall be arranged as shown on Drawing M-1.

18. Q. P-2 shows a backflow preventer, safety shower and eyewash station and a hose bibb. Please provide locations and specifications.

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Answer: See Drawing C-3, Revision 1, included in the Addendum for emergency eyewash/shower information. There is no backflow preventer or hose bibb.

19. Q. Please confirm the pipe class, coating and lining of the 6” and 12” ductile iron water lines. Confirm whether the pump discharge line is steel or ductile iron.

Answer: Above ground piping shall be welded steel or ductile iron. Refer to Section 33 11 00 Water Distribution Piping and Valves included in this Addendum.

20. Q. Please provide valve specifications.

Answer: Refer to Section 33 11 00 Water Distribution Piping and Valves included in this Addendum.

21. Q. Details 4,5 and 6 of drawing S-6 show conductor casing to be installed outside of well casing. Please provide specifications, diameter and depth for conductor casing.

Answer: Conductor casing is already existing and does not need to be constructed. Sounding/gravel/vent tubes extensions, and the well pedestal will need to be constructed under this Contract as shown on the Drawings.

22. Q. Please clarify sump depth for this vertical pump.

Answer: Refer to revised Section 11 93 10 VERTICAL TURBINE PUMPS included in this Addendum.

23. Q. In specification, page 25, flow at BEP is 3,876 GPM, this seems very far from design flow of 1,500 gpm and conflicts with max flow of 1,700 gpm. Is the BEP flow correct?

Answer: Refer to revised Section 11 93 10 VERTICAL TURBINE PUMPS included in this Addendum.

24. Q. Section 11 93 10 – Vertical Turbine Pumps and Motors

- 1.4 B.1 (Submittals) – Paragraph calls out pump efficiency, however this contradicts paragraph 2.1 D which requires bowl efficiency. Since this is a deep well pump, it’s highly likely to be bowl efficiency, please confirm.
- 2.2 A (Pump Requirements)

- *Bowls* – Paragraph calls out for ID/OD to be either enamel or fusion bonded epoxy coated. The requirement most likely applies to the bowl ID only since the coating specification 09 9000 requires the bowl OD to be Carboline 891 epoxy coated. Please also note it is not common practice to enamel coat the bowl OD surface. Please clarify.
  - *Vortex suppression* – Paragraph requires a 316SS basket strainer with integrated 316ss fabricated vortex baffles. This pump is going into an 18” diameter well and will most likely have more than enough submergence. For these reasons, it is unlikely the well pump will experience any major turbulence to be of concern. A standard conical strainer will be sufficient and will keep the cost down. Please clarify if this is acceptable.
  - *Column* – Paragraph requires flanged column which is not industry standard for a deep well application. Due to the large amount of column sections, threaded column is typical for this type of pump and will be significantly less in cost compared to flanged column. Paragraph also requires the column to be ID and OD epoxy 891 coated. Deep well applications typically do not epoxy coat the column and will usually require a primer coating. Please clarify the requirements for the column pipe.
  - *Line Shaft* – Paragraph requires polished (chrome) bearing journals for both normal and flipped/reversed installation, however the line shaft is specified to be oil lubricated and enclosed with schedule 80 tubing. For this reason, chrome/polished bearing journals are not applicable. Please clarify.
  - *Sole Plate*- Paragraph requires sole plate to be galvanized coated, however the coating specification 09 9000 requires a primer for exposed pump surfaces to be alkyd enamel coated. Please clarify which is required.
- 3.3 A (Factory Testing) – This paragraph and section 22 1000 (Pumps, General section 2.5 A.2) both require a complete unit test performance test with the job driver and VFD. This will be quite expensive. Can the factory testing be changed to a bowl only performance test?
  - 3.3 B (Factory Testing) – Paragraph requires hydrostatic testing for the bowl assembly, column and discharge head. Please note there is 160’ of column and it is not typical to hydrostatic test this large quantity of column. Please clarify of hydrostatic testing of the column is truly required.

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Answer: Refer to revised Section 11 93 10 VERTICAL TURBINE PUMPS included in this Addendum.

25. Q. Drawing M-1 Pump Prelube Piping Detail 2 – Components shown are typical for fresh water flush which contradicts the requirements for an oil lubricated arrangement in the pump specification 11 9310. Please clarify

Answer: Pump is water-lubed. Refer to revised Section 11 93 10 VERTICAL TURBINE PUMPS included in this Addendum.

26. Q. Drawing G-2 Pumping Equipment – Drawing indicates the well pump to be supplied with a constant speed motor and an open line shaft (product lubricated) construction. This contradicts the pump specification 11 9310 which requires a variable speed motor and oil lubricated enclosed line shaft. Please clarify

Answer: Pump is water lubed and variable speed. Refer to revision to Drawing G-2 in this addendum, and revised Section 11 93 10 VERTICAL TURBINE PUMPS included in this Addendum.

#### **Changes to Technical Specifications:**

1. **REPLACE** Section 11 9310 VERTICAL TURBINE PUMPS AND MOTORS (Attached).
2. **ADD** Section 22 11 33 FACILITY WATER DISTRIBUTION PIPING AND VALVES (Attached)
3. **MODIFY** Section 22 10 00 PUMPS, GENERAL, paragraph 2.5.A.2, as follows:

~~“2. Pump Systems: Centrifugal pump systems with drives of 10 hp up to and including 150 hp shall be tested at the pump factory in accordance with the American National Standard for Centrifugal Pump Tests (ANSI/HI 14.6) acceptance Level "1U" as approved by ANSI and published by the Hydraulic Institute. For sump pumps, acceptance shall be in accordance with Level "1U" of ANSI/HI 14.6, unless indicated otherwise. Tests shall be performed using the complete pump system to be furnished, including the project motor and variable speed drive if equipped with variable speed drive. For pumps with motors smaller than 40 hp, the manufacturer's certified test motor shall be acceptable. Testing of prototype models will not be acceptable. The following minimum test results shall be submitted:~~
4. **MODIFY** Section 43 4113 HYDROPNEUMATIC TANK AND ACCESSORIES, paragraph 1.5.A as follows:



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“Tank manufacturer shall provide warranty and guarantees for the tank vessel for a minimum of ~~twenty (20) years~~ **one (1) year from the date of issuance of Notice of Completion.**”

5. **MODIFY** Section 43 4113 HYDROPNEUMATIC TANK AND ACCESSORIES, paragraph 2.2.A.2 as follows:

“The tank shall be designed, fabricated, tested, and stamped in accordance with ASME section VIII and the additional requirements specified in ANSI K61.1. The tanks shall be rated for ~~100 PSIG~~ **the maximum allowable working pressure (MAWP) as shown on the Drawings**, between 20 Deg. F and 120 Deg. F and full vacuum.”

