# Navajo Tribal Utility Authority

## Chilchinbeto Well No. 4 Pumphouse
## Volume 2 –Technical Specifications

Prepared for:

**Navajo Tribal Utility Authority**

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# TECHNICAL SPECIFICATIONS

Albuquerque Area--Indian Health Service/Office of Environmental Health and Engineering (AAIHS/OEHE) – Sanitation Facilities Construction (SFC) Technical Provisions, November 2021 edition are incorporated by reference. The provisions are the same as if fully written herein and shall govern this Project except where revised, updated, or supplemented by the Special Provisions and Supplemental Technical Provisions.

| | |
|---|---|
| SECTION 01 | TRENCH EXCAVATION & BACKFILL FOR PIPELINES AND APPURTENANT STRUCTURES |
| SECTION 02 | CONCRETE |
| SECTION 03 | REINFORCING STEEL |
| SECTION 04 | WATER TRANSMISSION AND DISTRIBUTION MAINS |
| SECTION 05 | WATER SERVICE LINES |
| SECTION 11 | ROADWAY, RAILROAD AND SPECIAL UTILITY CROSSINGS |

# MODIFICATIONS TO TECHNICAL PROVISIONS

| | |
|---|---|
| **A** | **PERTAINING TO SECTION 01 – TRENCH EXCAVATION & BACKFILL FOR PIPELINES AND APPURTENANT STRUCTURES** |
| B | PERTAINING TO SECTION 02 – CONCRETE |

## A. PERTAINING TO SECTION 01 – TRENCH EXCAVATION & BACKFILL FOR PIPELINES AND APPURTENANT STRUCTURES

TP-104 ROAD, RAILROAD AND SPECIAL UTILITY CROSSINGS

*Add the following at the end of the last sentence:*

or prior notice duration as required by the permitting agency.

TP-107 EXCAVATION

*Replace the first sentence in the third Paragraph of TP-107.B. Rock with the following:*

Solid rock excavation shall be measured in cubic yards from the top of the rock to a point 6-inches below the invert of the installed pipe and an assumed 24-inches trench width, regardless of the actual trench width and depth excavation.

*Replace the first sentence in the fifth Paragraph of TP-107.B. Rock with the following:*

Trench in which rock is encountered shall be excavated at least 6-inches deeper than the pipe invert and refilled to the required elevation with sand, gravel, or crushed rock passing a ¾-inch mesh screen.

*Add the following after the second Paragraph of TP-107.B. Rock:*

For the purposes of trench excavation that cannot be dislodged by a Caterpillar Model No. 329DL track type hydraulic excavator, equipped with a 24-inch-wide short tip radius rock bucket, rated at not less than 204 HP flywheel power with bucket digging force of not less than 35,000 lbs. and stick digging force of not less than 25,000 lbs. or comparable equipment. Once rock is identified, the Contractor shall substitute this piece of equipment with an alternate piece of equipment or method more suitable for rock excavation. Rock removal techniques shall be at the Contractor's option; however, blasting must be approved by the ENGINEER and OWNER.

Any depression in the bottom of the trench caused by overshoot and/or excavating and being 6 inches or greater in depth from a theoretical bottom of the trench shall be backfilled with sand, gravel or crushed rock passing a ¾ inch mesh screen. The pipe zone, as shown on the plans, shall be backfilled with embedment material as described in these Technical Provisions. Final backfill shall be backfilled as specified in these Technical Provisions. The complete trench backfill from the bottom through to the top of the subgrade shall meet the compaction and/or moisture requirements as specified herein.

Once rock has been identified in the field, the Contractor shall excavate test pits ahead of the current trenching operations along the alignment at 100-foot intervals using the same equipment identified above to identify the extent to which rock excavation is required.

TP-109 COMPACTION REQUIREMENTS, METHODS, AND TESTING:

*Replace paragraph A with the following:*

Initial and final backfill and gravel resurfacing shall be compacted to the minimum requirements as specified in the project's geotechnical engineering report, which is included as an Appendix to the Contract Documents.

*Replace the first three sentences of the second paragraph of TP-109.D. Density Tests, with the following:*

The Contractor shall perform compaction testing at the frequency specified by the project's geotechnical engineering report.

TP-115 CLEARING & GRUBBING:

*Add the following sentence at the end of the paragraph:*

On-site burning of debris is not an approved disposal method.

## B. PERTAINING TO SECTION 02 – CONCRETE

TP-207 FIELD TESTING

*Add the following as the last sentence of the first Paragraph:*

The cost of testing shall be borne by the Contractor.

## SUPPLEMENTAL TECHNICAL PROVISIONS

Additions, substitutions, exceptions, and/or revisions to the Albuquerque Area-Indian Health Service/Office of Environmental Health and Engineering (AAIHS/OEHE) – Sanitation Facilities Construction (SFC) Technical Provisions, November 2021 edition.

### ADDED TECHNICAL PROVISIONS

| | |
|---|---|
| STP-1.0 | WELL CONSTRUCTION |
| STP-2.0 | PUMPHOUSE CONSTRUCTION |
| STP-3.0 | PUMPHOUSE SCADA INTEGRATION |
| STP-4.0 | ACCESS ROAD CONSTRUCTION |
| STP 5.0 | GAS CHLORINATION FEED SYSTEM |
| MARICOPA ASSOCIATION OF GOVERNMENTS 2022 REVISION OF THE 2020 EDITION OF STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION | |
| 701 | AGGREGATE |
| 702 | BASE MATERIALS |
| 796 | GEOSYNTHETICS |

## STP-1.0 WELL CONSTRUCTION

1.01 SCOPE: The work consists of three main tasks:

A. Procurement and setting the well pump, drop pipe, and appurtenances.

B. Installation of the pitless adapter unit.

C. Complete wellhead as specified.

Chilchinbeto Well #4 is targeted to produce 110 gallons per minute with a total dynamic head (TDH) of up to 993 feet. These conditions are based on a best-case scenario for water availability and a worst-case scenario for total dynamic head. Tables detailing well design and construction information are also shown on the Construction Drawings.

1.02 PERMANENT EQUIPMENT INSTALLATION: Installation of permanent equipment includes the installation of pump and motor, drop pipe, check valves, pitless adapter, pump cable, and sounding tube shall be according to the Construction Drawings (Detail 1 & 2).

A. WELL PUMP AND MOTOR

The Contractor shall furnish and install one multistage, submersible pump, and motor. The pump shall utilize bronze or stainless-steel impellers locked to the stainless-steel pump shaft using stainless steel collets. The pump shall be selected for best efficiency while pumping at the target production rate and TDH specified in Section 1.01 of this technical provision. A submittal shall be provided to the Engineer documenting the selected pump and motor.

