

CITY OF UMATILLA

DESIGN GUIDELINES AND STANDARD SPECIFICATIONS AND DETAILS FOR SEWAGE PUMP STATIONS

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CITY OF UMATILLA



GUIDELINES AND STANDARD SPECIFICATIONS AND DETAILS FOR SEWAGE PUMP STATIONS

City of Umatilla
700 Sixth Street
Umatilla, OR 97882
(541) 922-3226

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1.1 SCOPE

This document provides design guidelines and standard specifications and details for sewage pump stations between 20,000 and 0.5 million gallons per day average daily flow that are to be accepted for ownership, operation, and maintenance by the City of Umatilla.

Pump stations serving private developments will not be maintained or owned by the City. At the option of the City, the pump station may be located in public right-of-way and dedicated to the City for ownership, operation, and maintenance.

Any of these requirements may change without notice, and the City may grant variances from individual requirements on a case-by-case basis. Project approval by the City is independent of any other agency approval, and it is the responsibility of the Owner to secure approvals and permits from all other regulatory agencies.

1.2 DESIGN GUIDELINES

1.2.1 Submittals to City for Review and Approval

1.2.1.1 Submittal for Design Review and Approval

Despite the specific information provided herein, the drawings, specifications and details ("Designs") only show minimum requirements, should be considered conceptual in nature, and may require revision and/or modification to conform to project conditions and applicable laws, codes, ordinances, standards and other current requirements and/or best practices. Designs shall be checked, completed and stamped by a Oregon State Professional Engineer and Registered Electrical Engineer.

All deviations from City standards shall be clearly identified in a written transmittal attached to preliminary, design, construction, and record "as-built" drawings or plans.

Four (4) copies of the following shall be submitted to the City for design review and approval:

- Full or half size design drawings showing similar views and details of the pump station site and components as shown on the attached City Standard Drawings for Sewage Pump Stations
- Construction specifications
- Design calculations showing the following:

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- Existing and design influent flow estimates
- System curves superimposed on pump curves
- Pump(s) and wet well sizing including stops/starts per hour
- Storage capacity during projected peak hourly flows from high water alarm elevation to overflow conditions through collection lines at the nearest manhole or dwelling sewer stub
- Design assumptions
- Analysis showing impact of discharge on City's existing collection system
- Factor of safety against buoyancy

1.2.1.2 Submittal for Final Acceptance

Prior to final acceptance of the pump station, the applicant must submit the following:

- Testing: Provide results of testing, inspections, and certification by the Engineer of Record that the system passed the specified tests.
- Record "As-Built" Drawings: Submit final record drawings of the completed facility. Prepare record drawings in AutoCAD format and provide electronic files on CD. Provide one (1) reproducible full-size and reduced (11"x17") hard copy. Also provide one (1) PDF copy. Provide submittal within thirty (30) calendar days of completion of the project and prior to City final acceptance. All wires shall be tagged and all programs shall be submitted to the City on CD. Record drawings shall also be placed in Operation and Maintenance Manuals.
- Easements: Right-of-ways and/or easements for construction, operation and maintenance of the system shall be recorded with the County Assessor's Office and copies placed in the Operation and Maintenance Manuals.
- City Costs: Verify that all user equity fees and City administration, inspection, and other costs have been paid in full.
- O&M Manuals: Submit six (6) paper copies of the Operation and Maintenance Manuals approved by the City per Section 1.3.1.1.2. Also provide one (1) PDF copy.

1.2.2 General Design Guidelines

1.2.2.1 Design Criteria

Pump station design shall be in conformance with the latest versions of the City of Umatilla's Comprehensive Sewer Plan, City of Umatilla's Standard Specifications and Details, and Oregon Department of Environmental Quality (DEQ). The requirements in this standard specification are intended to supplement and supersede the criteria in these documents if they conflict.

1.2.2.2 Configuration

The pump station shall utilize a duplex submersible pump and wet well configuration with a separate valve vault. The pump station shall include the appurtenances and generally conform to the layout and configuration depicted in the attached standard drawings modified as necessary for each individual site requirements.

The station shall be designed with provisions for lifting the submersible pumps out of the wet well without disassembling fittings or the pump station structure and without entering the wet well.

1.2.2.3 Design Flows

Current and design flows including minimum daily, average daily, maximum daily, minimum hourly, peak hourly, and any other important flow conditions for the pump station shall be calculated for sizing the pumps and verifying the operating characteristics of the pump station. A design life of 20 years minimum shall be used unless otherwise approved by the City.

1.2.3 Pumps

1.2.3.1 Number and Size of Pumps

The station design shall include a minimum of two (2) pumps (i.e. duplex) each capable of handling, at a minimum, the design peak hourly flow. If the 20-year projected peak hourly flow exceeds 500 gpm, three (3) pumps (i.e. triplex) shall be provided with the ability to handle, at a minimum, the design peak hourly flow with the largest pump out of service.

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If the flow from the ultimate service area exceeds the needs of the particular area under consideration, the City may require pump station capacities greater than the size required for the 20-year design period. The City may participate in the project to the extent of the incremental cost of materials for oversizing the pump station.

1.2.3.2 Operational Criteria

The pumps and wet well should be sized to limit the number of starts per hour to less than or equal four (4) per pump. In addition, the pumps and wet well should be sized to limit the maximum cycle time to less than 30 minutes to avoid septic conditions.

1.2.3.3 Pump Type

Pumps shall be submersible sewage pumps capable of passing spheres of at least 3 inches in diameter. Pump suction and discharge openings shall be at least 4 inches in diameter. All sewage pumps shall be rated explosion-proof and meet National Electrical Code (NEC) requirements.

1.2.3.4 Pump Manufacturer

Pumps shall be manufactured by ITT Flygt.

1.2.4 Wet Well and Valve Vault

1.2.4.1 Size

The wet well shall be adequately sized to accommodate the pumps and any other required equipment and piping. If additional pumps are planned to be added in the future to serve the ultimate flow projections, the wet well shall be upsized appropriately. The storage capacity in the wet well shall be sized to provide 30 minutes minimum response time during design peak hourly flows between the high water alarm elevation and overflow conditions at the nearest manhole or dwelling sewer stub. The wet well shall be a minimum of 72 inches in diameter.

The valve vault shall be sized to provide adequate space for access to and maintenance of appurtenances.

1.2.4.2 Access Hatches

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The wet well and valve vault access hatches shall be sized to encompass and fully expose the entire interior to the atmosphere when opened.

1.2.4.3 Wet Well Liner

All interior surfaces of the wet well shall be lined with a non-corrodible lining system.

1.2.4.4 Confined Space Entry System

The wet well design shall provide for confined space entry by including a core mount sleeve base with sleeve cap. The components shall be incorporated into the design and installed per the manufacturer's instructions.

1.2.4.5 Miscellaneous Design Details

The valve vault shall drain back into the wet well. A check valve or flapper shall be provided on the drain line.

All P-traps shall be filled with water.

The wetwell and vault shall be designed to be watertight and for AASHTO H-20 traffic loads.

The corners of the wetwell bottom shall be filleted to minimize solids accumulation at the pump intakes at the bottom of the wet well.

Pipe inverts entering and exiting the structures, top slabs, and base elevations shall be shown on design drawings.

All materials shall be corrosion resistant. All nuts, washers, bolts and other steel hardware inside the structures shall be stainless steel.

Only rigid, ductile iron piping (Class 52) shall be used within and between the wetwell and valve vault. Where possible, interior fittings shall be flanged fittings with manufacturer-approved gaskets for sewage applications. Ductile iron piping and fittings shall have an interior and exterior epoxy coating. A dual flexible coupling system shall be provided between the valve vault and the wetwell to accommodate differential settlement between the two structures.

Stainless pipe supports shall be provided for the piping inside the valve vault.

1.2.5 Sun Shelter

A sun shelter shall be provided to shield the electrical, control, and telemetry panels from the prevailing winds and southwestern sun.

1.2.6 Electrical

The electrical system shall include, but shall not be limited to, electrical service, service equipment, power distribution equipment, motor control equipment, as well as control, instrumentation and telemetry equipment. The standard design shall include a manual transfer switch and generator connection device to allow the City's portable generator to be connected to the station.

The electrical system shall be constructed with two enclosures. The Power Panel shall contain a main circuit breaker, transfer switch, power distribution blocks, branch circuit breakers, combination stepdown transformer/panelboard, and motor starters. The Control Panel shall contain the control, instrumentation and telemetry equipment. These enclosures shall be NEMA 3R construction and shall be freestanding enclosures mounted adjacent to each other on a concrete pad.

The electrical installation shall meet NEC and other applicable codes in effect at the station location.

Electrical service shall be from the serving utility at the location of the station. Utility service requirements shall be adhered to.

Specific requirement for the electrical system are found in Section 1.3.5 of these specifications.

1.2.7 Controls

Controls for the lift station shall be provided to cause the pumps to cycle on and off based on wet well level. Motor starters shall be across the line starters or solid state soft starters, depending on motor size and City preference. Controls shall be provided for redundant means of starting and stopping pumps. One means shall be a level controller with programmable start and stop levels for lead and lag pumps. The second means shall be a high level float switch and timers to start both pumps and operate them for a time period after the float switch return to normal.

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Wet well level shall be monitored by a level transducer mounted in the wet well and connected to the level controller.

1.2.8 Telemetry

The Contractor shall provide telemetry equipment to permit the City to monitor the lift station over the existing telemetry system. Telemetry equipment shall be as described in Section 1.3.6.

1.2.9 Standby Power

Standby power will be via the Owner's portable generator set. The Contractor shall include a manual transfer switch and generator connection device (matching the Owner's generator set) to permit operation of the station when utility power fails.

1.2.10 Site Layout

1.2.10.1 Easements

The pump station shall be on dedicated right-of-way or easement with easy all-weather access. Written copies of all easements and right-of-ways shall be provided to the City, shown on all drawings, and recorded with the County Assessor's Office.

1.2.10.2 Access and Drainage

Access and drainage shall be clearly shown on design drawings. The pump station access road shall be paved in conformance to City Street Standards and provide direct truck vehicle access to the wet well and valve vault. Access location(s) shall be approved by City and authorized maintenance operator(s). Unpaved finish grade surfaces inside the pump station site shall be finished with a 4-inch layer of crushed surfacing top course over subgrade all compacted to 95% maximum density. Drainage facilities shall be constructed so that the access road, pump station, and surrounding properties are not subject to flooding from stormwater runoff.

1.2.11 Force Main

1.2.11.1 Size

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Force mains should be not less than 4 inches in diameter. At design peak pumping capacity (with one pump running), a minimum self-scouring velocity of 3.5 feet per second (fps) should be maintained. Alternatively, with City approval, this velocity may be provided by automatically cycling two pumps simultaneously according to a programmable schedule. Design velocity should not exceed 5 fps.

1.2.11.2 Alignment and Grade

Uniform grade and straight alignment between high and low points, fittings, and appurtenances shall be maintained in new force mains. The force main shall be installed at a positive grade so that it can be drained and emptied if necessary. A combination air valve, Apco or approved equivalent, shall be placed at all high points in the force main to release trapped air and relieve air/vacuums during filling/draining.

1.2.11.3 Materials

Force main piping shall be constructed of C-900 and C-905 PVC water pipe, although epoxy-lined ductile iron may be allowed on a case-by-case basis. Fittings shall be epoxy-lined ductile iron. Materials and construction of piping and fittings shall meet City of Umatilla's Standard Specifications. All nuts, washers, bolts and other steel hardware shall be stainless steel.

1.2.12 Other Considerations

These standards generally apply to typical residential pump stations, although the City reserves the right to impose other requirements as necessary. Also, additional requirements may apply to pump stations receiving commercial or industrial sewage.

The following is a list of additional items that may be considered on a case-by-case basis:

- Screening
- Grinding
- Grit handling/removal
- Grease handling/removal
- Flow metering
- Odor control
- Noise control
- Standby emergency power
- Site lighting

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- Site fencing
- Hydrogen sulfide corrosion control

1.3 STANDARD SPECIFICATIONS

1.3.1 Submittals

1.3.1.1 General

This section describes the requirements for construction and operation and maintenance (O&M) submittals and the review procedures.