**Changes to Drawings:**

1. Drawing G-2: **MODIFY** the table in the upper right as follows:

|                   |   |
|-------------------|---|
| PUMP SETTING      | <del>160 FEET</del> <b>AS SPECIFIED</b> |
| SPECIFIC CAPACITY | ~35.0 GPM/FT                            |

PUMPING EQUIPMENT

|             |   |
|-------------|---|
| PUMP TYPE   | DEEP WELL <del>SUBMERSIBLE</del> VERTICAL TURBINE,<br>OPEN LINESHAFT, PRODUCT-LUBRICATED<br>W/ PRE-LUBE SYSTEM  |
| DRIVER TYPE | 480-VAC VHS INDUCTION MOTOR,<br><del>CONSTANT</del> <b>VARIABLE</b> SPEED INVERTER DUTY<br>RATED, PREMIUM EFFICIENT, 4-POLE/1,800 RPM,<br><b>150 HP</b> |

~~WELL PUMP/MOTOR — GOULDS MODEL 12CHC 4 STAGE  
OR EQUAL WITH 150 HP MOTOR~~

2. **REPLACE** “Drawing C-3 Yard Piping”, with “Drawing C-3 Yard Piping, Revision 1” (Attached)
3. Drawing M-1: **REVISE** Detail 2 per below:
- a. **ADD** the following text below the callout text for the solenoid valve:  
“ASCO REDHAT 8210 SERIES, OR EQ”
  - b. **ADD** the following text below the callout text for the flow switch:  
“BRASS, SPDT, DWYER SERIES V6 FLOWTECT, OR EQ”
4. Drawing P-2: **DELETE** the “3/8” TUBING / 2”C W RAW WATER SAMPLE” tubing and carrier piping shown routed from the Pressure Instrument (PI) closest to the Well, and **REVISE** to install per Detail 2/Sheet M-2.

5. Electrical Drawing **CHANGES** related to compressor:

- a. Remove the 2 pole, 70 A circuit breaker from the Electrical Panel shown on the single line diagram on sheet E-5.
- b. The space for the 70 A circuit breaker shall be left blank and no opening shall be left for it in the door where shown on the Electrical Panel elevation of drawing E-3. No nameplate shall be provided for the circuit breaker, so nameplate 41 on sheet E-4 shall be removed.
- c. Conduit S6-1 on sheet E-2 shall be shown going from ELEC PB 2P to the hydropneumatic tank and a symbol shall be added on the hydropneumatic tank called out as: "TOP MOUNTED HYDROPNEUMATIC TANK AIR COMPRESSOR, 12 FEET ABOVE SURROUNDING GRADE, NOTE 4".
- d. Add Note 4 to drawing E-2 as: "PROVIDE FOUR (4) 10 FEET TALL, 1-5/8" GALVANIZED FRAMING CHANNEL POSTS 12 INCHES APART IN A SQUARE ARRANGEMENT. PROVIDE FOUR (4) 4 HOLE POST BASES AND CROSS MEMBERS AT THE TOP AND AT LEAST EVERY 4 FEET. PROVIDE A CONCRETE PAD 3' X 3' X 6" DEEP SQUARE ON WHICH TO SUPPORT THE FRAMING CHANNEL RACK STRUCTURE AND ANCHOR THE POST BASES TO IT. SUPPORT THE CONDUIT SERVING THE AIR COMPRESSOR ON THE FRAMING CHANNEL RACK STRUCTURE. LOCATE THE STRUCTURE TO BE NEAR THE AIR COMPRESSOR AND PROVIDE LIQUIDTIGHT FLEXIBLE METAL CONDUIT FROM THE RACK TO THE AIR COMPRESSOR."
- e. Use spare 20 A circuit breaker H16 on sheet E-6 for the hydropneumatic tank air compressor. Show dashed lines labeled "HYDROPNEUMATIC TANK AIR COMPRESSOR" from H16, N16, and G16.
- f. Revise conduit S6-1 on sheet E-12 to be: 2#12, #12G, and 3/4". The Riser Type and 90 Type shall be PVC COATED GRS. The Conduit Finish shall be "END BELL / GRS EXPOSED AND FLEX TO COMPRESSOR FROM TOP OF RACK". Add this note: "PROVIDE A "C" CONDUIT BODY WITHIN 24" OF STUBBING UP THE CONDUIT AT THE HYDROPNEUMATIC TANK. PROVIDE A CONDUIT BODY WITH CABLE STRAIN RELIEF AT THE TOP OF THE RACK."

6. Drawing E-13: **REVISE** as follows:

- c. Conduit S8-7 shall be "2 inch" instead of the "3/4 inch" shown on E13. The wire size shall be "5-TSP#16, #14 G" instead of the "MAGNETIC FLOW METER VENDOR" shown on E13. Add the following note: "THE FIVE SHIELDED PAIRS GO TO THE FLOW METER DISPLAY IN THE ELECTRICAL PANEL. PROVIDE A TERMINAL BOX NEAR THE MAGNETIC FLOW METER AND TRANSITION TO THE FLOW METER VENDOR SUPPLIED CABLE. INSTALL THE VENDOR

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CABLE IN FLEX CONDUIT PER MANUFACTURER'S  
INSTRUCTIONS.”

**Attachments:**

1. **NEW** Section 11 93 10 VERTICAL TURBINE PUMPS AND MOTORS (11 pages)
2. **REVISED** Section 33 11 00 WATER DISTRIBUTION PIPING AND VALVES (10 pages)
3. **REVISED** Drawing C-3 Yard Piping (1 page)

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SECTION 11 9310 VERTICAL TURBINE PUMPS AND MOTORS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The Contractor shall furnish all materials, equipment, labor and incidentals necessary to furnish and place in operation vertical turbine pumps as described. Work shall include all auxiliary equipment and accessories as shown on the Drawings and as specified herein. The Contractor shall provide additional appurtenances as required to interface with associated existing piping, controls, wiring, and appurtenances, for a complete and operable system, in accordance with the Contract Documents.

1.2 RELATED WORK

- A. The requirements of the following sections apply to this Section:
  - 1. Section 01 33 00 – Submittal Procedures
  - 2. Section 09 9000 – Protective Coating
  - 3. Section 11 0000 – General Requirements for Equipment
  - 4. Section 22 1000 – Pumps, General
  - 5. Section 26 0000 – Electrical Work, General

1.3 QUALITY ASSURANCE

- A. Equipment furnished under this Section shall be of a single manufacturer who has been regularly engaged in the design and manufacture of vertical pumps and demonstrates, to the satisfaction of the Engineer, that the quality is equal to equipment made by those manufacturers specifically named herein. The pump manufacturer shall have supplied complete units that have been in successful operation, at similar installations, for at least ten (10) years.
- B. A single vendor shall be made responsible for furnishing each pump, motor, and related components, and for coordination of design, assembly, testing, and installation of the pumps; however, the Contractor shall be responsible for compliance with the requirements of these specifications.
- C. Authorized Representative: The manufacturer shall have a factory authorized representative located within 200 miles from job site. Supervisory personnel shall have a minimum of five (5) years' experience in start-up, test and repair of comparable sized pumps.
- D. Governing Standard: Except as modified or supplemented herein, each vertical pump shall conform to the applicable requirements of ANSI/AWWA E101 and the Hydraulic Institute Standards. Each unit shall not develop at any frequency or in any plane, peak-to-peak vibration amplitudes in excess of Hydraulic Institute Standards.