The pump motor shall be sized so that its nameplate horsepower is not exceeded throughout the entire pumping range of the pump. The service factor shall not be considered when sizing the pump motor. (Note: Compliance with this specification might necessitate using a higher horsepower motor than would normally be provided by the pump manufacturer.) The pump motor shall operate on 460-volt AC, 3phase, 60Hz current.

B. PITLESS ADAPTER

The pitless adapter shall be equal to the Baker Monitor Division Industrial Pitless unit for submersible pumps, Model 5PS1012WBWE13T4ES. The bury depth of the discharge shall be 4 feet, but the upper case shall extend 2 feet above ground level. The unit shall be attached to the casing by welding. The cap shall be watertight with a protected screen vent. The spool shall have two pressure equalization passages. A 4” to 3” reducer is threaded for the 3” drop pipe.

C. DROP PIPE

The pump shall be installed using a 3-inch, Schedule 40, galvanized steel drop pipe conforming to the requirements of ASTM A53/A53M-02 (Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded, and Seamless). Galvanized steel drop pipe shall conform to the requirements of ASTM A53/A53M-02 (Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded, and Seamless). Couplings shall be API line couplings, extra heavy, and recessed. Pipe shall adapt to Pitless Unit.

Steel drop pipe shall meet the requirements of ASTM A-53 (Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless). Couplings shall be of the same material as the drop pipe. Pipe shall be adapted to the pitless adapter.

D. CHECK VALVE

An in-line, wing-type check valve shall be installed in the drop pipe between the first and second joints, approximately 21 feet above the pump and every 300 ft. thereafter. The check valve shall be a Technocheck with stainless steel wings or equal.

E. SOUNDING TUBE

The sounding tube shall be a 1.5" schedule 80 PVC water pipe. The Contractor shall install the sounding tube in the well, to provide a transducer conduit. The pipe shall pass through the pitless spool and extend to the top of the well casing. The pipe shall terminate approximately 5 feet above the submersible pump intake, capped on the bottom, and perforated with ¼-inch holes in the lower 20 feet to allow water to flow into the tube for well depth sensing by the transducer. The sounding tube shall be attached to the drop pipe, at every joint, using stainless steel bands and shall be taped to the drop pipe at the mid- section of each pipe. The sounding tube shall be attached opposite the submersible pump cable.

F. PUMP CABLE

The submersible pump cable shall be of sufficient size when designed in conjunction with other service requirements to limit the overall voltage drop from the electrical service to the pump motor to 5%. The submersible pump cable shall have three separate conductors and ground and shall be included in a single continuous jacket assembly. The insulation shall be specifically manufactured for underwater applications, with a minimum of 3/64-inch of moisture-resisting rubber insulation bonded to the copper and a minimum of 2/64-inch of neoprene covering for mechanical protection. The cable should be the length of the discharge pipe plus 100 feet to extend from the surface plate to the electrical controller. The Contractor shall submit calculations or charts used for final wire selection. Pump Cable is incidental to pump installation.

G. PUMP INSTALLATION

The pump shall be installed in strict accordance with the pump manufacturer's recommendations. The pump cable shall be strapped to the pipe column at intervals not to exceed 10 feet. The cable shall enter the well through the conduit opening provided in the sanitary well seal.

Connections and taping of the cable and pump leads shall be in strict accordance with the pump manufacturer's recommendations. Cable splicing, except at the pump leads, will not be permitted.

All splices shall be carefully made to ensure waterproof connections. The Contractor shall provide an ohmmeter capable of reading resistance up to 30 mega ohms. A resistance test at 500 volts shall be conducted in the presence of the Owner or Owner's Representative between each of the submersible pump leads and the well casing after the pump has been installed in the well. Any reading less than 5 mega ohms is unacceptable, and the Contractor shall repair the cable splices and/or replace the cable until this minimum resistance is reached. The pump shall be checked for correct rotation and shall be connected to the 3-phase power source in the configuration which results in the least unbalance in current. After final connections are made the Contractor shall furnish the Owner or Owner's Representative with copies of the voltage and current measurements and shall demonstrate that the pump is operating properly. Proper operation shall include conducting a performance test in the presence of the Owner or Owner's Representative to satisfactorily demonstrate that the pumping equipment develops the required capacity as

required by these specifications. The Contractor shall exercise every precaution in handling all materials to avoid contamination of the water supply during installation and construction operations.

1.03 INSTALLATION FORM: The Contractor shall be required to complete the attached form, labeled "Pump Information Form", which contains information about the pump being installed. If all applicable information is not obtained, the Contractor will be required to take any steps necessary to obtain such information prior to final payment.

1.04 OPERATION MANUAL: The Contractor shall furnish five copies of the manufacturer's operation and maintenance instructions for the submersible pump and motor.

1.05 WELLHEAD PROTECTION: A concrete pad shall be provided at the land surface around the new pitless unit. Concrete and mortar shall meet the requirements as set forth in TP-02 and reinforcing steel shall meet the requirements as set forth in TP-03. The concrete pad will measure a minimum of 6 feet by 6 feet and be a minimum of 6-inches thick. The pad will be reinforced with grade 40 4-inch welded wire fabric. The concrete pad will be centered around the well casing and slope away from the well casing to allow for surface drainage. Concrete shall have a 28-day compressive strength of 3,000 psi. A no.3 rebar stirrup shall be placed around each penetration in the concrete pad.

1.06 MEASUREMENT & PAYMENT:

Drop Pipe: Drop pipe shall be measured in linear feet along the centerline of the pipe, including fittings, for each of the various sizes of drop pipe installed. Payment for drop pipe shall be at the contract unit price shown in the Bid Schedule. This price shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete drop pipe installation including connection to pitless unit.

Sounding Tube: Sounding tube shall be measured in linear feet along the centerline of the pipe, including fittings, for each of the various sizes of sounding tube installed. Payment for sounding tube shall be at the contract unit price shown in the Bid Schedule. This price shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete installation including sounding tube perforation, connection to drop pipe, and connection to pitless unit.

Pitless Unit: Pitless unit shall be measured on a lump sum basis. Payment for the pitless unit shall be at the unit price shown on the bid schedule, which shall be full compensation for furnishing and installing the pitless unit including materials, plumbing, construction of concrete seal, installation of cable seals, connection to drop pipe, pump cable, and water main.

Check Valves: Check valves shall be measured each for the various sizes of check valves installed. Payment for check valves shall be at the contract unit price shown on the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for a complete check valve installation.