1.3.1.1.1 Construction Submittals

Submittals not following these procedures or requirements will be returned to the Contractor without being reviewed.

Provide a Submittal Control Document showing the project submittals required by the Special Provisions, Project Plans, and Specifications. Submit this log to the Engineer as a spreadsheet in EXCEL® format within fifteen (15) working days after the effective date of the Notice to Proceed.

Number the submittals as shown in the Submittal Control Document. Specific items submitted under a general item shall be given a dashed number suffix. For example, under a general item "Valves" (Submittal No. 6), product data for gate valves would be submitted with a dashed number suffix such as Submittal No. 6-01. Resubmittals of the same item shall be given the original number with an alphabetic suffix. For example, the first resubmittal of the product data for the gate valve would be designated Submittal No. 6-01a.

Transmit each submittal with a submittal form identifying the Project Name, Contractor, Subcontractor or supplier, corresponding plans sheet or specification section, submittal name, and number.

Provide a Contractor's stamp or cover letter, signed or initialed, certifying that the submittal has been reviewed by the Contractor and is in accordance with the requirements of the Work and Contract Documents. SUBMITTAL WILL BE RETURNED IF NOT CERTIFIED.

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Schedule submittals to expedite the Project and deliver to the City Engineer. Coordinate submission of related items.

The Contractor shall coordinate submittals with the work so that work will not be delayed. The Contractor shall coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another. No extension of time will be allowed because of failure to properly schedule submittals. The Contractor shall not proceed with work related to a submittal until the submittal process is complete.

Provide sufficient information together with technical cuts and technical data to allow an evaluation to be made to determine that the item submitted is in compliance with Contract Documents.

The Contractor shall submit a copy of the technical specification with each subsection clearly marked for conformance or nonconformance with the subsection. Where the proposed equipment deviates from the specification, all necessary information and supporting calculations to evaluate the deviation shall be attached. The City retains its right to reject without justification the proposed deviation in favor of the specification, as written. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work. Identify requests for "or equal" "or equivalent" items. Justify the said deviation or "substitution" in detail in a separate letter immediately following transmittal sheet (written requests through Contractor only):

- If the justification is not given, shop drawing can be rejected and returned without further action.
- If justification is not given, deviation is not approved even if shop drawing is approved.

In making request for "or equal" "or equivalent" item, Contractor represents:

- He has personally investigated proposed item, has determined that it is adequate or superior in all respects to that specified, and that it will perform the function for which it is intended.
- He will provide same guarantee for "or equal" "or equivalent" item as for item specified.
- He will coordinate installation of accepted "or equal" "or equivalent" into work, to include building modifications if necessary, making such changes as may be required for work to be complete in all respects.

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- He waives all claims for additional costs and/or time related to “or equal” “or equivalent” which subsequently arise.

(Note: This section does not address substitutions for major equipment during the bidding period.)

Provide space for Contractor and Engineer review stamps.

Unless noted otherwise, submit the number of copies which the Contractor requires to be returned, plus three (3) copies which will be retained by the Engineer. Special operation and maintenance submittal requirements are discussed below.

The Contractor shall be responsible for submitting complete and accurate information in accordance with the Contract Documents. All submittals requiring a third review by the Engineer shall be considered unresponsive and the Owner will charge the Contractor on a time and materials basis for all subsequent reviews and all related administrative costs.

Distribute copies of reviewed submittals to affected parties. Instruct parties to promptly report any inability to comply with provisions.

1.3.1.1.2 O&M Submittals

O&M Information shall be provided for all major equipment items as required by the Drawings and Specifications and indicated in the Submittal Control Document including but not limited to:

- All piping, fittings and valves.
- Pumps and motors.
- Electrical and control equipment.

IMPORTANT: Prior to startup, submit and bind together all O&M information in one complete manual binder that includes all of the O&M information for the entire booster station including mechanical and electrical. Only submittals provided in this format and as described below will be reviewed for acceptance. The manual binders shall be the heavy-duty, three-ring type. If O&M information does not fit in a single binder, multiple binders labeled “Volume 1”, “Volume 2”, etc. may be submitted. Each binder shall be labeled on the front and on the binder spine as follows: “[*project name*] Sewage Pump Station O&M Information (Volume _)”.

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Provide six (6) paper copies of the specified O&M manuals, which will be retained by the Owner. For ease of identification, each manufacturer's brochure and manual shall be appropriately labeled with the equipment name and equipment number as it appears in the project drawings and specifications. The manuals shall be indexed and reference the discrete equipment number on all manuals, data sheets and drawings. The manuals shall be provided with a table of contents and tab sheets to permit easy location of desired information.

If manufacturers' standard brochures and manuals are used to describe O&M procedures, such brochures and manuals shall be modified to reflect only the model or series of equipment used on this project. Extraneous material shall be crossed out neatly or otherwise annotated or eliminated.

Submit operation and maintenance information printed on 8½ in. x 11 in. size heavy quality paper (20 lb. or heavier). Reduce drawings or diagrams bound in manual to 8½ in. x 11 in. or 11 in. x 17 in. size.

Following the acceptable installation and operation of an equipment item, the item's instructions and procedures shall be modified and supplemented by the Contractor to reflect any field changes or information requiring field data.

Include manufacturer contact data, operating instructions, preventive and corrective maintenance requirements, warranty information, parts lists, and any other applicable information.

Operation and Maintenance Manuals shall contain operation and maintenance instructions, repair data, parts lists, manufacturer's warranty, record drawings, permits, easements, photo graphs, test results, schematics for mechanical, electrical, and civil design components, and other pertinent information.

1.3.1.1.3 Review Procedure

Unless otherwise specified, within thirty (30) days after receipt of the submittal, the Engineer will review the submittal. The returned submittal will indicate one of the following actions:

- If the review indicates that the material, equipment or work method is in general conformance with the contract drawings/specifications, the submittal copies shall be marked "Reviewed". In this event the Contractor may begin to

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incorporate the material/ equipment/work method covered in the submittal, subject to the full requirements of the Contract Documents.

- If the review indicates that the submittal is insufficient or that limited corrections are required, the submittal copies shall be marked "Furnish as Corrected". The Contractor may begin to implement the work methods or incorporate materials/equipment covered in the submittal, in accordance with the corrections/comments noted. Where submittal information is to be incorporated in O&M data, a corrected copy shall be provided; otherwise no further action is required.
- If the review reveals that the submittal is insufficient or contains incorrect data and that the comments require revision and resubmittal, the submittal copies shall be marked "Revise and Resubmit". (In this case, except at its own risk, the Contractor shall not undertake work covered by this submittal until the attached comments have been confirmed by a separate written communication of the submittal that has been revised, resubmitted, and returned to the Contractor).
- If the review indicates that the material, equipment, or work method is not in general conformance with the design concept or in compliance with the contract drawings/specifications, or if the submittal is incomplete, the submittal copies shall be marked "Rejected". Submittals containing deviations from contract drawings/specifications that have not been clearly identified and that have not been noted previously in correspondence also shall be considered rejected, even if the Engineer fails to note the deviation. No deviation will be accepted unless clearly marked on the submittal. (In this case, except at its own risk, the Contractor shall not undertake work covered by this submittal until the attached comments have been confirmed by a separate written communication or the submittal has been revised, resubmitted, and returned to the Contractor).

1.3.1.1.4 Effect of Review of Contractor's Submittals

Review of drawings, methods of work, or information regarding materials or equipment the Contractor proposes to provide, shall not relieve the Contractor of its responsibility for errors therein and shall not be regarded as an assumption of risks or liability by the Engineer on behalf of the City, or by any officer or employee of the City, and the Contractor shall have no claim under the Contract on account of the failure, or partial failure, of the method of work, material, or equipment so reviewed.

1.3.1.2 Materials

Not used.

1.3.1.3 Workmanship

Not used.

1.3.1.4 Payment

All labor, material, and equipment required to provide submittals shall be considered incidental and included in other bid prices.

1.3.2 Pumps and Motors

1.3.2.1 General

This section covers the wastewater submersible pumps and accessories.

1.3.2.1.1 Pump Performance Requirements

The pump shall meet the following performance requirements:

- Design Duty Point: _____ gpm at _____ feet total dynamic head (TDH)
- Design Static Head Lift: _____ feet
- Minimum Shutoff Head: _____ feet
- Minimum Efficiency: _____

The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

The pump and motor unit shall be suitable for continuous operation at full nameplate load while the motor is completely submerged, partially submerged or totally non-submerged.

The drawings and specifications for this project are based on the following pump and motor:

- Wastewater Submersible Pump: ITT FLYGT (w/N-Impeller) Model _____
- Motor: _____ Hp.

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1.3.2.1.2 Submittals

Submit the following under provisions of Section 1.3.1:

- Manufacturer's Certificate: Certify that products meet or exceed specified requirements, and are suitable for the use intended.
- Pump and motor performance data.
- Shop drawings showing pump dimensions, detailed drawings for installation requirements, pump connections and sizes, rail system and connections, and access hatch requirements.
- Pump curves with both one and two pumps operating and superimposed system duty points showing performance requirements are satisfied.
- Operation and maintenance manuals and information.

1.3.2.1.3 Quality Assurance

Install and operate pumps and motors in accordance with the manufacturer's recommendations.

1.3.2.1.4 Warranty

Include coverage of all pumps, motors, bearings, seals, wear plates, and accessories, for a minimum of five (5) years from the date of shipment. Pro-rate the warranty after the first 18 months of operation.

1.3.2.2 Materials

1.3.2.2.1 General Requirements

Included under this section will be the pump, motor, discharge elbow, guide bar brackets and related and required accessories.

The pump supplier shall also supply compatible motor, discharge elbow, mechanical seals, guide bar brackets and related and required accessories.

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The pumps shall be suitable for pumping raw unscreened wastewater comprised of domestic, commercial, and industrial waste and be easily removed for inspection and service requiring removal of no bolts, nuts, or other fastenings and not requiring personnel to enter the wet well.

All components and materials inside the wetwell shall be constructed of stainless steel or other non-corrodible materials.

Only ITT Flygt Corporation submersible raw sewage pumps and motors shall be allowed. No substitutes will be allowed. Pumps and motors shall meet applicable ITT Flygt Performance Specifications and the requirements of this specification:

1.3.2.2.2 Scope of Work

Furnish and install two submersible non-clog wastewater pump(s). In addition to the installation of the two pumps, furnish and deliver to the City of Umatilla Sewer Department Shop a spare pump, spare impeller and re-build kit.

Each pump shall be equipped with a submersible electric motor with ___ feet length of submersible cable (SUBCAB) suitable for submersible pump applications. The pump shall be supplied with a mating cast iron __ inch minimum discharge connection and be capable of meeting the performance requirements given in this specification.

1.3.2.2.3 Pump Design

The pump(s) shall be automatically and firmly connected to the discharge connection. There shall be no need for personnel to enter the wet-well. No portion of the pump shall bear directly on the sump floor. Sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal to metal watertight contact.

1.3.2.2.4 Pump Construction

Major pump components shall be of gray cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. All exposed nuts or bolts shall be AISI type 304 stainless steel construction. All metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump. Lifting bails shall be stainless steel.

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1.3.2.2.5 Cooling System

Each unit shall be provided with an integral motor cooling system. The cooling system shall provide for continuous pump operation in liquid temperature of up to 104 Degrees F or in free air. Restrictions below this temperature are not acceptable.

1.3.2.2.6 Cable Entry Seal

The cable entry seal design shall ensure a watertight and submersible seal.

1.3.2.2.7 Motor

The motor shall be totally enclosed for submersible service, explosion proof, and suited for operation on ___ volt, ___-phase, 60 hertz power.

The pump motor shall be induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber, NEMA B type. The stator windings and stator leads shall be insulated with moisture resistant Class H insulation rated for 180 C (356 F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%. The motor and pump shall be designed and assembled by the same manufacturer.

The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.15. The motor shall have a voltage tolerance of plus or minus 10%. The motor shall be designed for continuous operation up to 40 C (104 F) ambient and have a NEMA Class B maximum operating temperature rise of 80 degrees C. A motor performance chart shall be provided, upon request, showing curves for torque, current, power factor, input/output kW and efficiency. This chart shall also include data on starting and no-load characteristics.