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- E. Tests: Perform all factory and field tests required to meet performance requirements of all equipment as specified. Each complete pump shall be tested at the factory for capacity, power requirement, and efficiency at minimum head, rated head, and head which extends past the normal operating head range of the pump, and at as many other points as necessary for accurate performance curve plotting. All tests and test reports shall be made in conformity with the requirements and recommendations of the Hydraulic Institute Standards. Arrange for and conduct all field tests required by local and State authorities for permits or certifications.
- F. Design: Provide lateral and torsional analysis for critical frequencies (resonance) throughout entire operating speed range of each pump units if equipped with fabricated discharge heads. In order to ensure that neither harmful nor damaging vibrations occur to the pump structure at any speed within the specified operating range, the pump manufacturer shall perform a structural frequency analysis of the above ground structural components utilizing an FEA method to ensure that no structural frequencies occur within +/-20 percent of the operating speed range. When deemed necessary by the experience of the manufacturer, the below ground structural components shall also be included in the analysis.
- G. Warranty: Warranty each pump and motor for a period of one (1) year from the date of Project acceptance and guarantee against all defects in material, equipment, and workmanship. The warranty shall include all parts, labor and shipment costs. Warranty period shall begin after installation, testing, and final acceptance. This is in addition to any other warranty provisions between Contractor and pump manufacturer.

1.4 SUBMITTALS

- A. Submittals shall be provided in accordance with the requirements and specifications of Section 01 3300, "Submittal Procedures", Section 11 0000, "General Requirements for Equipment," and Section 22 1000, "Pumps, General."
- B. Complete assembly, mounting, and installation drawings, along with detailed specifications listing materials used, parts, devices, and other accessories forming a part of the equipment furnished, shall be submitted. The specifications and information for each pumping unit shall include, but shall not be limited to, the following:
  - 1. Performance data curves showing head, capacity, horsepower demand, NPSH required, and ~~pump bowl~~ efficiency over the entire operating range of the pump. The equipment manufacturer shall indicate separately the head, capacity, horsepower demand, overall efficiency, and the minimum submergence required at the rated flow conditions and the maximum and minimum flow conditions.
  - 2. Assembly and installation drawings including shaft size, seal, couplings, bearings, anchor bolt requirements, part nomenclature, material list, outline dimensions, and shipping weights.
  - 3. Submit complete dimensional drawings for all pump components. Coordinate equipment dimensions with the dimensional requirements as shown on the Drawings and as specified. Submit anchorage calculations meeting the requirements of Section ~~05501—Anchor Bolts and Anchoring Devices~~ **05 50 10 – Anchor Bolts**.
  - 4. Electric motor data including manufacturer, type, model, motor horsepower (hp) size, temperature rating, full load rotation speed, efficiency at full load and rated pump condition, and full load current.

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5. Manufacturer’s installation, lubrication, operation and maintenance manuals, bulletins, and parts lists. Manuals shall provide all the information required to install, operate and maintain the equipment in accordance with the standard provisions of all the manufacturer’s warranty provisions.
6. Shop Test Data: Signed, dated and certified shop test data for each pump, submitted before shipment of equipment.
7. Coating system component data sheets, including product data on each type of base coat and top coat, and preparation and application instructions.
8. Provide lateral and torsional analysis as specified herein.

1.5 COORDINATION

- A. Contractor shall be responsible for coordinating all components of the complete pump and motor assemblies and all accessories to be compatible with other construction and operating requirements specified herein. The ratings, requirements and capacities of the pumps and motors shall be coordinated throughout the entire range of operation including horsepower, RPM, torque, critical frequency and thrust load to insure conformance with these Specifications.

PART 2 - PRODUCTS

2.1 GENERAL DESCRIPTION

- A. Identification

|           |               |
|-----------|---------------|
| Pump Name | ARC East Well |
| Quantity  | 1 Total       |

- B. Operating Conditions: The Work of this Section shall be suitable for long-term operation under the following conditions:

|  |                         |
|--|-------------------------|
| Drive  | Variable speed          |
| Duty   | Continuous              |
| Ambient environment                                | Outdoors, Fully Exposed |
| Ambient temperature, degrees F                     | 25 to 104               |
| Ambient relative humidity, percent                 | 0 to 100                |
| Fluid service                                      | Raw Water               |
| Fluid temperature range, degrees F                 | <del>35</del> 65 to 75  |
| Fluid pH range                                     | 6 to 8                  |
| Fluid specific gravity                             | 1                       |
| Fluid viscosity, absolute centipoises at 60 deg. F | 1.129                   |

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|                                  |    |
|----------------------------------|----|
| Project site elevation, ft (msl) | 85 |
|----------------------------------|----|

C. The pump shall have a continuous increase in total dynamic head with a corresponding continuous decrease in flow capacity along the pump’s entire operating curve.

D. Performance Requirements

|  |   |
|--|---|
| Maximum shutoff head, ft,                              | 470 +/- 20  |
| Design flow capacity, gpm                              | 1,500   |
| Design flow TDH at pump bowls, ft                      | 276   |
| Design flow minimum bowl efficiency, percent           | 76% ± 3%  |
| Maximum flow capacity, gpm                             | 1,700   |
| Maximum flow TDH at pump bowls, ft                     | 200 +/- 10  |
| Flow capacity at Best Efficiency Point, gpm            | <del>3,876</del> <b>1,300</b> gpm +/- 400 <del>80</del> gpm |
| Best Efficiency Point minimum bowl efficiency, percent | <del>80%</del> <b>79%</b>                                   |
| Design pump speed, rpm                                 | 1,770   |
| Motor speed, rpm                                       | 1,800   |
| Motor size, hp   | 150   |

E. Pump Dimensions

|   |                  |
|---|------------------|
| Column diameter, in   | 10               |
| Minimum discharge diameter, in  | 12               |
| <b>Column Assembly Length (from bottom suction below bowl to the underside of the discharge head baseplate), ft</b> | <b>245 +/- 5</b> |
| Maximum bowl diameter, in   | 15.5             |

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a)

|                                  |   |
|----------------------------------|---|
| Acceptance of Vibration Criteria | Per ANSI/HI 9.6.4-2009 or the latest revised edition of the Hydraulic Institute Standards at the time of Bidding. |
|----------------------------------|---|

2.2 PUMP REQUIREMENTS

A. Pump Construction: Construction of vertical turbine pumps shall conform to the following requirements:

|                                |  |
|--------------------------------|--|
| Bowls                          | Pump bowls shall be of close-grained ASTM A48, Class 30 cast iron, free from blow holes, sand holes and all other faults; accurately machined and fitted to close dimensions. The interior surfaces of water passages <del>and all exterior surfaces of the bowls</del> shall be factory coated with vitreous enamel or fusion bonded epoxy. <b>All exterior surfaces of the bowls shall be epoxy coated per Section 09 9000 – Protective Coating.</b> |
| Impeller                       | The impellers shall be the enclosed type, constructed of ASTM B584 silicon bronze, or ASTM B148 alloy 952 aluminum bronze. They shall be accurately fitted, smoothly finished, and dynamically balanced at normal pump speed. The impellers shall be securely fastened to the bowl shaft with a key and thrust collar combination of stainless steel.  |
| Impeller Shaft                 | The impeller shaft shall be of Type 416 stainless steel and shall be supported by low zinc bronze and/or neoprene bearings which shall be easily removable. Bearings shall properly fit housing without knurling the housings or bearings. The first critical shaft speed shall be at least 125% of normal operating speed. The length of the bearings shall be at least 2½ times the diameter of the shaft.   |
| Wear rings (impeller and bowl) | ASTM B148 aluminum bronze, replaceable.  |
| Bowl shaft                     | Stainless steel, Type 410 or 416. The bowl shaft shall be of sufficient diameter to transmit the pump horsepower with a liberal safety factor and rigidly support the impellers between the bowl or case bearings.   |
| Bowl and suction bearings      | Product-lubricated bronze sleeve case bearings.  |
| Suction bell                   | Cast iron or ductile iron bell. Lining and coating shall be the same as for bowls.   |