Submersible Pump & Motor: Payment for submersible pump & motor shall be on a lump sum contingency allowance basis, which shall be full compensation for furnishing and installing submersible pump and motor including pump cable installation, securing pump cable to drop pipe, connecting submersible pump to drop pipe, start up, and testing.

Concrete Pad Construction: Payment for the concrete pad construction shall be on a lump sum basis. Payment shall be at the contract lump sum price shown on the Bid Schedule and shall be full compensation for furnishing all labor, equipment, materials,

and incidentals required for a complete installation including concrete, rebar, and welded wire fabric.

1.07 SUBMITTALS:

Submittals are required for the following items:

A. Drop Pipe
B. Sounding Tube
C. Pitless Unit
D. Check Valves
E. Pump Cable and Calculations
F. Submersible Pump and Motor
G. Concrete
H. Rebar and Welded Wire Fabric

# PUMP INFORMATION FORM

Reservation:_____ Community:_____

Contract #:_____ Contractor:_____

## WELL INSTALLATION

Well Name:_____

Type: Submersible:_____ Vertical Turbines:_____

Date of Installation:_____

Pump Manufacturer:_____ Model:_____

Serial No._____ Number of Stages:_____

Motor Manufacturer:_____ Serial No.:_____

HP:_____ Dia.:_____ Volts:_____ Phase:_____ RPM:_____

Amperage: Red:_____Amp, Black:_____Amp, Yellow:_____Amp.

Voltage: Red to Black:____V, Red to Yellow:_____V, Yellow to Black:_____V,

Resistance at well head:

Red to Black:_____Ohm, Red to Yellow:_____Ohm, Yellow to Black:_____Ohm.

Setting Depth:_____ft. Drop Pipe Size:_____in.

Electrode Setting: Top:_____ft. Bottom:_____ft.

## STP 2-0 PUMPHOUSE CONSTRUCTION

2.01 SCOPE: A two-room pumphouse shall be constructed in accordance with the Construction Drawings and specifications. Concrete and mortar shall meet the requirements as set forth in TP-02. The work shall include all labor and equipment necessary to perform the excavation, backfilling, grading, construction of footings, slab, and structure, plumbing tree installation, completion of functioning electrical and supervisory control and data acquisition (SCADA) system, waste drain line for the treatment building, rod iron ornamental security fence and gate, final cleanup, and start-up operations including painting and pipe connection (outside the building).

2.02 SITE GRADING: Site grading, composition, and compaction for the two-room precast pumphouse shall be that as outlined on the Construction Drawings (C-100) and in accordance with the recommendations of the geotechnical report and TP-01. The area of the pumphouse shall be backfilled to the foundation and brought to natural grades with slopes note to exceed five percent, except as may be noted on the plans. A five percent slope away from the building shall be provided on all sides of the building. Compaction testing shall be performed per recommendations of the geotechnical report.

Gravel cover shall be placed following construction per TP-6004.

2.03 STRUCTURE: The two-room precast pumphouse structure shall be built according to the Construction Drawings and Standard Details (W-29). The floor shall be poured with holes for piping as shown on the drawings to avoid drilling the finished concrete floor. All subsurface electrical conduits, piping, and drains shall be installed before concrete is placed.

The floor shall be finished to a smooth and even grade sloping toward the floor drain as shown on the drawings. Reinforcing bars and mesh shall be positioned as noted on the drawings and shall meet the requirements set forth in TP-03.

All blocks shall be laid in a full bed of mortar, applied to the shell only. Each unit shall be placed and shoved against the block previously laid to produce a well-compacted vertical mortar joint for the full shell thickness. Blocks shall be set with all cells in a vertical position. Cores of corner blocks and blocks abutting the door frame are to be filled with concrete. The top course of blocks of the walls shall be constructed of bond beam blocks with No. 4 rebar reinforcement and concrete fill as shown on the plans.

Horizontal mortar joint reinforcing shall be installed in each second horizontal joint, well bedded in mortar. All block cavities shall be filled with masonry fill insulation as each block course is laid, unless specified otherwise.

Doors shall be hung plumb and true. Windows, brackets, and pipes shall be placed plumb and true at a location shown on the drawings. All exposed lumber in the pumphouse shall be painted with one coat of primer and one finish coat of paint. All concrete blocks shall be painted with one coat of block filler paint and then the finish coat of paint.

2.04 PIPING: Pumphouse plumbing includes piping associated with the gas chlorination system, and shall be constructed according to the Construction Drawings and Standard Details (W-14, W-19, W-23). Spaces shall be left in the wall to accommodate piping as indicated on the drawings.

2.05 TRANSMISSION LINE: Pumphouse plumbing transitions from ductile iron to C900 PVC. The transmission line to be constructed per Technical Provision Section 04- Water Transmission and Distribution Mains.

2.06 TESTING & DISINFECTION: Hydrostatic testing and disinfection shall be performed in accordance with TP-04.

2.06 ELECTRICAL: The pumphouse electrical system shall be constructed according to the Construction Drawings and Standard Details.

2.07 SECURITY FENCE: The ornamental rod iron security fence and gate shall be constructed per the Construction Drawings and manufacturer's recommendations. The fence shall be 8' tall and include 12' wide double swing gate and 4' wide pedestrian walk thru gate. The manufacturer shall be American Eagle Brand 410- Granada rod iron ornamental fence or approved equal.

The fence shall be curved picket power coated black with 3" square posts 8' on center in 10"x36" cement footings with ¾" pickets installed 4.5" on center and 2x1.5" rails. The gates shall use 6" square posts installed in 48"x12" cement footings with 2" square framework, 11-gauge steel frame, and ¾" pickets 4.5" on center power coated black to match the fence.

2.08 MEASUREMENT AND PAYMENT:

Pumphouse Site Grading: Payment for pumphouse site grading shall be on a lump sum basis for furnishing all labor, equipment, materials, and incidentals for grading the site according to the Construction Drawings and specifications. Such payment shall include, but not be limited to, furnishing materials, soil preparation, excavation and backfill, labor, equipment, miscellaneous material, soil disposal, and cleanup.

Pumphouse Foundation & Structure: Pumphouse foundation and structure shall be measured on a lump sum basis. Payment for pumphouse foundation and structure shall be at the contract bid price shown on the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, materials, and incidentals, required for a complete installation including excavation, compaction testing, concrete, concrete testing, reinforcing steel, construction of footings, slab, and structure, backfilling, and final cleanup.