The power cable shall be sized according to the NEC and ICEA standards and shall be of sufficient length to reach the junction box without the need of any splices.

1.3.2.2.8 Bearings

The pump shaft shall rotate on two permanently grease lubricated bearings.

1.3.2.2.9 Mechanical Seal

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Each pump shall be provided with a positively driven dual, tandem mechanical shaft seal system consisting of two seal sets, each having an independent spring. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating tungsten-carbide ring. The upper, secondary seal unit, located between the lubricant chamber and the motor housing, shall contain one stationary tungsten-carbide seal ring and one positively driven rotating tungsten-carbide seal ring. All seal rings shall be individual solid sintered rings. Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment nor depend on direction of rotation for sealing.

Each pump shall be provided with a lubricant chamber for the shaft sealing system. The seal system shall not rely upon the pumped media for lubrication. Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal shall be easily accessible from the outside. The seal system shall not rely upon the pumped media for lubrication. The motor shall be able to operate dry without damage while pumping under load.

Seal lubricant shall be FDA Approved, nontoxic.

1.3.2.2.10 Pump Shaft

Pump and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft. Couplings shall not be acceptable. The shaft shall be AISI Type 431 or ASTM A479 S43100-T stainless steel.

1.3.2.2.11 Impeller

The impellers shall be of N-impeller design and manufactured of gray cast iron, ASTM A-48 Class 35B, dynamically balanced, semi-open, multi-vane, back swept, screw-shaped, non-clog design. The impeller leading edges shall be mechanically self-cleaned automatically upon each rotation as they pass across a spiral groove located on the volute suction. The screw-shaped leading edges of the impeller shall be hardened to Rc 45 and shall be capable of handling solids, fibrous materials, heavy sludge and other matter normally found in wastewater. The screw shape of the impeller inlet shall provide an inducing effect for the handling of up to 5% sludge and rag-laden wastewater. The impeller to volute clearance shall be readily adjustable by the means of a single trim screw. The impellers shall be locked to the shaft, held by an impeller bolt and shall be coated with alkyd resin primer.

1.3.2.2.12 Volute

The pump volute shall be a single piece gray cast iron, ASTM A-48, Class 35B, non-concentric design with smooth passages of sufficient size to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified. The volute shall have a replaceable suction cover insert ring in which are cast spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed. The insert ring shall be cast of (ASTM A-48, Class 35B gray iron or ASTM A-532 (Alloy III A) 25% chrome cast iron) and provide effective sealing between the multi-vane semi-open impeller and the volute housing.

1.3.2.2.13 Protection

All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. At 125 C (260 F) the thermal switches shall open, stop the motor and activate an alarm. A leakage sensor shall be included to detect water in the stator chamber. The Float Leakage Sensor (FLS) is a small float switch used to detect the presence of water in the stator chamber. When activated, the FLS shall stop the motor and send an alarm both local and/or remote. USE OF VOLTAGE SENSITIVE SOLID STATE SENSORS AND TRIP TEMPERATURE ABOVE 125 C (260 F) SHALL NOT BE ALLOWED. The thermal switches and FLS shall be connected to a Mini CAS (Control and Status) monitoring unit. The Mini CAS shall be mounted in the control panel and shall be provided with the pump.

Guide bars and brackets shall be stainless steel:

- Two continuous guide bars per pump used for raising and lowering the pump. Type 304 stainless steel.
- Lower guide bar holders to be integral with discharge elbow.
- Guide pump unit on guide bars utilizing guide brackets. Type 304 stainless steel.
- Use intermediate supports on guide bars as needed.
- Guide cables are not acceptable.
- Guide bars shall not support any portion of the weight of the pump.

1.3.2.3 Workmanship

1.3.2.3.1 Examination

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Verify all pumps, motors, and materials are present and meet the requirements of these Specifications.

1.3.2.3.2 Installation

Install pumps and motors in accordance with shop drawings and manufacturer's recommendations.

Interface with suction and discharge piping to provide a complete waterproof seal.

Install electrical and pump controls in accordance with the manufacturer's recommendations and the electrical division of these Technical Specifications.

Center pump bowls and discharge column.

Furnish and deliver one (1) spare pump, spare impeller and re-build kit to the City Sewer Department Shop.

1.3.2.3.3 Acceptance Testing

Prior to acceptance, test lift station with representatives of the City Engineer present to verify proper operation. Coordinate and schedule acceptance testing with the City a minimum of five (5) working days before.

Conduct drawdown test with one and with both pumps in operation measuring drawdown and time to verify the flowrates and that the pumps are pumping at their rated capacity.

Simulate alarm and control conditions. Operate pumps through complete fill and pump cycles. Field adjust level float and HydroRanger level settings to achieve optimum performance.

1.3.2.3.4 Start-Up Services

Provide a factory-trained representative for four (4) hours minimum to oversee, inspect and to certify the installation of each type of pump. Prior to operator training, demonstrate to the Engineer that the equipment is ready for operation. Coordinate and schedule operator training with the Engineer a minimum of five (5) working days before.

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Provide required Equipment Operation and Maintenance (O&M) Manuals to the Owner as per the requirements of Section 1.3.1.1.2.

1.3.2.4 Payment

Payment shall be made at the unit price or lump sum bid price as stated in the Contractor's bid proposal. Payment shall be considered full compensation for all labor, material, and equipment to install the pump and motors, complete and operational.

1.3.3 Precast Wetwell and Valve Vault

1.3.3.1 General

1.3.3.1.1 Scope

This work shall consist of constructing the pump station wetwell and valve vault in accordance with these specifications, as shown on the plans, and as staked by the Engineer.

In addition to the requirements of this specification, the wetwell and valve vault shall also comply, where appropriate, with the requirements of the City of Umatilla's Standard Specifications.

1.3.3.1.2 Submittals

Submit shop drawings for the lift station wetwell and valve vault. Shop drawings shall be complete and shall show overall layout, unit locations, fabrication details, reinforcement, connection details, hatch orientation and opening direction, location of uni-sleeve, support items, dimensions, and relations to adjacent materials.

Submit concrete mix design, concrete materials, accessories, epoxy adhesive and concrete test results.

Manufacturer shall provide structural design calculations sealed by a Professional Structural Engineer licensed in the State of Oregon.

1.3.3.2 Materials

1.3.3.2.1 Precast Concrete

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All cast-in-place and structural concrete for this project shall meet the requirements of Class 4000. Contractor shall submit concrete mix design, concrete materials, accessories, epoxy adhesive and concrete test results.

Design the wet well and vault for AASHTO H-20 loadings.

1.3.3.2.2 Wet Well

The lift station wet well shall conform to ASTM C-478, Standard Specification for Precast Reinforced Concrete Manhole Sections. The valve vault shall be a precast concrete vault sized as shown on the drawings. Cast hatches and/or frame and covers in the top slabs (coordinate opening location and size with pump manufacturer). Design the wet well and vault for H-20 loadings.

All interior surfaces of the lift station precast wet well shall be lined with non-corrodible lining systems.

- A. The wet well walls, floor (including the fillet taper), and roof slab surfaces shall be lined with a protective epoxy, polyamine, fiber reinforced coating. Coating shall be a 100% solids and spray applied. Minimum thickness shall be 100 mills.
- B. The lining shall be Series 436 Perma Shield FR Epoxy Coating as manufactured by Tnemec, or approved equivalent.
- C. Filler-resurfacer shall be Series 64-1500, 218, 219 or 434 as manufactured by Tnemec, or approved equivalent.
- D. Installation of the lining shall be done in accordance with the recommendations of the liner manufacturer.
- E. Joints between the lining/coating and other lift station components shall be sealed with butyl rubber sealant material.

1.3.3.2.3 Valve Vault

The valve vault shall be a pre-cast concrete vault sized as shown on the drawings. Provide plastic coated access steps where shown on the plans.

Check valves for the pump station discharge line shall be rubber flapper swing check valves, APCO Series 100R.

For industrial applications, flow meters for the pump station discharge lines shall be McCrometer Magmeter (Ultra Mag).

1.3.3.2.4 Top Slabs

Cast access hatch frames in the top slabs.

Design the wetwell and vault for AASHTO H-20 traffic loads.

Produce a smooth, troweled finish on the surfaces of all slabs including the station area slab. Slab shall be level and flat. All finished concrete and hatches shall be at same elevation.

1.3.3.2.5 Access Hatches

The access hatches shall be double-leaf aluminum with stainless steel hardware. Hatches shall be rated for AASHTO H-20 traffic loads unless this load rating is not available in the required size. Then hatches may be rated for a reduced traffic loading rating of 16,000 pounds over a 20 inch x 20 inch area. Provide a recessed, lockable hasp covered with a hinged lid flush with the surface. Provide a stainless steel safety chain for a safety barrier between the door leafs when open. Route the hatch drains to a drywell or drain. Hatches shall be Bilco or approved equivalent.

1.3.3.2.6 Non-Shrink Grout

Non-shrink grout shall be premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, capable of developing minimum compressive strength of 2,400 psi (17 MPa) in 48 hours and 7,000 psi (48 MPa) in 28 days, Gifford-Hill "Supreme," L&W "Crystex," or UPCO "Upcon High Flow.

1.3.3.2.7 Joint Filler Material

Install 1/2-inch joint filler material between the wetwell and concrete slab and where called for on Drawings. Joint filler material shall be asphalt impregnated fiberboard or felt, tongue and groove profile, set 1/8-inch below floor slab elevation, meeting the requirements of ASTM D-1751.

1.3.3.2.8 Exterior Coatings

The below ground level exterior surfaces of lift station precast wetwell and valve vault sections shall be coated with Asphalt for Waterproofing (ASTM D312, Type 4) in accordance with the Oregon Standard Specifications for Construction.

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1.3.3.2.9 Confined Space Entry System

A confined space entry system shall be furnished with the lift station. The system shall be Miller DuraHoist™ and shall consist of the following primary components:

- A. One-piece adjustable mast, Model No. DH-3, deliver to City Shop;
- B. Core Mount Sleeve Base, Model No. DH-9SS, and Sleeve Cap, Model No. DH-10SS, install per drawings and manufacturer's recommendations on the wet well and valve vault;
- C. Digital Winch, Model No. DH100/70FT, Miller 100 Series Digital Winch with 70 feet of 3/16 in. stainless steel cable, deliver to City Shop;
- D. Work Winch, Model No. DH50S/50FT, Miller Basic Winch with 50 feet of 3/16 in. stainless steel cable, deliver to City Shop;
- E. All other necessary brackets, hardware, and components required for a complete, operable confined space entry system.

1.3.3.3 Workmanship

Do not place backfill for at least 24 to 48 hours after application of exterior coating. Place backfill in a manner that will not rupture or damage the film or cause the coating to be displaced on the wall.

A minimum of one compaction test shall be taken at each structure location as follows: foundation subgrade, base under floor slab, midpoint of the backfill, and finished subgrade elevation.

1.3.3.4 Payment

Payment shall be at the unit price or lump sum price as stated in the Contractor's bid schedule.

1.3.4 Force Main Sewer

1.3.4.1 General

In addition to the requirements of this specification, the force main sewer shall also comply, where appropriate, with the requirements of the City of Umatilla's Standard Special Provisions.

1.3.4.2 Materials

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The sewer main line materials, as indicated on the plans for the sanitary sewer force main, shall be "Polyvinyl Chloride Pipe" (PVC) C-900 as specified in the City of Umatilla's Standard Specifications. Fittings for the force main shall be also as specified in the Standard Special Provisions. Ductile iron pipe conforming to ANSI/AWWA C151/A21.51 Class 50 as specified in the Standard Special Provisions, is a pre-approved substitute, but ductile iron pipe shall be epoxy lined. Cement mortar lining will not be allowed.

Tracer wire shall be insulated 12 gauge copper.

Valves and valve boxes for the sanitary sewer force main shall meet the requirements of the City's Standard Specifications. All valve box lids shall be marked with the letter "S".

1.3.4.3 Workmanship

The sewer force main shall be laid at a uniform grade as called for or as shown on the plans and as required to not create high or low points in the line.

Tracer wire for the sanitary sewer force main, valves and valve boxes shall be installed in accordance with the detail in the plans.

The Contractor shall hydrostatic test the sanitary sewer force main in accordance with the City's Standard Specifications.