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b)

|  |   |
|--|---|
| <p>Vortex suppressor<br/><b>Strainer</b></p> | <p><del>Stainless steel vortex suppressor, type 316, of minimum 3/16" thick plates, with a minimum net open area equal to four (4) times the suction pipe inlet area, design as recommended by the pump manufacturer for the intended installation. Vortex suppressor components shall be welded to form a single removable assembly, to be attached to the suction bell.</del></p> <p><b>Stainless steel cone type strainer, Type 316, with a net open area equal to at least five (5) times the suction pipe area.</b></p>  |
| <p>Column</p>                                | <p><del>ASTM A53 grade B steel pipe, minimum Schedule 30, with flanged ends. Flanges shall be machined with a registered fit after being welded to the column, and shall be assembled with through bolting only. Interior and exterior surfaces shall be factory epoxy coated.</del></p> <p><b>ASTM A53 grade B steel pipe, minimum Schedule 30, threaded and coupled. The column pipe shall be connected with 8 thread-per-inch right-hand straight-threaded standard mill steel couplings. The ends of each section of the column pipe shall be faced parallel and machined with straight threads to permit ends to butt in the couplings. The exterior surfaces of the column pipes and couplings to be installed in wells shall not be coated. Interior surfaces shall be factory epoxy coated.</b></p>   |
| <p>Line shaft</p>                            | <p><del>Line shafting shall be of ample size to transmit the torque and operate the pump without distortion or vibration. Line shafting shall be made of carbon steel conforming to AISI 1045 and be furnished in interchangeable sections not over ten feet in length. Line shaft sections shall be turned, ground, and polished with journals at bearing locations for both normal and reversed/flipped shaft installation. Line shafting shall be coupled with extra strong Type 316 stainless steel threaded steel couplings machined from solid bar steel. An enclosing tube shall be provided to house the line shaft. Enclosing tube sections shall be of extra strong ASTM A120, Schedule 80 pipe and furnished in interchangeable sections not over five feet in length, uncoated inside, and coated outside with 10 to 12 mils vitreous enamel or epoxy as specified in Section 09 90 00 Protective Coating. Each end of the enclosing tube shall be machined to receive a bronze connector bearing. Enclosing tube connector bearings shall be of bronze material conforming to ASTM B505 C93200 material. Units with overall lengths exceeding 30 feet shall incorporate an enclosing tube stabilizer for each additional 50 feet of the tube assembly.</del></p> <p><b>Line shafting shall be of ample size to transmit the torque and</b></p> |

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|                        |   |
|------------------------|---|
|                        | <p>operate the pump without distortion or vibration. Line shafting shall be made of ASTM A582, type 416 stainless steel and be furnished in interchangeable sections not over ten feet in length. Line shaft sections shall be turned, ground, and polished. Line shafting shall be coupled with extra-strong Type 316 stainless steel threaded steel couplings machined from solid bar steel. Lineshaft bearings shall be Neoprene or Styrene Butadene Rubber (SBR) with bronze or ductile iron retainers. Where specified or indicated on the Drawings, the lineshaft bearings in the upper length of column pipe as noted shall be of Vesconite Hi-Lube with bronze or ductile iron retainers.</p> |
| Line shaft lubrication | <p><del>Oil reservoir, tubing, needle valve, and oiler solenoid (normally closed) shall be provided for oil drip lubrication of the enclosed line shaft. Lubrication oil shall be food grade oil. Provide shaft seal with tension plate for oil lubrication.</del></p>  |
| Discharge head         | <p>The discharge head assembly shall be of cast iron or fabricated steel with a discharge elbow, baseplate, and driver mount. The discharge elbow shall be located above or below the baseplate as shown on the Drawings. The assembly shall be of ample strength to support the motor, bowl assembly, column pipe, column of water, and the entire assembly at operating thrust. Discharge shall be provided by a flanged elbow. The discharge flange shall be rated ANSI Class 150 lb. The discharge head shall be provided with the means to lift the combined head, column, and bowl assembly. The discharge head shall be epoxy lined and coated.</p>  |
| Sole plate             | <p>The pump sole plate shall be sized to amply support the total weight of the pump (including water column within both pump column and discharge head, pump, and motor). Sole plate shall be <del>galvanized</del> <b>coated per Section 09 90 00 – Protective Coating</b>. Design calculations for the sole plate shall be submitted in accordance with Section 01 30 00 – Submittals</p>   |

2.3 PUMP MOTORS

A. A. Pump Motors shall be of the following type for each pump:

|                   |                                 |
|-------------------|---------------------------------|
| Motor speed, rpm  | 1,800                           |
| Motor size, hp    | 150                             |
| Electrical supply | 480 Volts AC, 3-phase, 60 hertz |

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|                |   |
|----------------|---|
| Type           | Vertical Hollowshaft                                      |
| Duty           | Continuous, <b>Inverter Duty Rated for Variable Speed</b> |
| Ratings        | 50° C, IEEE-841   |
| NEMA enclosure | WP-I  |

- B. Vertical hollow shaft electric motors shall be Design B, high-thrust, squirrel cage, induction-type having NEMA enclosure types as specified, suitable for outdoor exposure and use. Motors shall be built to form an integral part of pump head assembly and shall be suitable electrically and mechanically to efficiently and effectively drive pumps specified. Motors shall operate in accordance with these specifications.
- C. All materials, workmanship, and tests shall conform to the applicable specifications of the National Electrical Manufacturers Association (NEMA), Institute of Electrical and Electronic Engineers (IEEE), American Standards Association (ASA), and the Anti-Friction Bearing Manufacturers Association (AFBMA).
- D. Heaters and Winding Thermostats: Motors shall be equipped with 115 volt, single phase strip heaters capable of raising motor temperature 10 degrees C above ambient temperature to prevent condensation. All strip heater leads shall terminate in motor terminal box. Strip heater sizing shall be determined by motor frame size and strip heater manufacturer’s sizing charts. Strip heaters shall be manufactured by Electro-Film or equal. Provide motors with three (one per phase) automatically resetting bi-metallic thermostats with normally closed (N/C) contacts wired to the motor terminal box.
- E. Rodent Protection: Motors shall be equipped with suitable corrosion resistant safety and rodent screens on all openings. Said screens shall not interfere with motor cooling or motor heat dissipation.
- F. Thrust Bearing: Motor thrust bearing for each motor shall have ample capacity to carry the weight of all rotating components plus the hydraulic thrust at the maximum operating condition.
- G. Load Conditions: Actual motor loads shall not exceed the nameplate rating (horsepower).
- H. Motor Balance: Motors shall be dynamically balanced to a maximum of 0.0005 inches measured peak to peak amplitude, especially at upper bearing housing. Steady bushings shall be installed on motors when mechanical seals are used.
- I. Bushings: All motors rated at 50 horsepower and above shall be equipped with lower end head shaft steady bushings.
- J. Lubrication: Motor thrust bearings shall be oil lubricated; however, motor guide bearings may be grease lubricated. Oil lubrication systems shall provide optimum lubrication of bearings. Said systems shall have sufficient oil storage and oil cooling capacity to limit oil bath temperature rise to 45 degrees C above 40 degrees C ambient temperature unless temperature rise of 50 degrees C is specifically permitted. Oil lubricated motors shall have visual level

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indicators and accessible fill and drain plugs. Indicators and plugs shall be located 180 degrees from the pump discharge unless specified otherwise. Grease lubrication systems shall be regreasable and shall provide for automatic flushing or purging of grease cavity during regreasing.