Pumphouse Piping: Pumphouse piping shall be measured on a lump sum basis. Payment for the pumphouse piping shall be at the contract bid price shown in the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, materials, and incidentals, required for a complete installation, including excavation, compaction testing, piping, connection to water mains, hydrostatic testing, bacteriological testing, drain line, infiltrator, filter fabric, and gravel installation, gate valves (interior), fittings, required pipe coatings, locator tape, tracer wire, pressure gauges, air release valve, hose bibs, gas chlorination system (including chlorine scale, chlorinator, booster pump, tubing, injector, automatic transfer switch, gas detector, etc.), backfilling, final cleanup, and all necessary appurtenances for a complete and operational installation.

Pumphouse Transmission Line: Transmission line piping shall be measured on a lump sum basis. Payment for the transmission line shall be at the contract bid price shown in the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, materials, and incidentals, required for a complete installation, including excavation, compaction testing, piping, connection to water mains, valves, hydrostatic testing, bacteriological testing, locator tape, tracer wire, backfilling, final cleanup, and all necessary appurtenances for a complete and operational installation.

Pumphouse Electrical: Payment for pumphouse electrical shall be measured on a lump sum basis. Payment for pumphouse electrical shall be at the contract bid price shown in

the Bid Schedule, which shall be full compensation for a complete pumphouse electrical system including labor, equipment, delivery, testing, control panel, junction box, wiring, conduit, buried electrical cable, electrical service connection, enclosures, outlets, 25-foot power pole, wiring and conduit from control panel to pitless unit, connection to pump cable, and all necessary appurtenances for a complete and operational installation.

Security Fence: Payment for the security fence shall be measured on a lump sum contingency allowance basis. Payment for the security fence shall be at the contract bid price shown in the Bid Schedule, which shall be full compensation for furnishing all labor, equipment, materials, and incidentals required for the complete installation of a fully functional rod iron fence, secure entry, and gate including posts, rails, gates, signage, accessories, and clean up.

2.09 SUBMITTALS:

Submittals are required for the following items:

A. Compaction testing
B. Concrete
C. Rebar
D. Piping and fittings
E. Gate valves
F. Air vacuum/relief valve
G. Check valves
H. Magnetic flow meter
I. Chemical pump & injector
J. Hose bibbs
K. Pressure gauges
L. Aggregate base course
M. Structural steel
N. Exhaust fan
O. Wall heaters
P. Louvered vent
Q. Rigid insulation
R. Control panel
S. Junction box
T. Transformer
U. Load center
V. Cable/wiring
W. Conduit
X. Enclosures

Y. Receptables

Z. Meter socket & metering box

AA. Lighting

BB. Lightning arrestor

CC. Security Fence

DD. Motorized Security Slide Gate Operator

## STP-3.0 PUMPHOUSE SCADA ELECTRICAL CONTROLS

3.01 SCOPE: The work covered under this section consists of furnishing, installing, testing, and commissioning all equipment, labor, materials, and incidentals necessary for integrating the new Chilchinbeto Pumphouse and Chilchinbeto Well into the existing SCADA system. This system shall be able to remotely monitor and control the new pumphouse and well. Final design of the SCADA panels and components shall be the responsibility of the selected Contractor.

Contractor's scope of work and performance requirements include:

A. Programming the computer using the SCADA software to allow monitoring and control of the new Chilchinbeto Well # 4 Pumphouse and Chilchinbeto Well # 4.

B. Remote Terminal Unit (RTU's) at the specified pumphouse location. RTU shall be provided with disconnect, well pump motor protector, and motor starter with NEC compliant overload protection for well locations only.

C. All RTUs shall be provided with an Allen Bradley PLC (or engineer approved equal), surge protection, DC power supplies, overcurrent protection, radio, cables, and connectors. Work includes connection of the RTU's to the field instrumentation and to the pump motors at the well locations.

D. Antennas and antenna masts, designed for specified wind loading, and grounded in accordance with NEC requirements.

E. Specified instrumentation.

F. Supply of required power to the RTU's at each site with local disconnect.

G. PLC programming for all the RTU locations to allow the remote monitoring and control of RTU site equipment and instrumentation.

H. Validation of radio paths. Engineer has evaluated the radio links using commercially available software and has a high level of confidence that the paths shown are viable. Contractor shall confirm path viability by conducting a detailed on-site radio path survey utilizing labor and equipment at the site. Submit this detailed report to Engineer for evaluation.

I. Remote sites include one well and pumphouse site.

J. Submit fully detailed wiring, fabrication, and Bill of Material drawings for the remote RTU panels.

K. Bound and indexed Operations and Maintenance (O&M) manuals complete with all equipment manuals, shop drawings, certified equipment drawings, and "Record" project drawings.

L. Furnish and install one (1) new RTU/PLC Control Panels that include motor starter and motor protector.

M. Furnish and install one (1) new interposing control relay for remote reset of pump alarm failures. Provide PLC programming and SCADA screen additions to allow control reset from SCADA.

3.02 GENERAL: The SCADA system shall be constructed in the location specified and satisfy the requirements of the contract documents.

3.03 CONTROL SYSTEM NARRATIVE:

A. Master Telemetry Panel

Pump running setup shall be user configurable using the SCADA HMI. Operators will also be able to select tank level set-points to determine pump starting and stopping conditions.

B. Remote Terminal Units (RTUs)

All RTUs shall consist of power supply, PLC, ethernet radio, power conditioning, and associated appurtenances to make a complete and working UL508A compliant RTU control panel. Well site RTU control panels shall include motor starters, motor protectors and will be integrated with Well Control Panel.

At a minimum, each RTU will convey the following information to the Master Telemetry Panel:

A. AC power failure

B. DC battery failure

C. Pump(s) running condition

D. Tank level

E. Well level

F. Overloads tripped

G. Motor saver tripped

H. HOA (Hand-Off-Auto) selector switch position (all three positions)

I. Chemical alarm condition

J. Flow(s)

K. Flow Total(s)

L. CFNR (Call For Not Run) alarm

C. Radio

Ethernet Radios and PLCs installed in the Tank Site RTUs shall send tank level signals to the Chilchinbeto Well control panels and shall be used to control the pumps on/off operation.

D. Alarm Beacon

The well site shall include a common alarm output utilizing alarms chosen by the operator to actuate an externally mounted alarm beacon. The beacon shall

be located at the instruction of the Project Engineer and shall be positioned so that the operator can see it from a distance if an alarm condition occurs. The alarm beacon shall have its circuit breaker so that the Operator can shut off the alarm. The user should be able to acknowledge the alarm beacon using HMI. Acknowledgment will de-energize the beacon until a new alarm condition exists.

3.04 MATERIALS & OPERATION:

A. RTU Page

Each RTU location shall have its own screen which will have graphical information about each site.