1.3.4.4 Payment

Payment for fitting and valves including valve boxes shall be at the contract unit price as stated in the bid schedule for each type and size fitting and valve.

Payment shall be at the contract unit price as stated in the bid schedule for "Force Main Sanitary Sewer Pipe ____ In. Diam." The contract unit price shall be considered full compensations for all labor, materials and equipment to include trench excavation and backfill, pipe installation, and testing.

A separate payment will not be made for testing the sanitary sewer force main. All costs to perform the test shall be inclusive to the contract unit price for the sanitary sewer force main.

1.3.5 Electrical System

1.3.5.1 General

1.3.5.1.1 Scope

The Contractor shall provide a complete electrical system for the project site including: electrical service (in conjunction with the local electric utility), service equipment, distribution equipment, motor control equipment, telemetry equipment, instrumentation equipment, conduit, conductors, fittings, hangers, and associated devices/equipment required for a complete and operational system.

This section is intended to delineate the minimum requirements of the system, but in no way do they relieve the Contractor from providing all hardware and programming necessary to accomplish the functional tasks indicated by the system specifications.

The control panel (CP) shall be furnished by a single supplier, and that supplier shall supervise the construction, installation and testing of the telemetry and control system. The supplier shall also coordinate with the City representative to ensure the correct interface of the telemetry equipment with the City's existing man-machine interface software program. The supplier shall be a firm which can demonstrate significant experience in the design and installation of computerized radio telemetry instrumentation and control systems associated with the wastewater industry, with a minimum of five projects during the last five years in performing such work.

The system shall be complete with any incidental items necessary to provide proper and reasonable operation of the component parts. This may include, but shall not be limited to: power supplies, filters, isolation transformers, delay or suppression devices, interconnecting devices, or any items which are ordinarily furnished as a part of a system, or which are necessary to successful operation of the system and/or equipment.

1.3.5.1.2 Submittals

All submittal information shall be submitted to the City representative by the Contractor, in accordance with Section 1.3.1. Extraneous or non-applicable material and information shall be omitted, or clearly denoted as inapplicable when such omission is impractical.

Shop drawings, where required, shall be accurately drawn to a scale or scales appropriate to show overall arrangement, pertinent features, details, and methods of connection or joining. Figure dimensions shall be used, as opposed to scaled dimensions.

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For the following specific equipment items, shop, catalog, and other appropriate drawings, along with pertinent descriptive information shall be submitted to the City for review prior to fabrication:

- Telemetry and Control Panel
- Antenna and antenna cable
- Motor Controllers
- Power Panel and enclosed components
- Level Controller and Transducer
- Radio Transceiver

A single complete package shall be submitted including all of the above referenced equipment items. Submit the number of copies specified in Section 1.3.1.

1.3.5.1.2.1 Telemetry/Control Panel Information Submittal

The submittal shall contain a detailed diagram showing the proposed hardware and interconnections to be used for the Telemetry/Control Panel. The diagram shall contain references to discrete supplementary submittal information on each supplied component. The supplemental information shall contain, but not be limited to, physical and functional attributes of the hardware including manufacturer's name, specific model numbers and series numbers of proposed equipment, accessory items, cut sheets, and operating/maintenance instructions for each equipment item. Where more than one type or item exists on a single page, the item proposed shall be clearly indicated. Information on accessory items such as power supplies, fuses, batteries, relays, signal converters, and enclosures shall also be included.

A dimensioned outline drawing of the control panel enclosure, inner door, and backplate showing device locations within the enclosure and conduit connection locations shall be submitted, along with an elementary wiring diagram showing connections of all devices and equipment contained within the panel and clearly showing connection of all field located devices.

1.3.5.1.2.2 Antennas, Support Structures, And Associated Devices

The submittal shall contain complete information on antennas and antenna support equipment, including antenna cable, cable connectors, masts, brackets, and mounting hardware.

1.3.5.1.2.3 Motor Controllers

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The submittal shall contain complete information on motor controller, including ratings, dimensions, features, options, and operation and maintenance manuals.

1.3.5.1.2.4 Power Panel

The submittal shall contain information on the Power Panel enclosure along with dimensioned interior and exterior elevations showing locations of all contained equipment/devices. In addition, it shall contain information on devices contained within the enclosure such as motor starters, transformers, panelboards/loadcenters, fuses, and similar items, including wiring and/or connection diagrams.

Mounting details shall be submitted, including information on mounting relative to the utility service meter.

1.3.5.1.2.5 Support Structure for Power Panel and Control Panel

The submittal shall contain a dimensioned layout, schedule of materials of construction, and anchoring hardware for the support structure for the Power Panel and the Control Panel. Supporting calculations demonstrating the adequacy of the proposed anchoring method, including concrete pad dimensions and seismic considerations, shall be submitted for the designed location.

1.3.5.1.2.6 Instrumentation Devices

The submittal shall contain information on the level controller and ultrasonic transducer including model numbers, features, ratings, and dimensions, along with all manufacturer's installation, operation, and maintenance manuals. Submit a configuration sheet showing proposed parameters for operation of the controller specific to this application.

1.3.5.1.2.7 Radio Transceivers

Submit information on radio transceivers, including manufacturer and model number, and the radio frequencies to be programmed.

1.3.5.1.2.8 Operations & Maintenance Information

The Contractor shall provide the number of copies of Operation and Maintenance Manuals specified in Section 1.3.1. The following operations and maintenance

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information shall be furnished for all installed equipment specified in the contract documentation:

- Complete identification, including model and serial numbers.
- Installation and initial start-up instructions.
- Complete instructions regarding operation and maintenance requirements, including procedures and recommended intervals.
- Identification of any special materials, software, or tools required for maintenance.
- Record wiring diagrams
- Parts lists.
- Warranty information, including the name, address, and telephone number of the manufacturer's representative to be contacted for warranty, parts, or service information.

Operation and maintenance information shall be comprehensive and detailed, specific for the items of equipment installed on the project. Material not directly applicable shall be removed, omitted, or clearly marked as inapplicable.

It is the responsibility of the Contractor to ensure that all operation and maintenance materials are obtained and formally transmitted to the City. Material submitted must meet the requirements of Section 1.3.1 and the approval of the City prior to project acceptance.

1.3.5.1.3 Record Information

The Contractor shall be furnished one full set of plans to be used as record drawings. During construction, the Contractor shall maintain an accurate and complete record of all changes in red ink on this set of record drawings. All dimensions shall be field-verified and clearly shown on the drawings. The red-marked set shall be submitted to the City prior to project closeout and approval of final payment.

Three copies of complete record wiring diagrams for all equipment and electrical circuits shall be submitted to the City when the as-built installation differs from that shown on previously submitted drawings or on the plans. Record diagrams shall be clearly marked indicating all such differences, and shall be coordinated with the plat record drawings.

The Contractor shall also maintain records of the hardware and firmware versions, settings, and configurations for the equipment provided. These records shall be updated as necessary during testing and start-up of the system to indicate the final

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configuration at closeout of the project. These records must be submitted prior to final contract closeout.

The record drawings shall be checked by the Contractor and bear his approval prior to submittal to the City.

1.3.5.1.4 Substitutions

It is the intent of this set of specifications that equipment be provided as specified for uniformity with the existing radio telemetry system. The City will consider proposals for substitution of certain materials, equipment, and methods only when such proposals are accompanied by full and complete technical data and other information required by the City to evaluate the proposals.

Substitution requests will not be considered for telemetry equipment (RTU's and radio) or motor starter equipment.

To obtain acceptance of items for substitution, the Contractor shall submit requests not later than seven days after the start of Contract execution.

Submission of a substitution proposal shall not relieve the Contractor from the requirement to provide equipment as specified. Substitution proposals will be reviewed by the City for conformance with the functional requirements and intent of these specifications. It is the Contractor's responsibility to demonstrate that the proposed substitute equipment will meet the requirements and the intent of these specifications. The City retains the exclusive right to approve or disapprove all proposed substitutions; all decisions by the City regarding these matters are final. Therefore, the Contractor is responsible for abiding by any decision made by the City regarding proposed substitutions for any equipment and/or system component.

A shop test of the power panel and control panel shall be conducted prior to shipment of the equipment to the job site. The shop test shall be conducted by the panel fabricator and witnessed by the City's representative. Drawings of the panels shall be provided at the shop test. The City representative will compare the drawings to the actual panels. Drawings and actual panel fabrication must match prior to panels being shipped to the job site.

1.3.5.1.5 Tests/Inspection

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The shop test shall demonstrate proper operation of the power panel and control panel. Controls shall be operated in each state (for example, hand, off, and automatic for HOA switches); inputs shall be tested by shorting across inputs or actuating devices connected as inputs; and outputs shall be tested by measuring resistance across terminals or contacts. Analog inputs shall be tested at not less than three points, nominally near zero, mid-range, and full range. Test result shall be documented in writing by the panel fabricator. The City representative may choose to bring a laptop computer to the test and monitor I/O on the RTU by connecting the laptop to the RTU. Deficiencies identified as a result of the shop test shall be corrected and retested prior to shipment of the panels to the job site.

The system shall be field tested after installation. Equipment at the site shall be checked for proper operation and functionality. This functional test shall be performed in the presence of a City representative to demonstrate that the entire system is in proper working order and that it will perform the functions for which it was designed. Since the control system will be operating using an existing telemetry system, the field test must be coordinated with the City to ensure that the testing does not negatively impact operation of the existing wastewater telemetry system.

The Contractor shall obtain and pay fees for applicable permits and inspections required by any authority having jurisdiction.

1.3.5.2 Materials

1.3.5.2.1 Basic Materials and Methods

Provide new materials and equipment approved and labeled for the purpose for which they are to be used by a nationally-recognized electrical testing laboratory. Similar items of equipment shall be of the same manufacturer and quality. The equipment and materials shall meet applicable NEMA, IEEE, and ANSI standards.

Furnish materials, devices, equipment, or supplies of materials that are inherently non-corrosive, or are coated or covered in a manner acceptable to the City which renders them non-corrosive. Do not install materials in a manner, location, or construction that produces galvanic action or any other materials which have the potential to facilitate corroding or eroding action.

Equipment or devices fabricated in the field shall be equal in every respect to manufactured items used for the same purpose. Where cutting, drilling, grinding, etc., is

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done to galvanized or painted metal, it shall be regalvanized or painted to match original finish.

1.3.5.2.2 Raceways

Rigid steel conduit shall be hot-dipped, galvanized, or sherardized steel conduit meeting ANSI C80.1. Couplings shall be unsplit, NPT-threaded, steel cylinders with galvanizing equal to conduit. Threadless couplings are not permitted. Nipples shall be factory-made through 8-inch length. Running threads are not permitted. Intermediate steel conduit is not permitted.

Liquid-tight flexible metal conduit shall be flexible, galvanized steel convolutions covered by a liquid-tight PVC layer with manufacturer's marking at 3-foot or less intervals. Connectors shall be UL approved for grounding and employ a ferrule which covers the end of the conduit inside and out. Conduit shall be Electri-Flex Type LA or American Sealtite, Type UA.

Flexible metal conduit shall be flexible galvanized steel convolutions forming a continuous raceway. Connectors shall be galvanized screw-in type, approved by UL for grounding. Flexible aluminum or light-wall steel conduit is not acceptable.

Rigid plastic conduit shall be Schedule 40 or Schedule 80 PVC rigid conduit suitable for underground installation without concrete encasement, and shall meet NEMA TC-2 standards for plastic conduit. Manufacturers are Carlon, Johns-Manville, or equal.

Raceway supports shall be stainless steel, galvanized steel, or aluminum structural shapes, and cast hardware.

1.3.5.2.3 Conductors

Power wiring for service, feeder, and motor circuits shall be Class B stranded copper conductor, with Type RHH-RHW-USE insulation.

Branch circuit conductors shall be Class B solid copper conductor, THHN-THWN insulated in sizes No. 10 and No. 12 AWG. Minimum conductor size for all power wiring shall be No. 12 AWG.

Control wiring shall be Class C stranded copper conductor with Type MTW insulation. Minimum conductor size shall be No. 14 AWG, except conductors which connect to the RTU or radio terminals or connectors shall be sized and fused to match the terminals or

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connectors (20 gauge nominal). DC circuits shall be color coded, red for positive and black for negative.