- K. Terminal Box: Motors shall be equipped with extra-large heavy duty split type conduit boxes. Unless specified otherwise, motor terminal boxes shall be located 90 degrees from pump discharge.
- L. Painting: Electric motor manufacturers shall prepare and prime surface of motor case. Prime coat paint shall be compatible to final paint system. Prime coat and final color coat shall be provided and at a minimum three mils thickness each for a total minimum coating thickness of six mils. Contractor to submit color chart for Owner's color selection.

## 2.4 SPARE PARTS

- A. Furnish the following spare parts for each pump:
  - 1. One set of all bowl, suction, and discharge case bearings
  - 2. One set of all wear rings
  - 3. Two sets of all static and dynamic seals, gaskets, and o-rings

## 2.5 PUMP MANUFACTURERS, OR EQUAL

- A. Fairbanks Morse
- B. Floway
- C. Flowserve
- D. Goulds
- E. Johnston Pumps (Sulzer)

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Installation of the pump and motor shall be in accordance with the American National Standards Institute / Hydraulic Institute (ANSI/HI) 2.1-2.4-2008, for vertical pumps for nomenclature, definitions, application, operation, and installation, and per the manufacturer's printed instructions. An authorized technical representative of the manufacturer shall visit the site to witness the following and to certify in writing that the equipment has been properly installed, aligned, lubricated, adjusted, and readied for operation.
  - 1. Installation of the equipment.
  - 2. Inspection, checking and adjusting the equipment.
  - 3. Startup and field testing for proper operation.

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4. Performing field adjustments to ensure that the equipment installation and operation comply with requirements.

B. The manufacturer's representative shall be present at the site for three (3) work days to furnish the services. For the purpose of this Section, a work day is defined as an eight-hour period at the site, excluding travel time.

3.2 PERFORMANCE TESTING

A. Pumps shall be tested per the latest edition of ANSI/HI 14.6, and to an acceptance grade of 1U for both factory and field tests.

B. Field performance tests shall demonstrate that pump operation and controls meet the requirements as specified in this Section.

3.3 FACTORY TESTING

A. Provide non-witnessed Factory Pump Performance Testing.

B. Provide non-witnessed Factory Hydrostatic Testing, including bowl assembly, ~~column~~, and the discharge head.

3.4 FIELD TESTING

A. Functional Tests

1. General: Conduct field performance tests to demonstrate that pump operation and controls meet the requirements specified in the above specifications.

2. Alignment: Test complete assemblies for correct rotation, proper alignment and connection, and quiet operation. Monitor bearing areas on pump and motor for abnormally high temperatures.

B. Vibration Test

1. Conduct tests all with units installed, in normal operation, and discharging to the connected piping systems at rates between the high and low discharge head conditions specified.

2. Manufacturer to provide documentation of the analysis ensuring that the specified requirements have been met, and that documentation should be signed and stamped by the professionally licensed engineer who performed the analysis work.

3. If pump units exhibit vibration in excess of the limits specified adjust or modify as necessary. Units which cannot be adjusted or modified to conform as specified shall be replaced.

C. Sound Test

1. Conduct tests all with units installed, in normal operation, and discharging to the connected piping systems at rates between the high discharge head conditions specified.

2. Each unit shall not develop sound levels in excess of 71 dBA within three (3) feet at rated speed.

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3. If pump units exhibit noise in excess of the limits specified adjust or modify as necessary. Units which cannot be adjusted or modified to conform as specified shall be replaced.

3.5 FIELD PAINTING

- A. Factory painted items requiring touch up work shall be cleaned completely, and shall be primed and topcoated in accordance with Section 09 9000 – Protective Coating.

END OF SECTION 11 9310

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SECTION 33 11 00 - WATER DISTRIBUTION PIPING AND VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes buried and exposed water-distribution piping and related components.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.
- C. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.1 REFERENCES

- A. American Water Works Association (AWWA)
1. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
  2. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems
  3. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings
  4. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
  5. AWWA C115/A21.15 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
  6. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water
  7. AWWA C153/A21.53 - Ductile-Iron Compact Fittings for Water Service
  8. AWWA C200 Steel Water Pipe 6 In. and Larger
  9. C205, Cement-Mortar Protective Lining and Coating for Steel Water Pipe-4-inch and Larger – Shop Applied.
  10. AWWA C206 Field Welding of Steel Water Pipe
  11. AWWA C207 Steel Pipe Flanges for Waterworks Service – Sizes 4 In. Through 144 In.
  12. AWWA C208 Dimensions for Fabricated Steel Water Pipe Fittings
  13. AWWA C213 Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines
  14. AWWA C600 - Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances
  15. AWWA C800 - Underground Service Line Valves and Fittings
  16. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In., for Water Transmission and Distribution
  17. AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 30 In., for Water Transmission and Distribution

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- B. The American Society of Mechanical Engineers (ASME)
  - 1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings (Classes 25, 125, and 250)
  - 2. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings
  - 3. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
  
- C. American Society for Testing and Materials (ASTM)
  - 1. ASTM A 36 Specification for Structural Steel
  - 2. ASTM A 53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
  - 3. ASTM A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature of High Pressure Service and Other Special Purpose Applications
  - 4. ASTM A 570 Specification for Steel, Sheet and Strip, Carbon, Hot-rolled Structural Quality
  - 5. ASTM A 572 Specification for High-strength Low-alloy Columbium-Vanadium Steels of Structural Quality
  - 6. ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
  - 7. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

## 1.2 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
  
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

## 1.3 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
  - 1. Notify Owner no fewer than two <2> days in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of water-distribution service without Owner's written permission.



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PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE

- A. Pipe: DIP pipe shall be Class 350 conforming to AWWA C151 with cement mortar lining in accordance with AWWA C104. For long continuous pipe runs between valves and fittings, pipe shall be furnished in minimum standard lengths of 20 feet.
- B. Exterior Coating: Pipe exterior shall be mortar coated for buried locations. For exterior above ground locations, coat exterior of piping per Section 09 9000 PROTECTIVE COATING requirements. Above to below ground transition of exterior mortar coating shall occur two (2) to four (4) inches above finished grade for paved surfaces, otherwise the transition shall occur four (4) to six (6) inches above finished grade of unpaved surfaces.
- C. Joints: Joints shall be either bell and spigot end, push-on type or cast iron mechanical joint type, 250 pound working pressure, with elastomeric rubber ring joints, conforming to AWWA C111.
- D. Fittings: Fittings shall be ductile iron pipe conforming to AWWA C153, size 3 through 24 inch, and AWWA C110 greater than 24 inch, and shall be 350 psi working pressure rated. Couplings, sleeves, and accessories shall be manufactured by U.S. Pipe TrimTyte, Union Foundry, Tyler; or equal.
- E. Mechanical Joint Restraints: Pipes shall be restrained using a wedge action, self-actuating lug type restraint device. DIP pipe mechanical restraints shall be EBAA Iron Sales, StarGrip, or equal.
- F. Flanged outlets shall conform to ASME B16.1, 125 pounds. Bolts and nuts for flanges shall be Type 304 stainless steel, ASTM A193, Grade B8M hex head bolts and ASTM A194, Grade 8M, hex head nuts. Washers shall be of the same material as the bolts. Unless otherwise noted, flanges on all DIP spools shall conform to AWWA C115.
- G. Miscellaneous nuts and bolts shall be Type 304 stainless steel.
- H. All buried ductile iron pipe and fittings shall be wrapped in polyethylene per AWWA C105.