The following information shall be shown at a minimum:

- Tank level of related storage tank(s)
- Pump running status of the submersible pump
- HOA status (Hand Off or Auto) (all three positions)
- Instantaneous Flow
- Flow Total
- Run-time total
- Radio link status
- AC power status
- Battery backup battery status
- Motor saver status
- Overload or pump fail status
- Chemical Alarm (If available)

Each RTU page will also have a trending chart showing tank level, pump running condition, common alarm condition for the site, HOA status, and flow and valve status (where applicable).

B. Trending Page

Trending will access historical data. Historical data will be logged at least once every minute for each historical tag. The historical buffer shall write to the hard drive at least once every 10 minutes. Historical tags shall be:

- Tank levels
- Pump running conditions
- HOA status
- Instantaneous flow
- Flow totals
- Run times (used in reporting not trending)
- Valve status for each control valve in the project

- Common alarm for each site

Format of trending page:

The format shall allow easy navigation of the trending. The following shall be available to the user:

- Date pick function for right side of period
- Time pick function for right side of trend period
- Time period buttons: 1 week, 24 hours, 8 hours, 4 hours, 1 hour

Pens selected will automatically show scale on vertical axis for each pen selected.

C. Alarming Page

The alarming page will show alarming for all areas and allow the user to see many alarms at once in one location.

Alarms should be acknowledged by right clicking on alarms or by using a button with a VB script which will allow the user to easily acknowledge all alarms at once. The alarm screen will have a reset button to allow a global reset of alarm conditions within the Master Telemetry processor.

In addition, the alarm page will allow the user to view a history of all alarms and events selected by date. Events shall be alarm acknowledgements, setpoint changes, and resets. No other events shall be recorded.

Alarms should generate cellular phone call to the operator.

D. Reports

A system report shall be configured to show statistical information about the entire water system. The report shall show at a minimum for each site:

- Tank levels (Minimum, Maximum and Average)
- Flows (Minimum, Maximum and Average)
- Flow totals
- Run times

Reports will also be printed on the printer provided as part of this project.

E. Supervisory Control

The existing SCADA computer shall allow the user to enter set-points for start/stop tank levels for the submersible pump. This can be done at the tank page screen. In addition, the user can enter the alarming levels for the system on the tank page. Enabling and disabling the pump can also be done here.

## 3.05 OPERATION AND MAINTENANCE MANUALS

Submit one (1) set of preliminary O&M Manuals for review by the OWNER'S REPRESENTATIVE at least 28 days prior to final inspection and/or start up of any equipment system furnished under this Contract. O&M Manual shall be bound in 8-1/2 x 11 inch three D-size ring capacity expansion binders with hard durable plastic covers. All sheets shall have reinforced binding. All documents to be originals, unless otherwise noted.

A. Prepare binder covers with printed title “OPERATION AND MAINTENANCE

B. INSTRUCTIONS”, title of project, date, OWNER, contract number and subject matter of binder when multiple binders are required. Printing shall be on face and spine.

C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly typed under reinforced laminated plastic tabs.

D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, type on 30-pound white paper.

E. Part I: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.

F. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:

   a. Significant design criteria.

   b. List of equipment including model and serial number.

   c. Parts list for each component

   d. Operation instructions.

   e. Scheduled maintenance instructions for equipment and systems including lubrication instructions.

   f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.

   g. At the front of this Part, indicate a convenient operation summary including preventative maintenance and a trouble shooting guide.

G. Part 3: Project documents and certificates, including the following:

   a. Shop drawing and product data to reflect as-built condition. Edit the documents to show only the information applicable to the Project.

   b. Certificates.

   c. Photocopies of warranties and bonds.

H. The OWNER’S REPRESENTATIVE will return one (1) copy of the preliminary O&M Manual with review comments from the OWNER’S REPRESENTATIVE. Revise content of the O&M Manuals as required prior to final submittal.

I. Submit one (1) copy of the final O&M Manual that reflects all corrections pursuant to OWNER’S REPRESENTATIVE’s review comments within twenty-one (21) calendar days after receipt of OWNER’S REPRESENTATIVE’s review comments on the preliminary O&M Manuals.

3.06 AS-BUILT DRAWINGS:

The Contractor shall be responsible for keeping accurate records of all installed items under this section of the specifications and indicating revisions of construction drawings in sufficient detail to be accepted by the Owner or Owner’s representative for as-built

drawings. Further information on as-builts is contained in the Special Provisions section of these specifications.

The recording of the as-built information is considered an integral part of the progress of this construction and shall be reviewed with the Owner or Owner's representative in determining progress under this contract.

Documentation for the instrumentation and controls shall be kept accurate and up-to-date through the duration of the project. Accurate documentation shall include:

A. MTP and RTU layout and wiring schematic drawings. Drawings shall reflect finished condition of panels and device wiring in project final state. One set of drawings shall be left in each panel. One shall be given to owner and pdfs of all drawings shall be given to the owner and engineer at completion of the project. Pdfs shall be provided on labeled cd.

B. All PLC program applications shall be the property of the owner and shall be provided at the end of the project. Last state PLC application files shall be provided to the owner on cd and shall also be installed on SCADA computer.

C. Radio configuration details shall be provided to the owner, the engineer and shall be installed on SCADA computer.

D. PLC programming documentation. Each routine, word, bit, counter, timer, or other programming element shall be clearly documented. The programmer shall provide detailed information created on rung comments describing the method and process used to create the ladder logic for the project.

E. Tag List: A detailed list of data points shall be provided to the engineer for both the initial project submittals as well as final submittals representing the last state of the data at the close of the project. Tags data shall be provided in an Excel worksheet and shall include about each data point:

    a. Name of Tag (utilize existing convention for tag naming)

    b. Physical address if applicable at the site RTU

    c. PLC address for slave RTU

    d. PLC address for any masters or Sub-Masters

    e. SCADA software address

    f. Data type

    g. Description (clear so that an operator will readily know what it is)

    h. Node

    i. Site Location

    j. Test Documentation: Each data point shall be tested, and testing documentation shall include a written record of the test at each location. Testing for each point on the tag list shall include:

    k. Physical I/O

    l. Slave PLC

    m. Master and Sub-Masters

    n. SCADA database

o. SCADA graphing and
p. SCADA trending (where applicable)
q. Alarming at SCADA
r. Alarm annunciation
s. Reporting
t. Local HMI graphics
u. Local HMI alarms
v. Local HMI trending