Low-voltage instrument wire shall be multi-conductor cable with overall neoprene or PVC jacket. Individual conductors shall be PVC or polyethylene/nylon insulated. Unshielded instrument cable shall be Belden 9486 (#18 AWG), Belden 9488 (#14 AWG), or equal. Shielded single pair instrument wire (2/C#18) shall be Belden 9341 or equal.

Ground rods shall be copper-clad steel, 3/4 inch round, 10-feet long. Grounding clamps shall be equal to T&B 3900 UB Series. Grounding wire and cable shall be solid copper for No. 4 and smaller diameter.

Connectors for splicing copper conductors shall be: "Scotchlok" insulated spring connectors for No. 18 through No. 6 AWG solid conductors; insulated, solid-barrel, crimp-type, plated copper alloy connectors for No. 18 through No. 6 AWG stranded conductors.

Connectors for terminating copper conductors shall be insulated, solid-barrel, crimp-type, spade tongue-plated copper alloy terminal for No. 18 through No. 10 AWG.

Insulating materials for splices shall be "Scotchfill", or equal, for filling bolted or irregular areas before taping with Scotch No. 88, 33 plus or equal 7-millimeter vinyl plastic tape.

Wire markers shall be slip-on sleeve, shrink to fit style. Brady, or approved equal.

1.3.5.2.4 Fittings

Fittings shall be galvanized, cast iron alloy with threaded hubs, neoprene gasket and galvanized cast iron alloy cover. Miscellaneous fittings shall be as follows:

- Clamp backs shall be galvanized cast iron alloy, one-hole style.
- Locknuts shall be extra-heavy, hot-dip galvanized steel through 2 inches trade size and hot-dip galvanized malleable iron above that size.
- Bushing shall be hot-dip galvanized iron with insulating thermosetting collar. Provide grounding connector on bushing where terminating at enclosures.
- Seals shall be provided in conduit runs where runs exit or enter from outdoor areas. Seal shall be EYA or EYS type; sealant shall be clear or colorless RTV silicone or equal.

1.3.5.2.5 Anchors, Supports, and Attachments

Attachments to building surface and structural shapes or members shall be as follows:

- Wood: Lag screws, Type A tapping screws.
- Masonry: Rawl hollow-set drop-in expansion anchor.
- Hollow Partitions: Molly or toggle bolts.
- Concrete: Rawl Lok-Bolt expansion anchors.
- Structural Shapes or Members: Clamps or U-bolts.
- Other Steel: Machine screw-in tapped hole.

Attachments shall be stainless steel or hot-dipped galvanized.

1.3.5.2.6 Motor Controller

Motor Controller shall be Square D/Schneider Electric LC1 Series Motor Starter with LRD Series electronic overload with remote reset. Starter shall include HMCP short circuit protection, fused control power transformer, auxiliary run contacts.

1.3.5.2.7 Main Circuit Breaker

Main circuit breaker shall meet NEMA Standard AB-1. The unit shall be a molded case circuit breaker with thermal magnetic trip. The circuit breaker shall have a short circuit withstand rating as required for the available short circuit current at the point of connection to the Electric Utility.

1.3.5.2.8 Enclosures for Power Panel and Control Panel

Power Panel shall be NEMA 3R double door enclosure nominally 48"W x 72" H. Control Panel shall be NEMA 3R single door enclosure nominally 36"W x 72"H. Depth of the enclosures shall be equal and as required for the devices and/or enclosures contained therein, but not less than 20". The enclosures shall be provided with a pad-lockable, three-point latching system and handle, and panel backplates and mounting hardware as required for the installation. The control panel shall have an internal swing door for mounting of pilot devices and the level controller.

The enclosure shall be manufactured of stretcher leveled steel of 12 or 14 gauge thickness welded into a self-supporting rigid structure. Doors shall be piano hinged with stainless steel hinge pins. Reinforcement shall be provided around areas of the enclosure weakened by openings or mounting of heavy equipment/components. The

Umatilla Design Guidelines and Standard Specifications and Details for Sewage Pump Stations

panel subplate shall be sized to fit within the enclosure and shall be mounted on collar studs for easy installation and/or removal. Print pockets shall be provided on the door.

Panels shall be descaled, cleaned, and primed in preparation for painting. Painting shall consist of one coat of flat white enamel in the interior and two coats of hard finish exterior enamel, gray in color. Paint shall be suitable for field touch-up. Spare paint (one pint) shall be provided for exterior touch-up purposes.

1.3.5.2.9 Limit Switches

Proximity switches shall be provided for use as intrusion sensing devices at the Valve Vault, Main electrical and control enclosures, and at the wet well.

Proximity sensors shall be Turck Bi15-Q20-Y1X-H1141 2-wire NAMUR proximity sensor, 5-30 VDC, 4-pin M12 quick disconnect with Turck RK 4T-10 cable, 10 meter, 4-wire with M12 quick disconnect. (Note -- Modify Part number to meet actual cable length required for continuous run of cable from Proximity Sensor to Seal-off Electrical Vault.)

Limit switches shall be provided for use as intrusion sensing devices at the Control Panel and Power Panel enclosures. Limit switches shall be Hoffman, or approved equal.

1.3.5.2.10 Power Center

The power center shall be Cutler Hammer "Mini Power Center", or approved equal.

1.3.5.2.11 Fuses

Fuses shall be as follows: Power fuses, Class RK-5 silver element. Control fuses, Bussman FNQ or equal.

1.3.5.2.12 Current Sensor

Current sensor shall be used as undercurrent to indicate pump fail-to-start condition.

Current Sensor for undercurrent detection shall be Bender Incorporated CME420 with 0.1-16 amp range and adjustable trip point, start-up delay, response delay, release delay, and SPDT contacts rated 5 amps. Where motor full load amps exceed 10 amps, provide appropriately rated current transformers.

1.3.5.2.13 Panel Heater

Panel Heater shall be 120 volt, single phase with built-in thermostat, fan, and aluminum enclosure. Hoffman D-AH2001A, or equal.

1.3.5.3 Workmanship

1.3.5.3.1 Clean-Up

Vacuum equipment clean after installation; remove metal cuttings with a magnet or suitable means before assembling equipment; wipe insulating supports, bushings, etc. with a clean lint-free cloth; clean debris, shavings, etc. from equipment and enclosures before startup.

1.3.5.3.2 Raceways

Rigid steel conduit shall be used for all work except as noted in this item of the Specifications.

Rigid plastic conduit may be used as follows:

- Between the wetwell and the power and sensing manhole,
- Between the valve vault and the control enclosure, and
- For utility service circuits as permitted by the serving utility.

Where rigid plastic conduit is used, transition to rigid steel PVC coated conduit at stub-ups and locations where the conduit changes from buried to encased in concrete or exposed. Do not extend plastic conduit above grade, or into equipment.

Flexible conduit shall be provided for connections to equipment which is subject to vibration in normal service. Runs shall be kept as short as practical and shall not be used in place of elbows, offsets, or fittings to attach to fixed equipment. Flexible conduit shall not be strapped to structures or other equipment.

Circuits shall run in individual raceways unless specific combinations in one raceway are shown. Raceways shall not be ganged into wireways, pull boxes, junction boxes, etc., without specific approval.

Conduit connections to enclosures shall be made at the nearest practicable point of entry to the enclosure area where the devices are located, to which the circuits contained in the conduit will connect.

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Where raceway exits from grade or concrete, provide the following: For runs exiting from grade, slabs or encasement, provide a rigid steel elbow and adapter. In "wet" areas, elbow shall be 20 mil PVC coated.

Direct-buried rigid steel conduit shall be installed where underground runs are shown. Rigid steel conduit, underground or encased in concrete, shall have a half lapped wrap of Scotchrap No. 51 plastic tape or a coat of Koppers Bitumastic No. 505 or factory PVC coating, 20 mils minimum thickness.

Install raceway as a complete, continuous system without wires, mechanically secure and electrically connected to all metal boxes, fittings, and equipment. Blank off all unused openings, using factory-made knockout seals. Keep conduits clean and dry until conductors are installed using caps, bushings, and "penny" or other suitable means.

Provide double locknuts and insulating bushings at all conduit connections to boxes and cabinets. Bushings shall be grounding type where connecting to concentric or eccentric knockouts. In "wet" areas, locknuts shall be sealing type or Myers hubs shall be used.

Use approved split or union type couplings only where permitted by the Engineer.

Cut ends of conduit square with hand or power saw or approved pipe cutter. Ream cut ends to remove burrs or sharp ends. Thread cuts on conduit in the field shall have same effective length and thread dimensions and taper as specified for factory-cut threads. Transitions from plastic to steel shall be made with a plastic threaded male adapter to a steel conduit coupling.

Provide anchors, hangers, supports, clamps, etc. to support the raceways from the structures in or on which they are installed. Provide sufficient clearance to allow conduit to be added to racks, hangers, etc. in the future.

Conduit couplings, fittings, and boxes where threaded male to female connections are made shall be waterproofed and rustproofed by application of a watertight, conductive thread compound. Clean threads of cutting oil before applying thread compound and making up joint.

1.3.5.3.3 Conductors

Insulated conductors and cables shall be installed in raceway systems after the system is complete. Damage due to missing bushings, burrs on conduit ends, etc. shall be cause to require removal and replacement of conductors. Damaged ends shall be considered

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sufficient indication of damaged insulation to require replacement. Cable lubricants, pulling sleeves, pullboxes, etc. shall be used to keep pulling tensions within allowable limits. Pulling compounds shall be Ideal Yellow 77 or equal. Pulls shall be by hand using cable grips or wrapping extra conductor around to form an eye. Cable and conductor ends shall be cut off after pulling and all compound cleaned from conductors before terminating.

Power circuits shall be continuous without splices from equipment terminal to equipment terminal. Instrumentation and control circuits shall be continuous except for termination on terminal strips in control panels or at terminal cabinets. Branch circuits may be spliced at taps.

Do not use white or green color for any conductor not intended for neutral or grounding purposes. This limitation applies to power, lighting, and control wiring, except smaller gauge (No. 18 or less), low voltage control circuits.

Use wire with the insulation of required color for conductors No. 8 AWG or smaller. DC circuits shall be color coded red for positive and black for negative.

Control wiring must be of colors different from power wiring or be supplied with a trace of color in addition to the basic color of the insulation. In general, use same color throughout a given system for any signal or control wires performing the same function.

Install wire neatly in all enclosures. Bend or form wires in neat runs from conduits to terminals. Arrange wires so that they may be grouped by conduit or by function in the enclosure. Install cable ties and straps to support and bundle wiring in enclosures. Arrange wires to allow wire tags and numbers to be easily read without bending or flexing wiring.

Terminate wiring with connectors made especially for the wire size and terminal size on which they are installed.

1.3.5.3.4 Anchors, Supports and Attachments

Install attachments to structures or surfaces in a manner which does not damage the structure or surface. Trim all excess length of studs, rods or bolts.

Provide stainless steel or galvanized fasteners in all outdoor, wet, or below grade locations, and any location exposed to the process. Support each raceway or device independently.

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Do not drill, tap, punch or shoot structural metal or pre-stressed concrete structures; use clamping devices only to metal and expansion shields or inserts on concrete.

1.3.5.3.5 Power Panel

Power panel shall be assembled with open style devices, except for Mini Power center. Wiring shall be routed open or in plastic wireways. Distribution blocks, and other devices with open terminals shall have plastic, or similar material, guards to cover the terminals and prevent accidental contact. The assembled panel shall bear the label of an approved Electrical Testing Laboratory.

1.3.5.4 Payment

Payment shall be made at the unit price or lump sum bid price as stated in the Contractor's bid proposal. Payment shall be considered full compensation for all labor, material, and equipment to install the electrical system, complete and operational.

1.3.6 Telemetry and Control System

1.3.6.1 General

1.3.6.1.1 System Capabilities

The existing wastewater telemetry system communicates via radio. The Contractor shall provide the radio for the new station. The City will configure the radio so that communications may be established with the existing telemetry controller.

The existing controller for the wastewater telemetry system, together with the control computer, provides for recording all analog variables and status inputs and maintaining a database of values for reports. Programming of the control computer man-machine interface shall not be the responsibility of the Contractor, but shall be performed by the City.