2.2 WELDED STEEL PIPE

- A. Welded steel pipe shall be used above ground in exposed locations where ductile iron pipe is not preferred for use by the Contractor, or cannot be used, and shall be factory fusion bond epoxy lined and coated, and additional field coating on the exterior per Section 09 9000 PROTECTIVE COATING requirements.

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- B. Pipe:
1. AWWA C200:
    - a. ASTM A53, Type E or S, Grade B
  2. Or ASTM A134 made from:
    - a. Steel plate: ASTM A283, Grade C, with maximum carbon content of 0.30 percent and maximum manganese of 1.2 percent, or ASTM A570, Grade 30.
  3. Or ASTM A135, Grade B.
  4. Or ASTM A139, Grade B.
- C. Fittings:
1. AWWA C200 or ASTM A234, Grade WPA, unless otherwise required:
    - a. Steel plate: same as for pipe.
    - b. Unless otherwise noted or detailed on the Drawings, fitting dimensions shall conform to AWWA C208. Use 250 psi for the design pressure P.
- D. Flanged Joints:
1. Flanges: slip-on or welding neck, except where otherwise indicated.
    - a. Flange material: ASTM A283, Grade B or C, ASTM A181 Grade 1.
    - b. Dimensions and drilling: AWWA C207, Class D, Table 1 or 2.
    - c. Bore weld neck flange to ID of pipe.
  2. Flange bolting:
    - a. Material: ASTM A307
    - b. Type: Bolt and nut; bolt-stud and two nuts permitted for 1 inch and larger.
    - c. Bolts and bolt-studs:
      - 1) Length: Ends project ¼ inch to ½ inch beyond nuts.
      - 2) Ends: Chamfered or rounded.
      - 3) Threading: ANSI B1.1, coarse thread series, Class 2A fit. Bolt studs may be threaded full length. Studs for tapped holes threaded to match holes.
    - d. Bolt heads:
      - 1) Shape: Hexagonal or square.
      - 2) Dimensions: ANSI B18.2, regular pattern for square, heavy pattern for hexagonal.
    - e. Nuts:
      - 1) Dimensions: ANSI B18.2, heavy, semi-finished pattern.
      - 2) Threading: ANSI B1.1, coarse thread series, Class 1B fit.
- E. Gaskets: SBR, AWWA C207, 1/8-inch thick.
- F. Gasket Compound: Garlock “Compound No. 1”, Titesal T25, or equal.
- G. Couplings:
1. Mechanical Couplings:
    - a. Dresser “Style 38”, Smith-Blair “411 Flexible Coupling”, or equal.
    - b. Transition coupling: Dresser “Style 62”, Smith-Blair “411”, or equal.
  2. Joint Harness:
    - a. Bolts: Stainless Steel ASTM A193, Grade B7, or Ryerson Stress-Proof, minimum yield point 100,000 psi:

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- 1) Threading: ANSI B1.1, Class 2A fit, coarse thread series for 1 inch and smaller and 8-thread series for 1-1/8 inch and larger.
      - 2) Ends: Chamfered or rounded.
    - b. Nuts: Hexagonal, ASTM A194, Grade 2H, or better:
      - 1) Threading: As specified for bolts except Class 2B fit.
      - 2) Dimensions: ANSI B18.2, heavy, semi-finished pattern.
    - c. Washers: Hardened steel, ASTM A325.
  3. Flanged Coupling Adapters:
    - a. Smith-Blair “913”, Dresser “128-W”, or equal.
    - b. All FCA’s shall be restrained with joint harnesses. Anchor pins or anchor studs are not acceptable, and are prohibited.
- H. Small Branch Connections:
1. Pipe nipples:
    - a. Seamless black steel pipe, ASTM A120, standard weight (Schedule 40).
  2. Welded fittings:
    - a. Threaded outlets: Bonney “Thredolets”, Porter “W-S Teelets”, Vogt “Weld Couplets”, or equal.
    - b. Welded outlets: Bonney “Weldolets”, Porter “W-S Teelets”, Vogt “Weld Couplets”, or equal.
- I. Coatings and Linings for Pipe:
1. Factory fusion epoxy line and coat steel pipe in the shop per below and per the requirements specified in Section 09 9000 Protective Coating:
    - a. Exterior Coating: Fusion Bonded Epoxy: 3M “Scotchkote 206N”, fluidized bed type application or equal. Brush blast surface for proper profile for finish coat adhesion. Factory applied prior to shipment.
    - b. Interior Lining: Fusion Bonded Epoxy: 3M “Scotchkote 206N”, fluidized bed type application or equal. Factory applied prior to shipment.
  2. Provide additional field coating on the exterior per Section 09 9000 PROTECTIVE COATING requirements.

## 2.3 PVC PIPE AND FITTINGS FOR BURIED SERVICE

- A. PVC Pipe: PVC pipe shall be bell and spigot with rubber ring joints, minimum Pressure Class 200 AWWA C900 DR-18. Outside diameter pipe dimension shall be manufactured to cast iron pipe equivalent. Underwriters' Laboratories, Inc. (UL) listed, Factory Mutual and National Sanitation Foundation (NSF) approved. Elastomeric ring to be factory bonded into bell groove and meet requirements of ASTM F477. Pipe shall be furnished in minimum standard lengths of 20 feet
1. Fittings: AWWA C111, cast iron mechanical joint type, 250 pound working pressure, ductile iron, mechanical joints with SBR rubber ring gaskets. Flanged outlets shall conform to ANSI B16.1, 125 pounds.
  2. Bolts and nuts for flanges shall be Type 304 stainless steel, American Society for Testing and Materials (ASTM) A193, Grade B8M hex head bolts and American Society for Testing and Materials A194, Grade 8M, hex head nuts. Washers shall be of the same material as the bolts.

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2.4 CORROSION-PROTECTION PIPING ENCASEMENT (BURIED PIPE)

- A. Encasement for Underground Metal Piping:
1. Standards: ASTM A 674 or AWWA C105.
  2. Form: Sheet or tube.
  3. Material: LLDPE film of 0.008-inch minimum thickness, or high-density, crosslaminated PE film of 0.004-inch minimum thickness.

2.5 PIPING SPECIALTIES

- A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.6 GATE VALVES

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Gate Valves Up To 3 Inches:
1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, compression ends, with control rod, and extension box for buried locations, and handwheel for exposed locations. Working pressure shall be 200 psi.
- C. Gate Valves 4 inches and Over:
1. AWWA C509 or C515, iron body, bronze mounted, double-disk, parallel seat gate valve. All valves shall open by turning the stem counterclockwise. Buried valves shall be non-rising type with O-ring seal equipped with 2 inch square operating nut, and shall be bituminous coated. Buried valves shall have stem extensions to place operating nut within 6 inch of top of valve box. Exposed valves shall have handwheel operators. End connections shall be flanged ends or mechanical joint as required for the type of pipe used. Working pressure shall be 200 psi.