3.07 MEASUREMENTS AND PAYMENT:

SCADA Electrical Controls: Payment for the Electrical Controls shall be measured on a lump sum basis and shall represent full reimbursement for all costs associated with this Technical Provision including but not limited to: furnishing all labor, equipment, materials, incidentals, and all required appurtenances for a complete installation, including electrical design, conduit, wiring, wiring diagrams and manuals, control panel, enclosures, radios, batteries, antenna, mounting accessories, junction box and support structure, programming, commissioning of devices, SCADA integration, as-builts, start up, training, O&M manuals, final clean up, and all necessary appurtenances required for a complete and operational system in accordance with these specifications

3.08 SUBMITTALS:

Submittals are required for the following items:

A. One-line drawings for each remote location showing cable and raceway sizes, overcurrent protection, and estimated available short circuit current.
B. Detailed wiring and BOM drawings for the MTP and each RTU panel
C. Network switches and media converters
D. Antennas
E. Alarm Beacons

## STP-4.0 ACCESS ROAD CONSTRUCTION

4.01 SCOPE: A 12’ wide gravel access road to the new pumphouse site shall be constructed as shown on the construction drawings according to the Typical Gravel Road Section detail. Geosynthetic Material and Aggregate base course shall be in conformance with the project’s geotechnical engineering report and Section 701, 702, and 796 of the Maricopa Association of Governments 2022 Revision of the 2020 Edition of Standard Specifications for Public Works Construction. The gravel access road shall not go through washes or arroyos. The road should start/stop at the edge of each wash or arroyo crossing.

4.02 MEASUREMENT AND PAYMENT: Measurement and payment for the 12’ wide gravel access road shall be on a lump sum basis. Payment for the gravel access road shall be at the unit price shown on the Bid Schedule which shall be full compensation for a complete

construction of a new gravel access road to the tank site including clearing and grubbing, excavation, subgrade preparation, compaction, geotextile fabric, and aggregate base.

4.03 SUBMITTALS:

Submittals are required for the following items:

A. Aggregate base course

B. Geosynthetic material supplier per recommendation of geotechnical report

C. Compaction testing

## STP-5.0 GAS CHLORINATION SYSTEM

TP-501 SCOPE:

A gas chlorination system shall be constructed as shown on the construction drawings according to the modified Detail W-15. The booster pump and chlorinator should be programmed to turn on and off with the well pump. The exhaust fan should automatically turn on when the door is opened to the chlorine room. The gas controller should automatically close the emergency valve closure system and send an alarm to the SCADA system when a gas leak is detected. The chlorinator should adjust feed rate based on flow input from the flow meter.

TP-502 SYSTEM COMPONENTS:

A. CHLORINE GAS DETECTION SYSTEM

1. SUMMARY

a. The gas detection system shall monitor the pumphouse chlorine room for the presence of chlorine gas in the ambient atmosphere.

b. The gas detector shall be ranged for 0-10 PPM Chlorine.

c. The gas detector shall have two independent alarm set points (for each point) adjustable from 5% to 100% of range, with separate alarm LED's and an integral audible horn.

i. There should also be a 4-digit sunlight readable LED to display gas concentration in PPM as well as a 4-20 mA output signal proportional to gas concentration.

ii. The gas sensor shall be capable of being remotely mounted up to 1,000 ft. away from the control electronics.

A. The sensor shall be fitted with an integral gas generator that automatically tests the sensor daily with an electrochemically produced gas sample.

B. An alarm shall be sounded if the sensor fails the self-test.

d. This system shall be ACUTEC 35 Gas Detection System as manufactured by USFilter/Wallace & Tiernan or approved equal.

2. SYSTEM DESCRIPTION

a. The system shall consist of 1 Receiver Module and a separate Power Supply Module DIN rail-mounted for flexibility in a NEMA 4X polystyrene enclosure suitable for wall mounting

b. A clear, hinged polycarbonate window with push-button latches shall be included to provide easy access to the control modules.

c. One Receiver Module is required for each gas sensor to provide separate alarm functions.

d. The Sensor/Transmitter shall also be in a NEMA 4X enclosure remotely mounted in an area where gas leakage could occur.

3. POWER SUPPLY MODULE

a. A Power Supply Module should be provided to accept any AC input between 85 and 255 volts, 50/60 HZ and automatically convert this into a 13.7 VDC output for powering 1 Receiver Module.

b. Loss of input power shall be indicated by a built-in power failure relay.

c. A Battery back-up system shall be provided:

i. Consisting of a sealed lead-acid battery mounted in a separate enclosure.

ii. To maintain all gas detection system functions for a minimum of 12 hours in the event of a power failure.

iii. The Power Supply Module shall continuously and automatically recharge the Battery.

4. RECEIVER MODULE

a. Each gas specific Receiver Module shall contain 4 separate LED indicators for operational and alarm status:

i. Warning

ii. Alarm

iii. Sensor Failure

iv. Power

b. There shall be three separate alarm relays that can be assigned to the 2 alarm set points and configurable for:

i. normal/fail-safe

ii. latching/non-latching

iii. fast/slow operation

c. Relay contacts shall be rated 10A at 120 VAC, 5A at 250 VAC resistive, SPT

d. A fourth relay shall be provided to indicate a sensor failure in the event the transmitter cable is disconnected (or the sensor fails the automatic integral autotest).

e. A 4 digit sunlight readable LED to display gas concentration in PPM shall be provided in addition to a 4-20 mA output signal proportional to

gas concentration.

f. The operating range of the Sensor shall be field adjustable through DIP switches in the receiver module.

g. An acknowledge/reset button shall provide for:

i. silencing the audible alarm

ii. resetting the alarm circuit

iii. LED indicator testing (on-demand activation of the sensor autotest)

iv. alarm relay inhibition for servicing

5. SENSOR/TRANSMITTER

a. The Sensor/Transmitter shall be housed in a NEMA 4X enclosure suitable for wall mounting.

i. It shall be an electrochemical type

ii. specific for the gas being monitored

iii. be provided with an operating life of 2 years

b. The Sensor shall not require the addition of chemicals.

c. The Transmitter shall be powered from the Receiver through a 2-conductor cable up to 1,000 ft. long.

d. This same cable shall transmit a current pulse position signal, for improved noise immunity, representative of gas concentration back to the Receiver.

e. The Sensor shall be fitted with an integral electrochemical gas generator that automatically produces a specific gas sample to test the Sensor response daily.

6. INSTALLATION

The equipment shall be installed per the contract documents and manufacturer's recommendations.

7. WARRANTY

Seller shall furnish its standard warranty against defects in material and workmanship for all Equipment provided by Seller under this Section. The Seller shall warrant the Equipment, or any components thereof, through the earlier of: (i) eighteen (18) months from delivery of the Equipment or (ii) twelve (12) months from initial operation of the Equipment.