1.3.6.2 Materials

1.3.6.2.1 Enclosure

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The telemetry equipment shall be contained in the control panel enclosure specified under 1.3.5.2 above.

1.3.6.2.2 Conductors

Conductors shall be as specified in 1.3.5.2 above.

1.3.6.2.3 Protection, Control, and Instrumentation Devices

Miscellaneous protection and control devices shall be as follows:

- Power fuses, Class RK-5 silver element. Control fuses, Bussman FNQ or equal.
- Lightning arresters shall be General Electric Company Catalog No. 9L15BBC008, Joslyn, Phoenix Control-Trabtech, or equal.
- Control relays shall have contacts rated 10A - 120VAC, unless higher ratings are required for the circuit being serviced. Coils shall be rated for the voltage of the coil circuit. Relays shall be Schneider Electric RUM or equal mounted in RUZ DIN rail mounted sockets. Relays shall have LED indicators of coil state. Provide surge suppressers and hold down springs.
- Time delay relays shall be Schneider Electric RUW101MW in combination with RUM relays and RUZ base units.
- Pilot devices (selector switches) shall be heavy duty, oil-tight type per NEMA ICS-1. Allen-Bradley, or equal.
- Phase monitoring relay shall be SSAC Model PLMU11.
- Float switches shall be Gems Sensors and Controls (Warrick Controls) Series M mechanical tilt float switches, form C wide angle.

1.3.6.2.4 Remote Telemetry Units

The telemetry equipment (RTU) shall be a Zetron model 1716 unit for conformity with the existing radio telemetry system. It shall be supplied with full capability for accumulator register and pulse counter data access.

1.3.6.2.5 Power Supply and Surge Protection

Provide a 120 Volt AC input, 12 VDC output power supply, Sola SPD3-15-100T. Provide a 7 Amp-hour battery backup system.

1.3.6.2.6 Level Controller

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The level controller shall be Siemens HydroRanger 200 Level Controller with a XPS 15 (F Model) Transducer (for ranges up to 50 ft). Backup of the HydroRanger 200 shall be accomplished by a single level float and time delay off, which will run both pumps when the float is activated.

Float switches shall be Warrick Controls part # MBLU40W (hung with weight attached for tether method – NOT tethered to float switch mast).

Timer shall be Schneider Electric / Telemecanique:

Base RUZC3M – 11 Pin Base

Relay RUMC3AB2F7 – 11 Pin 120vac Relay

Timer Module RUW101MW – Multi Function Timer

1.3.6.2.7 Radio Transceiver

Radio transceiver shall be Microwave Data Systems Model MDS 9710B "SMART" Remote Data transceiver with programmable synthesized frequencies. The unit shall operate from 12 VDC, have a four-wire interface, and four LED indicator panel. The unit shall include a Remote Maintenance Diagnostics Module. Provide an interface cable for connection of the radio to the Remote Telemetry Unit.

1.3.6.2.8 Antenna Systems

A YAGI directional antenna shall be provided for the telemetry system. The antenna shall be a commercial antenna: Andrew DB-499K, or Kathrein SCALA TY-900. Antennas shall be provided with manufacturer's standard stainless steel or galvanized steel mounting hardware for mounting antennas on up to 2.375" diameter standards or poles.

The Contractor shall be responsible for providing all equipment necessary for installation. This includes provision of all incidental items necessary for proper installation and operation, which may include, but shall not be limited to, structural supports, masts, anchoring hardware, supporting members, connection cables, cable connectors. Antenna mast bell reducers, if utilized, shall be drilled and tapped (1/4" minimum) in four locations and stainless steel bolts installed to prevent turning on the mast.

1.3.6.2.9 Antenna Cable

Provide antenna lead in cable and jumpers at each site.

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All antenna coax shall be premium quality. The main antenna cable shall be 1/2" corrugated hardline with foam insulation. The inner and outer conductors shall be copper. The cable shall be Andrews Heliax or Cablewave FLC 12-50.

Provide two male Type "N" connectors for the main antenna cable that are recommended by the manufacturer. Provide two connector weatherproof kits for connections at the antenna.

Provide 18 inch antenna jumper cable with one male "N" connector to connect to antenna and a female "N" connector to connect to lead in cable. Jumper cable shall be Cablewave S-FLC12, or equal.

Provide 24 inch radio jumper cable with two male "N" connectors to connect between radio and antenna cable lightning arrester. Jumper cable shall be Cablewave S-FLC12 or equal.

Provide a coax cable grounding kit for each site to ground the antenna cable to the mast. Ground kit shall be Cablewave #916383, or equal.

Provide an antenna lightning arrester for each site. Antenna lightning arrester shall be Polyphasor #S-50NX-C2.

1.3.6.3 Execution

1.3.6.3.1 Control Panel

The telemetry equipment remote unit, radio, battery, relays, and associated wiring and components at the site shall be provided in the control panel. The assembled panel shall bear the label of an approved Electrical Testing Laboratory. This section of the specifications applies to the control panel.

1.3.6.3.2 Component Installation

Components mounted in the interior shall be fastened to an interior subpanel using machine screws plus adhesive to insure vibration-free attachment. No fastening devices shall project through the outer surfaces of the cabinet. Interior component mounting and wiring shall be grouped as much as possible by function and then by component

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type. Interiors shall be so arranged that control relays, terminal blocks, fuses, etc. can be replaced or added without disturbing adjacent components. Spare mounting space equal to at least 20 percent of each type of component shall be provided for all components in the system. This provision applies primarily to relays, gutter space, internal selector switches, fuses, and similar components.

Devices, including fuses, power supplies, relays and terminal blocks, installed on the panel subplate, shall be provided with a minimum spacing between the component and the wire duct of 1 inch. Minimum spacing between adjacent components shall be 1 inch. A minimum of 2 inches shall be provided between terminal strips and wireways or between terminal strips. DC fuses shall be mounted completely separate from AC fuses and not in the same horizontal plane.

Panel wireways shall be provided between each row of components, and adjacent to each terminal strip. Wireways shall be a minimum of 1 inch wide and 2 inches deep with removable snap-on covers and perforated walls for easy wire entrance. Wireways shall be constructed of non-metallic materials with a voltage insulation in excess of the maximum voltage carried therein. Wiring duct shall be Panduit "E" Type LG, Panel Channel, or equal.

Terminals shall be provided for the termination of external power, control, and instrument wiring. Where terminal blocks are used for low energy resistance, current, or voltage circuits, they shall be physically separated from line voltage circuit or current transformer secondary circuits. Where multiple terminals are required for a given wire number, additional terminals shall be provided and jumpered as necessary to provide terminal spaces for each individual outgoing wire. Terminal numbers shall correspond to those shown on the elementary wiring diagram. Provide space for a minimum of 10 percent additional terminals distributed at each group of terminals.

Power terminals shall have brass screws with straps suitable for No. 12 through No. 18 AWG wire. They shall be Buchanan, General Electric, Marathon, or Siemens. Control and instrument terminals shall be modular, rail mounted units, Phoenix, Entrelec, or equal.

Control power fuses shall be FRN for ratings above 10 amperes or FNQ for 10 amperes and below. FRN fuses shall be mounted in phenolic blocks and a fuse puller mounted adjacent to them. FNQ fuses shall be mounted in a buss HPC fuseholder. Label all fuseholders with fuse identification number and fuse size and type. Provide 3 spare fuses of each type and size in each panel. Provide box or fuse clip mounted on panel interior marked "SPARE FUSES" to hold the spares.

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1.3.6.3.3 Wiring

Panel wiring shall comply with National Electrical Code.

Panel wiring terminating on device or terminal block screw terminals shall be terminated using slip-on spade tongue insulated crimp (compression) terminators. Run wiring within the panel in wiring duct neatly tied and bundled with tie wraps or similar materials.

All wires to internal components shall be connected to the "inside" or panel side of the terminal strip. All wires to external components shall be connected to the "outside" or field side of the terminal strip. No more than two wires shall be connected to any one control terminal point.

Wiring inside the panel shall be arranged to separate low voltage control signals of the milliamp-millivolt or other low energy type from inductive power circuits, and all panel wiring shall be effectively shielded and grounded to a panel common which will be grounded by the electrical contractor in the field.

Shielding of instrumentation circuits shall be connected to insulated terminals provided adjacent to the circuit terminals, i.e. three terminals for 0-5VDC, 4-20 mA, or similar analog circuits. In general, analog circuits shall be run directly from instrument to instrument without termination. Loop wiring connections to devices shall be made by joining two runs of cable to the device, terminating one conductor of each cable on the device and splicing the other conductors.

1.3.6.3.4 Marking and Identification

Wiring which is an internal part of a device and is not connected to external terminal blocks may be wired using the manufacturer's standard wire designations. Wire which connects to external circuits, to terminal blocks, or other devices which are connected to external circuits shall be identified by the numbers shown on the elementary wiring diagrams. Every wire termination, including all jumpers, shall be identified with wire markers. Wire markers shall be installed over wire terminators or directly adjacent to them. Markers shall be arranged to permit reading of identification without the flexing or twisting of wires.

Nameplates shall be rigid phenolic plastic laminate with engraved lettering or engraved metal plate with filled lettering. Background shall be black. Lettering shall be white. Edges shall be beveled showing a white border. Abbreviations are not permitted unless

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approved by the Engineer or specifically shown on the nameplates, schedules, or drawings. The engraving shall be as shown on the plans for the identification of each panel.

Nameplates shall be installed plumb and parallel to the lines of doors or structures to which they are attached. Nameplates shall be attached to the sheet metal structure by a thin coat of adhesive and sheet metal screws. Adhesive and screw application shall be made in a manner to avoid buckling or distorting nameplates due to use of excessive adhesive or over tightening of screws.

A nameplate shall be provided for each panel. It shall be 2"×10" minimum size with ½" minimum engraved letters. Nameplates shall be provided for all relays, timers, transformers, fuses, terminal blocks, switches mounted internally, and other components which are mounted to the internal mounting panel. These nameplates shall be sized to the scale of the device to which they refer. Lettering shall be white. Backgrounds shall be black. The engraving shall be as shown for the device on the elementary wiring diagrams.

1.3.6.3.5 System Integration

The telemetry and control system installation shall be performed by an installer who has been trained in system design, installation, operation, and maintenance of the RTU equipment.

The Contractor shall assume full responsibility for the proper installation, maintenance, and operation of all equipment provided under this contract, prior to acceptance. The operation of the man-machine interface, insofar as the program written for the City's Radio Telemetry System, shall not be the responsibility of the Contractor.

1.3.6.3.6 Radio System

The radio shall be installed in the control panel. The City shall install the cables and make connections of the antenna to the antenna cable, the antenna cable to lightning arrester, lightning arrester to antenna jumper cable, and antenna jumper cable to radio using connectors. The City will adjust the radio for proper transmission and reception of radio signals. The Contractor shall be prepared to assist the City in coordinating the work of this Contract with the work of the City, including, but not limited to, adjusting the RTU transmit and receive gain settings, adjusting antenna mounting height and directional orientation. This assistance shall include one additional callback of at least four hours for re-adjustment of the system within the first three months of operation.

1.3.6.3.7 Field Calibration And Startup

After equipment has been installed at the site, the Contractor shall test the telemetry system as described in 1.3.5.1. All analog inputs shall be verified with external devices providing signals of 4.0, 12.0 and 20.0 mA. All discrete inputs shall be verified by simulating contact closure and opening.