2.7 CHECK VALVES

- A. Valves of the same size and service shall be provided by a single valve manufacturer. Packing shall be non-asbestos material. Actual length of valves shall be within 1/16 inch (plus or minus) of the manufacturer's specified length.
- B. Check valves 2 inches and smaller:
1. Valves shall be AWWA C508, Class 150 bronze swing check valves with Y-pattern body and threaded ends. Rotating disk design and regrindable seat.
- C. Check valves greater than 2 inches:
1. Valves shall be globe style silent check valves.
  2. Unless otherwise specified, valves 2 inches through 12 inches shall have a minimum working pressure of 175 psi.

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- D. Check valves wetted parts shall be coated with fusion bonded epoxy per requirements of AWWA C550.
- E. Check valve materials shall be as follows:
  - 1. Body and cover: Cast iron, ASTM A126, Class B or Bronze ASTM B62
  - 2. Seat rings: Aluminum bronze, ASTM B148 or Stainless steel, ASTM A276, Type 316
  - 3. Bushings: Unleaded bronze, ASTM C89833
  - 4. Spring, fasteners and hardware: Type 304 stainless steel

## 2.8 COUPLINGS AND RESTRAINED JOINTS

- A. For buried DIP and PVC pipe:
  - 1. Unless otherwise noted, couplings and sleeves for DIP and PVC shall be ductile iron conforming to AWWA C153, size 3 through 24 inch and AWWA C110 greater than 24 inch, and shall be 350 psi working pressure rated. AWWA C100 fittings shall be ductile iron only. Couplings, sleeves, and accessories shall be manufactured by U.S. Pipe TrimTyte, Union Foundry, Tyler; or equal.
  - 2. Unless otherwise noted, flanges on all DIP spools shall conform to AWWA C115.
  - 3. Push-on joints shall have SBR rubber ring gaskets.
  - 4. All fittings shall be restrained joints. Pipes shall be restrained using a wedge-action, self-actuating lug type restraint device as manufactured by EBAA Iron Sales, StarGrip, or equal.
  - 5. All pipe joints within the minimum distances listed below shall be restrained. Restraint shall be by use of locking gasket for ductile iron pipe. Restraint for PVC pipe shall be by use of a restraint harness EBAA Series 2800, StarGrip, or equal.
    - a. 6 inch pipe:
      - 1) Horizontal Elbows:
        - a) 11.25 degree bend: 1 foot minimum restraint length.
        - b) 22.5 degree bend: 3 foot minimum restraint length.
        - c) 45 degree bend: 6 foot minimum restraint length.
        - d) 90 degree bend: 14 foot minimum restraint length.
      - 2) Tees: 14 foot minimum restraint length.
      - 3) Reducers: 21 foot minimum restraint length.
      - 4) Dead Ends: 42 foot minimum restraint length.

## 2.9 ACCESSORIES

- A. Mechanical Restraints:
  - 1. PVC Pipes: Certain Teed Certa Lock, Romac Grip Rings, or equal.
  - 2. Ductile Iron Pipes: Field Lock Gaskets, Mega Lug 1100 series, TR Flex, or equal.
- B. Rods and Clamps: Socket clamps shall be stainless steel, four bolt type, equipped with stainless steel socket clamp washers and nuts Grinnell Fig. 595 and 594, Elcen Fig. 37 and 37X, or equal.
  - 1. Rods shall be stainless steel, 3/4 inch diameter.

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- C. All underground domestic water piping shall be accompanied by an HMWPE insulated (blue color) copper clad steel (CCS) tracer wire. Both ends of tracer wire shall be accessible at all utility valve boxes.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

3.2 EARTHWORK

- A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.3 INSTALLATION – PIPE

- A. Have on hand all installation manuals, brochures, and procedures for the equipment and materials concerned.
- B. Follow manufacturer instructions, where such are provided, in all cases that cover points not shown on the Drawings or specified herein. Manufacturer's instructions do not take precedence over the Drawings and Specifications. Where manufacturer's instructions are in conflict with the Drawings and Specification, submit the conflicting instructions to the University's Representative for clarification before performing the work.
- C. Use fittings to make all changes in direction and size unless otherwise indicated on the Drawings.
- D. Maintain factory plastic end covers on the pipe during storage. Caps shall be removed upon installation of pipe to insure cleanliness.
- E. Lay piping on a bed of the specified sand, at least 6-inches thick, on firm undisturbed earth. Remove loose rock, clods, and debris from the trench before placing bedding sand and before laying any pipe.
- F. The piping shall be made up with the pipe barrel bearing evenly along its full length on the sand bed on the bottom of the trench.
- G. In the case of steel or other rigid joint piping, excavate holes under joints and connections for access for making up, welding, testing and wrapping joints.

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- H. Thoroughly clean out each section of pipe and fitting before lowering into the trench. Clean each pipe or fitting by swabbing-out, brushing-out, blowing-out with compressed air, washing-out with water, or by any combination of these methods necessary to remove all foreign matter.
- I. If cleaned pipe sections and fittings cannot be placed in the trench without getting dirt into the open ends, tie tightly woven canvas or other type of approved cover over the ends of the pipes and fittings until they have been lowered into position in the trench. After removal of the covers in the trench, completely remove foreign matter from the pipe ends and fittings.
- J. Do not lower any pipe or fitting into a trench that contains water. Pump water from wet trenches, and keep the trenches dry until the joints have been completed and the open ends of the pipes have been closed with watertight plugs or bulkheads. Do not remove the plug or bulkhead unless the trench is dry.
- K. Assemble lengths of PVC that are joined by couplings, Tyton type push-on joints, Ring-Tite, Fluid-Tite, or equal, such that centerline of two pipes being joined do not form an angle exceeding 2 inches in any plane. In addition, the angle formed in the vertical plane shall not exceed 1-1/2 inch.
- L. Transition plastic pipe to ductile iron when within 10 feet of a steam line. Provide 6 inches minimum powdered insulation around ductile iron sewer pipe when within 5 feet of steam line. Install insulation according to manufacturer's recommendations.
- M. Install trace wire on top of pipe.
- N. Install continuous line marker 18 inches above top of pipe; coordinate with Section 02300 Earthwork.

### 3.4 INSTALLATION – VALVES

- A. Set valves on solid bearing.
- B. Center and plumb valve box over valve. Set box cover flush with finished grade.

### 3.5 CONNECTIONS TO EXISTING WATER SYSTEM

- A. Under no circumstances shall existing lines or utilities be interrupted without prior approval of the District. Submit a request for this approval and also state the maximum duration of shutdown.

### 3.6 PIPE TESTING

- A. Water piping shall be hydrostatically tested at 150 psi pressure for four hours and proven watertight. Provide all instruments, facilities, and labor to conduct testing and placing in operation.

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- B. Piping shall be tested in sections. Testing under this Section of the work shall be done before final connections to existing utility piping is made, with the provision that subsequent leaks, if developed, at these conditions shall be corrected.
- C. Any part of the system, including all accessories, that shows failure during testing shall immediately be repaired or replaced with new materials. The system shall be completely retested after repair for replacement. This procedure shall be repeated, if necessary, until all parts of the system withstand the specified tests. All retesting costs shall be part of the Contract.
- D. Leakage rate shall not exceed 1.5 gallons/hour/1000 feet of pipe over a 2-hour test period.
- E. Tests shall be witnessed by the District. At least 48 hours notice of tests shall be give.