B. CHLORINE SCALE

1. A quantity of 2 chlorine scales shall be provided and shall be of the digital readout/electronic load cell type. Scale platform shall be constructed of corrosion-proof PVC plastic and sized to accept standard 150 lb type chlorine/SO2 cylinders. Platform height shall be less than 2 inches to allow easy handling and unloading of cylinders. Platform shall be resistant to moisture, chemicals, abrasion, impact and UV light.

2. Scale shall be of the single load cell design. Weight shall be transferred via a pivoted platform to a shear beam load cell of the electronic strain gauge type. Flexible cable shall connect load cell to indicator to allow easy remote installation of the readout. Cable length shall be 10 feet. Cylinder chaining bracket shall be wall mounted and use a double coil chain and a spring-loaded snap hook to secure cylinder. Chaining bracket shall have an integral tool rack for storing cylinder change out tools.
3. Indicator shall monitor two scale platforms. The remote mounted LCD indicator shall carry CE marking and shall be housed in a NEMA 4X, UL approved enclosure. All operations shall be performed via a keypad with menu driven display prompts. No setting adjustment shall require entry into the enclosure to insure the NEMA 4X seal is always maintained. The alphanumeric LCD readout shall have backlighting for readability in low light conditions. Power requirement shall be 110/220 VAC.
4. A 6-digit numerical display shall give operator the ability to monitor chemical by weight (lb) or volume (gallons). A bar graph display shall read 0-100% for the net contents. A dual mode TARE key shall allow user to enter the tare weight of the vessel or enter the net weight of the chemical depending on application needs. A diagnostics menu shall allow recalibration without the need to apply field test weights. A user adjustable filter function shall stabilize display in the event of local vibration from pumps or mixers.
5. Indicator shall output net weight via a 4-20mA signal and full scale output shall be user adjustable via the keypad. Indicator shall have four adjustable set points to display low or high level conditions on the indicator.
6. Scale shall carry a Full Five (5) Year Factory Warranty. Full scale accuracy shall be better than 1%. Scale shall be Electronic CHLOR-SCALE 150® and SOLO® G2 digital display, Model GR150-2 or approved equal.

C. CHLORINE GAS FEEDER

1. The gas feeder shall be an Evoqua / Wallace & Tiernan S10K Sonic Chlorinator or approved equal.
2. It shall be a vacuum operated sonically regulated type system consisting of:
    a. A vacuum regulator
    b. Rotameter with rate valve
    c. Injector
3. It shall have a maximum capacity of 200 pounds per day chlorine and properly sized to feed the system based on the well flowrate.
4. It shall be automatically controlled having a feed range of 10:1 automatic and the capability to control within ±4% of the indicated feed rate.

D. VACUUM REGULATOR

1. DESIGN

a. The cylinder-mounted vacuum regulator shall be rated for 200 PPD of chlorine and properly sized to feed the system based on the well flowrate.

b. It shall consist of a vacuum regulator designed to reduce full supply pressure to a vacuum without venting.

A self-aligning yoke designed to Chlorine Institute recommendation per drawing 189 shall be provided as an integral part of the vacuum regulator.

The unit shall include a selector knob and icons to indicate the chlorine gas container status.

An off position shall be provided to isolate the diaphragm and internal components from atmospheric air when the operator changes containers.

It shall contain internal pressure relief.

The 500PPD unit shall include a secondary check to prevent gas pressure from venting into the atmosphere.

The check valve shall close in the event of leakage past the primary valve.

2. AUTOMATIC SWITCHOVER

An automatic switchover system shall be furnished to change over to new supply as the on-line supply is depleted.

A pair of vacuum regulating valves with built-in switchover capability shall be furnished

The regulator valve shall include a mechanical detent to keep the standby gas supply ready for on-line service.

When the switchover is accomplished gas shall continue to be drawn from the former source until the container(s) are empty.

A separate switchover device will not be acceptable.

Each regulator shall include easy to read indication of the following positions:

a. Stand-by

b. Operating

c. Empty

d. Off

3. CONTROL UNIT

One 3 inch rotameter assembly with a V-notch rate valve shall be furnished and shall be capable of local or remote mounting.

There shall be provisions for interlocking rotameter frames for multiple feed points.

The rotameter tube shall be serviceable without removing the frame from its mounting.

4. INJECTOR

Each gas feeder shall have a PVC (3/4) (1) inch fixed throat injector rated 200PPD to generate the operating vacuum for the system.

The injector shall be properly sized and capable of feeding against system pressures.

It shall include built-in double check valve protection to prevent water from back flooding into the vacuum regulator.

The injector shall include an integral mounting bracket.

It shall be capable of mounting in either the vertical or horizontal plane.

5. AUTOMATIC CONTROLS

Each gas feeder shall be provided with an integral automatic control system consisting of:

a. A dedicated electronic controller

b. A V-notch positioner

i) Shall move the V-notch plug

ii) Shall contain a reversible motor with:

- thermal overload protection
- mechanical override
- feedback potentiometer
- selectable contacts
- front accessibility for service

c. A 5” rotameter

d. A V-notch chamber

The positioner, V-notch Chamber and 5” rotameter shall be mounted remote from the gas storage area.

The positioner and controller shall be housed in NEMA 4X enclosures

E. SFC-SC FLOW PROPORTIONAL CONTROLLER

The Flow Proportional Controller shall be microprocessor-based with NEMA 4X enclosure.

It shall accept a 4-20 mA process variable input signal.

The user interface shall include a membrane touch keypad and backlit LCD display.

The display shall be scrollable to five operating menus as follows:

1. Main Menu shall display values
2. Setup Menu
3. Input and Output options
4. Diagnostics Menu for troubleshooting

5. Calibration Menu

Dosage can be set from 10 to 400% of output.

An isolated 4-20 mA output signal shall be provided for the following positions:

1. Control
2. Flow
3. Actuator

The controller shall be a SFC-SC (Signal Conditioning Unit) as manufactured by Evoqua / Wallace & Tiernan or approved equal.

SFC-PC COMPOUND LOOP CONTROLLER

The Compound Loop Controller shall be microprocessor based and capable of accepting 3 input signals:

1. Flow
2. Residual
3. One spare

It shall have the following:

1. A membrane touch keypad
2. Digital LED display of residual
3. LED bar graph display of percent valve position
4. 16 character alphanumeric LED display of all operating and setup parameters

The user shall be able to select from six modes of operation:

1. Direct residual control
2. Compound loop control
3. Dual signal feed forward control for dechlorination
4. Center zero control for dechlorination
5. Flow proportional control
6. Manual control

Four configurable alarm relays shall be provided to select from 16 different alarm conditions

The controller shall have a password protection to prevent tampering.