1.3.6.4 Payment

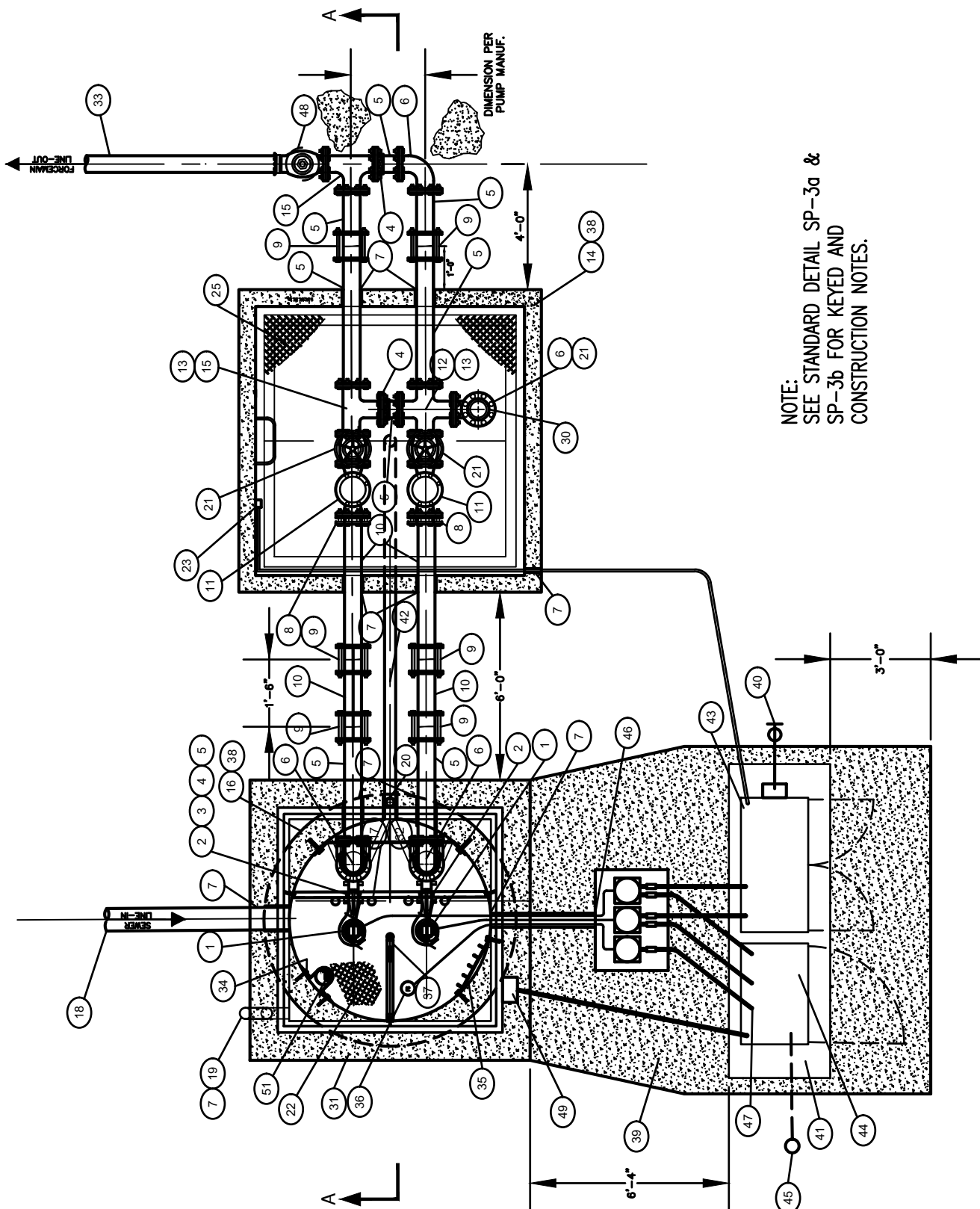
Payment shall be made at the unit price or lump sum bid price as stated in the Contractor's bid proposal. Payment shall be considered full compensation for all labor, material, and equipment to install the telemetry and control system, complete and operational.

1.4 STANDARD DETAILS

Despite the specific information provided herein, the drawings, specifications and details ("Designs") only show minimum requirements, should be considered conceptual in nature, and may require revision and/or modification to conform to project conditions and applicable laws, codes, ordinances, standards and other current requirements and/or best practices. Designs shall be checked, completed and stamped by a Oregon State Professional Engineer and Registered Electrical Engineer.

The following standard detail sheets are attached:

- SP-1 Pump Station Mechanical Plan
- SP-1a Industrial Pump Station Mechanical Plan
- SP-2 Pump Station Mechanical Section
- SP-2a Industrial Pump Station Mechanical Plan
- SP-3a Pump Station Mechanical Notes
- SP-3b Pump Station Mechanical Notes
- SP-4 Vactor Suction Pipe Detail
- SP-5 Thrust Restraint Pipe Support Detail
- SP-6 Pipe Brace Detail
- SP-7 Typical Steel Pipe Support Detail
- SP-8 Ultrasonic Level Transmitter and Bracket Detail
- SP-9 Cable Support Bracket Detail
- SP-10 Pump Station Sun Shelter Detail
- SP-11 Transducer Cable J-Box Detail

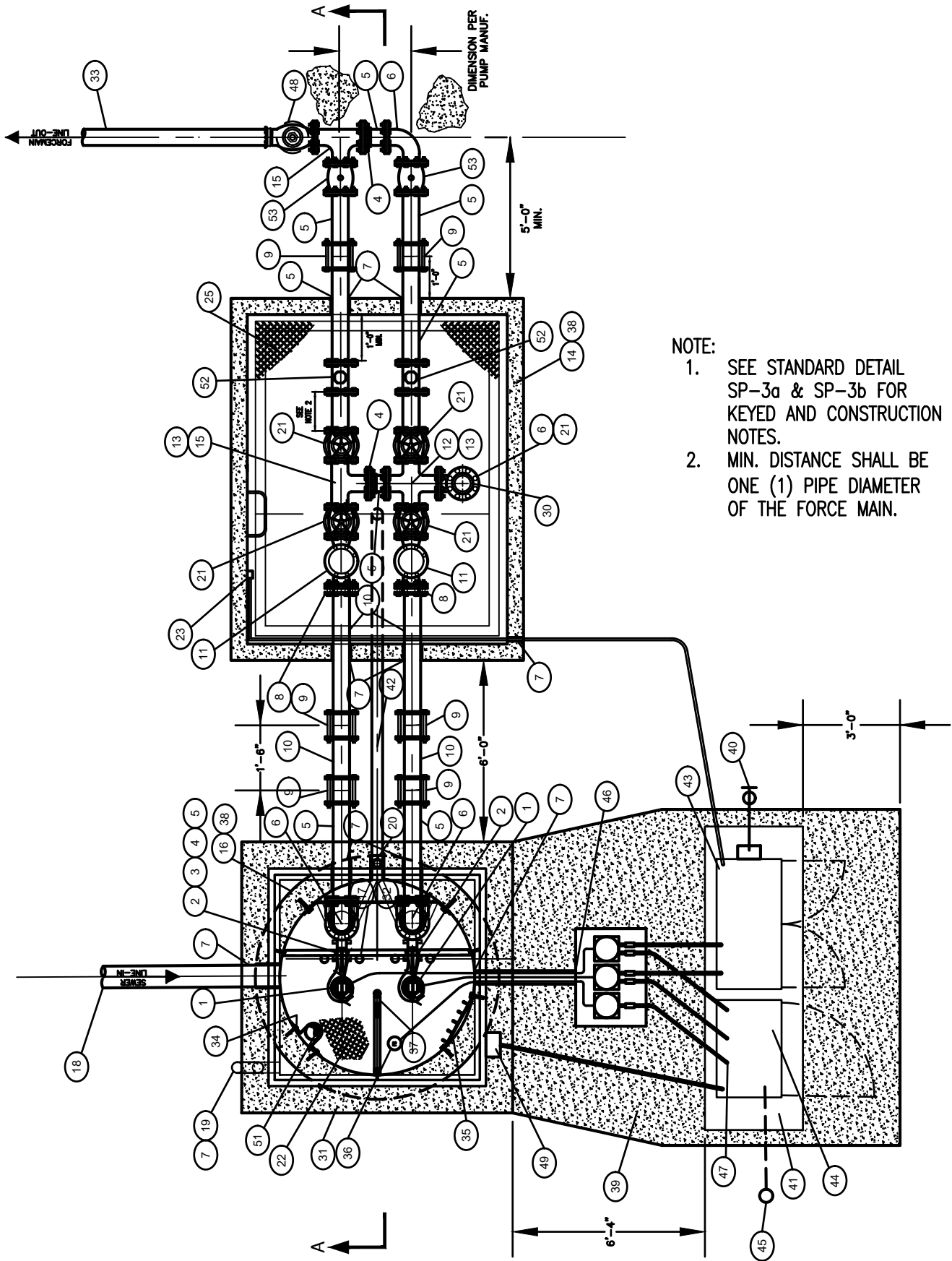


NOTE:
SEE STANDARD DETAIL SP-3a &
SP-3b FOR KEYS AND
CONSTRUCTION NOTES.



SP-1
PUMP STATION
MECH. PLAN

PUBLIC WORKS ENGINEERING
DATE: 10/5/21?1
DWG: SP-1



- NOTE:
1. SEE STANDARD DETAIL SP-3a & SP-3b FOR KEYED AND CONSTRUCTION NOTES.
 2. MIN. DISTANCE SHALL BE ONE (1) PIPE DIAMETER OF THE FORCE MAIN.