3.7 IDENTIFICATION

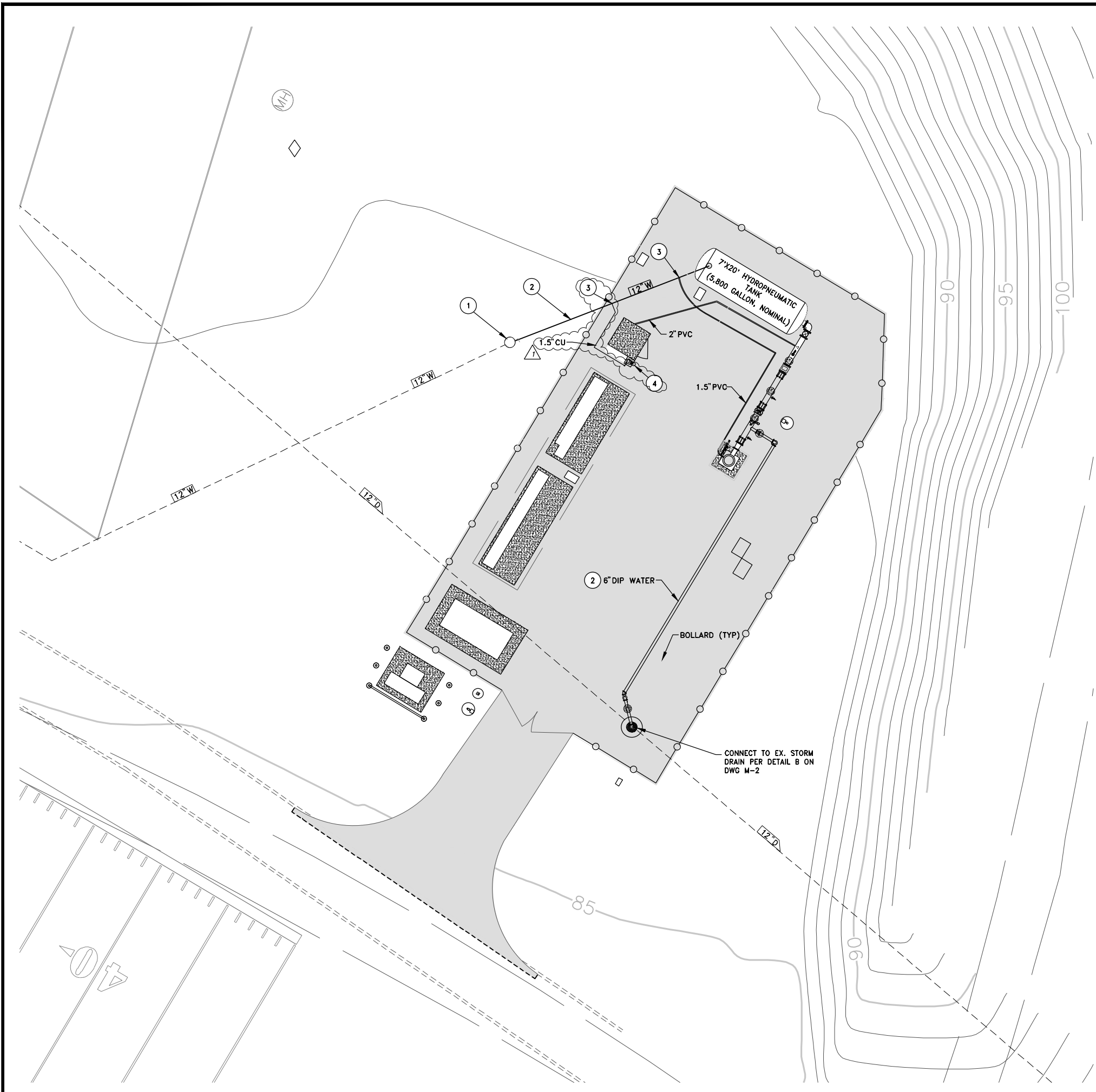
- A. Install continuous underground warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 31 Section "Earth Moving."

3.8 CLEANING

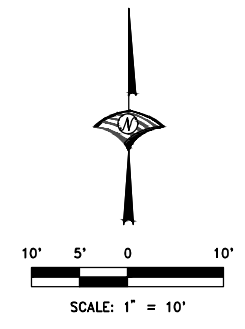
- A. Clean and disinfect water-distribution piping as follows:
  - 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
  - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
  - 3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
    - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
    - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
    - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
    - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

END OF SECTION 33 11 00





- CONSTRUCTION NOTES:**
- 1 REMOVE EXISTING BLOW-OFF VALVE & CONNECT TO EXISTING WATER PIPE. CONTRACTOR TO VERIFY LOCATION AND PROVIDE FITTINGS AS REQUIRED TO CONNECT.
  - 2 ALL JOINTS FOR 12" WATER AND 6" WATER SHALL BE MECHANICALLY RESTRAINED.
  - 3 CONNECT TO 12" WATER.



4 PROVIDE 18"-SQUARE x 8" THICK CONCRETE PAD WITH #5 @ 12" FOR COMBINATION SHOWER/EYEWASH BASE MOUNTING. PROVIDE AND INSTALL NON-FREEZE TYPE COMBINATION EMERGENCY SHOWER AND EYEWASH UNIT ON PAD WITH STAINLESS STEEL ADHESIVE ANCHORS AND HARDWARE PER MANUFACTURER'S RECOMMENDATIONS. COMBINATION SHOWER/EYEWASH SHALL BE ANSI Z358.1 COMPLIANT SUITABLE FOR OUTDOOR INSTALLATION WITH THERMOSTATICALLY CONTROLLED ELECTRIC HEAT TRACED CABLE. UNIT SHALL ALSO INCLUDE REMOVABLE 3/4" FOAM INSULATION AND AN ABS PLASTIC GREEN JACKET WITH ELASTOMERIC SEALS FOR ALL SEAMS AND OPENINGS IN THE JACKET THAT PREVENTS FREEZING DOWN TO AMBIENT TEMPERATURES OF 15°F. UNIT SHALL BE HAWS CORPORATION MODEL 8317CTFP, GUARDIAN EQUIPMENT CO. MODEL GFR3110, OR EQUAL. PROVIDE 1-1/2" BRONZE GATE VALVE ON COPPER SUPPLY PIPE 6" ABOVE GROUND, AND ROUTE SUPPLY TO UNIT. INSULATE ALL EXPOSED PIPING.

|                     |  |                            |  |
|---------------------|--|----------------------------|--|
| DATE: NOVEMBER 2016 |  | SCALE: H: NOTED V: N/A     |  |
| DRAWN BY: MNT       |  | DESIGNED BY: P. TOBIA      |  |
| ENGR BY: P. TOBIA   |  | CHECKED BY: P. TOBIA       |  |
| NO.                 |  | DESCRIPTION                |  |
| EAG                 |  | ADD SHOWER/EYEWASH - ADD#1 |  |
| INIT                |  | COUNTY APPROVED            |  |
| DATE                |  | BY                         |  |

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IMPROVEMENT PLANS FOR  
**ARC EAST WELL PUMP STATION IMPROVEMENTS**  
 YARD PIPING

AMERICAN RIVER COLLEGE COUNTY OF SACRAMENTO CALIFORNIA  
 Station: C-03-YR-ARC\_SW (ADD=1).dwg 1/10/2017 11:55 AM Eddie Goss

PROJECT NO. 8131.036  
 DRAWING C-3  
 SHT 6 OF 33

DATE: NOVEMBER 15, 2016