The unit shall be capable of computer interface via RS485 serial communication.

An isolated 4-20 mA output signal shall be provided for control, flow or actuator position.

The controller shall be a SFC-PC (Process Control Unit) as manufactured by Evoqua / Wallace & Tiernan or approved equal.

F. ACCESSORIES

A vacuum switch shall be supplied to actuate on loss of gas pressure.

It shall be designed for mounting integral to the vacuum regulator and shall be supplied with one NO/NC contact rated at 10 amps.

G. INSTALLATION

The equipment shall be installed per the contract documents and manufacturer's recommendations.

H. WARRANTY

Seller shall furnish its standard warranty against defects in material and workmanship for all Equipment provided by Seller under this Section. The Seller shall warrant the Equipment, or any components thereof, through the earlier of: (i) eighteen (18) months from delivery of the Equipment or (ii) twelve (12) months from initial operation of the Equipment.

I. Booster pump

Booster pump shall be Franklin Electric BT4 Series Horizontal Multi-Stage Booster Pump or approved equal.

*EMERGENCY CYLINDER VALVE CLOSURE AND CONTROL PANEL*

Contractor shall furnish all labor, materials, equipment and appurtenances required to provide a fully functional electrically driven emergency cylinder valve closure system(s). Valve closure system shall be E-Pro Electric Valve Closure System or approved equal. Valve closure system shall include the following components (or approved equal):

E-Pro™ Electric Actuator w/ mounting bracket 2 2

Valve Adapter, Chlorine 2 2

Double Motor Control Panel 1 1

Valve Wrench 1 1

1500VA UPS Power Supply Liebert GXT4-1500RT120 1 1

E-Stop ASSY W/Legend Plate 1 1

Storage Bracket, Wall Mounted

The emergency cylinder valve closure system(s) is to be specifically designed to close 1-ton containers AND 150 Lbs. cylinders. This shall be accomplished by using an electrically operated motor directly coupled to the cylinder or container valve. The electrically operated actuator shall utilize common 120 VAC as a power source for the actuator control system. The system shall use an assembly that is clamped

directly to the cylinder or container valve and shall not require any external supports. The system shall also avoid contact with the yoke and yoke adapter system. The system shall be designed to allow an operator to open the valve without removing the actuator by depressing an open button on the actuator. The system shall be designed to simultaneously close up to 2-cylinder valves when activated using the standard control package. Systems that cannot close multiple valves simultaneously shall not be acceptable.

1. Closure System Construction

a. The emergency cylinder valve closure system(s) shall consist of the following components: 1. Electrically operated actuator capable of producing no more than 40-ft. lb. of stall torque. Motor power supply is obtained from 120VAC circuit. The control system converts to the required DC voltage.

2. Two-piece bracket system: One piece permanently attaches to the electric actuator. Second half is field attached to cylinder valve prior to installation of vacuum regulator or a yoke adapter. The Electric actuator bracket shall be installed into lower bracket and secured using a pin. Bracket assembly shall use a hitch pin to allow quick disassembly and shall not rely for support on packing nut or yoke assembly for support, or any other external support. The fully assembled actuator and bracket shall weigh less than 9 pounds.

3. No part of the bracket mounting system shall attach to the yoke. Equipment attaching to the cylinder yoke shall not be acceptable.

4. A corrosion resistant multi-connector electrical cord of 20 feet in length shall be used to supply power to actuator. The cord shall be pre-wired to the control panel by the manufacturer. The contractor shall be responsible for installing the quick connect plug to each electric actuator.

5. Control panel

a. The control system shall be designed to activate two electric actuators simultaneously. The valve closure system shall be furnished with a local control panel with a fiberglass NEMA 4X enclosure to house the required controls. The control panel shall be mounted in the chlorine room. The control panel shall include the following switches and pilot lights.

i. Emergency Stop

ii. Reset switch

iii. System Ready

iv. System Activated

b. The control panel shall be labeled by Underwriters Laboratory to UL 508A.

c. All control devices shall be mounted on the front of the control panel enclosure. Each control device shall have an engraved or etched nameplate describing its function.

d. The control panel shall have a nameplate identifying it. The nameplate shall be plastic with engraved letters and shall be securely fastened to the control panel.

e. The control panel shall have a terminal strip for connection of power and control circuits in the field. All terminals shall be numbered, and terminal numbers shall be shown on the manufacturers wiring diagram.

f. Electrical connections of supply power, external alarm and control wiring shall be the owner's responsibility.

g. Uninterruptable power supply shall be mounted and wired external of the control panel by the contractor. The UPS shall have a minimum 1500VA output power with no transfer time required. The UPS shall utilize “true” on-line double conversion technology. 8. Uninterruptible power supply shall provide supply power when main power is offline or lost. The system shall be configurable to either activate or not activate the actuators when supply power is lost. This shall be field selectable by removing a jumper. The UPS shall be able to provide up to 2 hours of emergency power.

6. Operating Electrical supply

a. The system owner shall provide 120VAC, 15A power supply for the system. The supply power shall be field wired to the control system as required. Contractor to install in accordance with the N.E.C., State and local code requirements.

b. Execution

c. Examination and Preparation

i. The contractor shall inspect all equipment immediately upon delivery to site. All visible damage shall be reported and repaired.

ii. Damaged equipment shall not be installed until repairs have been made in accordance with manufacturer's written instructions and approved by the Engineer. Damaged items shall be sent to factory for repair or replacement, unless otherwise approved by the Engineer.

d. Equipment Installation

i. Install equipment in complete conformance with manufacturer's written instructions and Engineer approved shop drawings.

ii. Notify the ENGINEER of any discrepancies.

iii. Make all field connections required to place equipment in proper operation in accordance with manufacturer’s instructions and recommendations.

iv. Provide all required appurtenances for a complete installation.

e. Manufacturers Services

i. If required by the specifications, the equipment manufacturer shall provide a qualified factory trained technician for equipment startup and operator training.

ii. The manufacturer may provide one person on site for a maximum of 2 days.

TP-503

MEASUREMENT AND PAYMENT: All costs associated with the completion of the gas chlorination feed system shall be merged with Pumphouse Plumbing and will not be considered a separate item for payment.

TP-504 SUBMITTALS:

Submittals are required for the following items:

A. Chlorine gas detector

B. Chlorine scale
C. Chlorine gas controller unit
D. Booster pump
E. Emergency cylinder valve closure and control panel