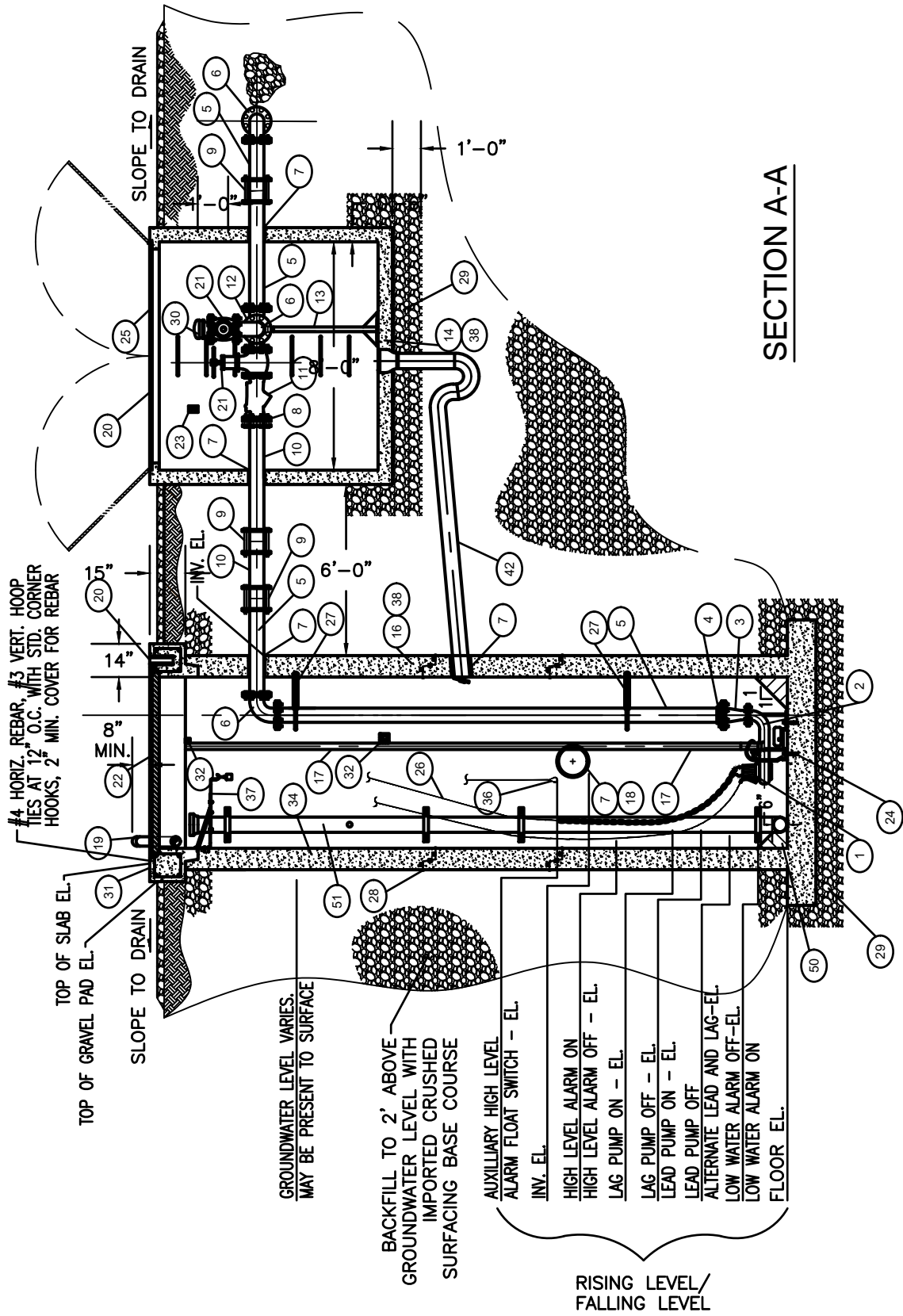
SP-1a INDUSTRIAL
PUMP STATION
MECH. PLAN

PUBLIC WORKS ENGINEERING

DATE: 10/5/21:1

DWG: SP-1a

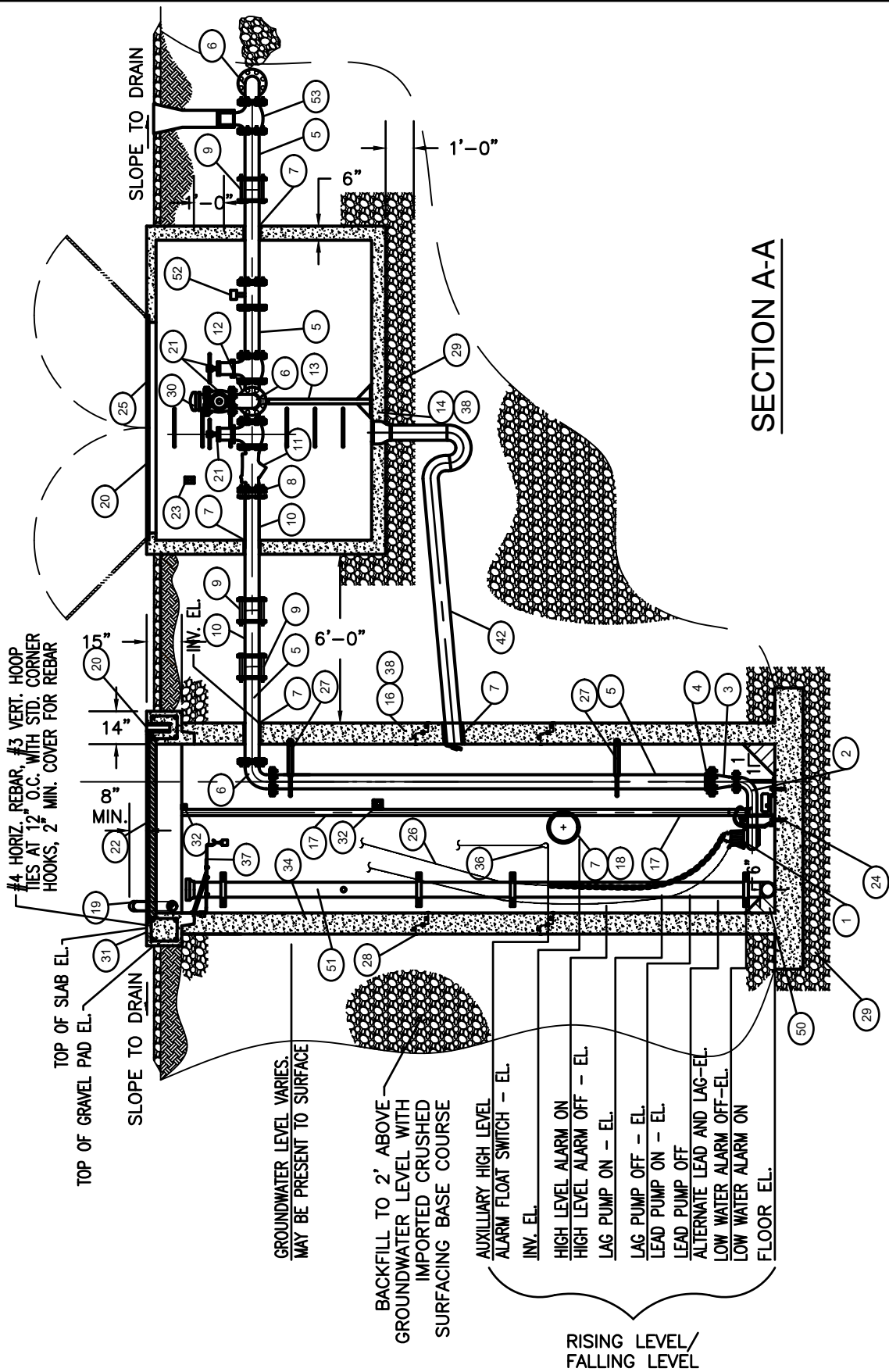
NOTE:
 SEE STANDARD DETAIL SP-3a &
 SP-3b FOR KEYED
 AND CONSTRUCTION NOTES.



SP-2
 PUMP STATION
 MECH. SECTION

PUBLIC WORKS ENGINEERING
DATE: 10/5/21
DWG: SP-2

NOTE:
 SEE STANDARD DETAIL SP-3a &
 SP-3b FOR KEYED
 AND CONSTRUCTION NOTES.



SECTION A-A



SP-2A INDUSTRIAL
 PUMP STATION
 MECH. SECTION

PUBLIC WORKS ENGINEERING	
DATE:	10/5/21
DWG:	SP-2a

CONSTRUCTION NOTES:

1. CONSTRUCT ALL WORK IN ACCORDANCE WITH CITY OF UMATILLA STANDARD SPECIFICATIONS.
2. ALL BOLTS, NUTS, WASHERS, FASTENERS, ETC. WITHIN WETWELL SHALL BE STAINLESS STEEL.
3. FIELD ADJUST LEVEL SETTINGS TO OBTAIN OPTIMAL PERFORMANCE.
4. ALL PIPING AND FITTINGS TO VALVE DOWNSTREAM OF VALVE VAULT SHALL BE D.I.P. CL-52. ALL PIPING AND FITTINGS INSIDE WET WELL AND VAULT SHALL HAVE AN INTERIOR AND EXTERIOR EPOXY COATING. ALL PIPING AND FITTINGS UNDERGROUND SHALL HAVE AN INTERIOR EPOXY COATING AND AN ASPHALTIC EXTERIOR COATING.

KEYED NOTES FOR MECHANICAL PLAN AND SECTION:

1. SUBMERSIBLE PUMP.
2. QUICK DISCONNECT ELBOW AND MOUNTING SYSTEM
PUMP DISCHARGE ELBOW AND MOUNTING BASE
3. REDUCER, FLGxFLG
4. UNI-FLANGE
5. PIPE SPOOL (FLGxPE), 4" MIN. DIA.
6. 90° ELBOW, (FLGxFLG) WITH THRUST BLOCK
7. WATERTIGHT WALL PENETRATION, MANHOLE ADAPTER "A-LOK",
"KOR-N-SEAL" OR EQUIVALENT
8. FLANGE COUPLING ADAPTER
9. FLEXIBLE SLEEVE-TYPE PIPE COUPLING
10. PIPE SPOOL (PExPE), 4" MIN. DIA.
11. RUBBER FLAPPER SWING CHECK VALVE
12. CROSS, FLG
13. STAINLESS STEEL VALVE/PIPE SUPPORT. PER DETAIL.
14. PRE-CAST CONCRETE VALVE VAULT. PROVIDE OPENINGS AS
REQ'D TO ACCOMMODATE PIPING AND ACCESS HATCH AS SHOWN.
15. TEE, FLG WITH THRUST BLOCK
16. PRECAST MANHOLE WITH MONOLITHIC BASE
17. STAINLESS STEEL PUMP REMOVAL SYSTEM, COMPLETE WITH
MOUNTING BRACKETS AND INTERMEDIATE SUPPORT BRACES.
18. INLET PIPE
19. 4" STAINLESS STEEL, SCH. 40, SCREENED VENT
20. CONFINED SPACE ENTRY SYSTEM-LIFTING SUPPORT PEDESTAL
FLUSH MOUNT STAINLESS STEEL SLEEVE AND CAP.
21. RESILIENT WEDGE GATE VALVE (FLGxFLG) WITH 12" HAND WHEEL
22. DOUBLE-LEAF, ACCESS HATCH
23. ELECTRICAL OUTLET
24. EPOXY-SET STAINLESS STEEL ANCHOR BOLTS
25. DOUBLE-LEAF ACCESS HATCH
26. STAINLESS STEEL LIFTING CABLE/CHAIN WITH S.S. CLEVIS FITTING
AT EACH END.
27. DISCHARGE PIPE SUPPORT, PER DETAIL.
28. MANHOLE JOINT WITH EXTRUDED BUTYL RUBBER SEAL. GROUT
JOINT INSIDE AND OUT, TYPICAL.
29. CRUSHED SURFACING BASE COURSE COMPACTED TO 95%
30. CAM-LOCK FITTING WITH PRESSURE CAP.
31. CONCRETE CURB FOR SUPPORT OF HATCH PER HATCH
MANUFACTURER RECOMMENDATIONS. SEE SECTION DETAIL FOR
REINFORCEMENT DETAILS.



SP-3a PUMP STATION MECH. NOTES

PUBLIC WORKS ENGINEERING

DATE: 10/5/21

DWG: SP-3a

KEYED NOTES FOR MECHANICAL PLAN AND SECTION (CONT.)

32. BOLT UPPER GUIDE RAIL SPACER TO FABRICATED SUPPORT BRACKET AS RECOMMENDED BY MANUFACTURER. POSITION SPACER AS REQUIRED TO LOCATE GUIDE RAIL PIPES IN TRUE VERTICAL POSITION. MOUNTING HARDWARE AND BRACKET TO BE S.S. AND TO INCLUDE 1/4" S.S. BAR STOCK HOOK FOR HANGING LIFTING CABLE.
33. FORCE MAIN
34. INTERIOR LINING SYSTEM
35. CABLE SUPPORT BRACKET. SEE DETAIL.
36. AUXILIARY HIGH LEVEL ALARM FLOAT SWITCH WITH NO/NC CONTACTS
37. ULTRASONIC LEVEL TRANSMITTER AND BRACKET. SEE DETAIL.
38. EXTERIOR ASPHALTIC COATING
39. 6" CONCRETE PAD ON 6" CRUSHED SURFACING BASE COURSE AND SUBGRADE COMPACTED TO 95%.
40. ELECTRICAL SERVICE CIRCUIT. COORDINATE CONNECTION WITH UTILITY.
41. SUN SHELTER, SEE DETAIL.
42. CAST IRON FLOOR DRAIN 4" SDR 35 PVC DRAIN PIPE WITH P-TRAP INSTALLED AT 2% SLOPE TO WETWELL. INSTALL FLAP GATE ON OUTLET IN WETWELL.
43. POWER PANEL
44. CONTROL PANEL
45. ANTENNA AND POLE
46. POWER AND SENSING HANDHOLE
47. GALVANIZED STEEL RIGID CONDUIT FOR POWER AND CONTROL CABLES
48. GATE VALVE W/VALVE BOX (FLGxMJ) WITH MEGALUG JOINT RESTRAINT
49. JUNCTION BOX
50. CONSTRUCT CONCRETE FILLET (TYPICAL) APPLY WELD -CRETE® OR APPROVED EQUIVALENT BONDING AGENT. APPLY IN CONFORMANCE WITH MANUFACTURERS RECOMMENDATION.
51. 6" SCH 80 PVC VACTOR SUCTION PIPE PER DETAIL. DRILL TWO 1" HOLES IN PIPE 7' BELOW TOP OF SLAB. PROVIDE ST.ST. PIPE SUPPORTS AND FEMALE CAMLOCK FITTING.
52. McCROMETER MAGMETER (ULTRA MAG) FLOWMETER
53. GATE VALVE W/VALVE BOX (FLGxFLG)



SP-3b
PUMP STATION
MECH. NOTES

PUBLIC WORKS ENGINEERING

DATE: 10/5/21

DWG: SP-3b

CHANNEL THROUGH FILLET
TO SUCTION PIPE INLET

WET WELL

9"

WET WELL

1/2" ST.ST.CONCRETE
ANCHOR BOLTS WITH
4" MIN. EMBED. TYP.

6" SCH 80 PVC
SUCTION PIPE

3/16" ST.ST. PIPE
SUPPORTS, TYP. OF 4

45°

FILLET

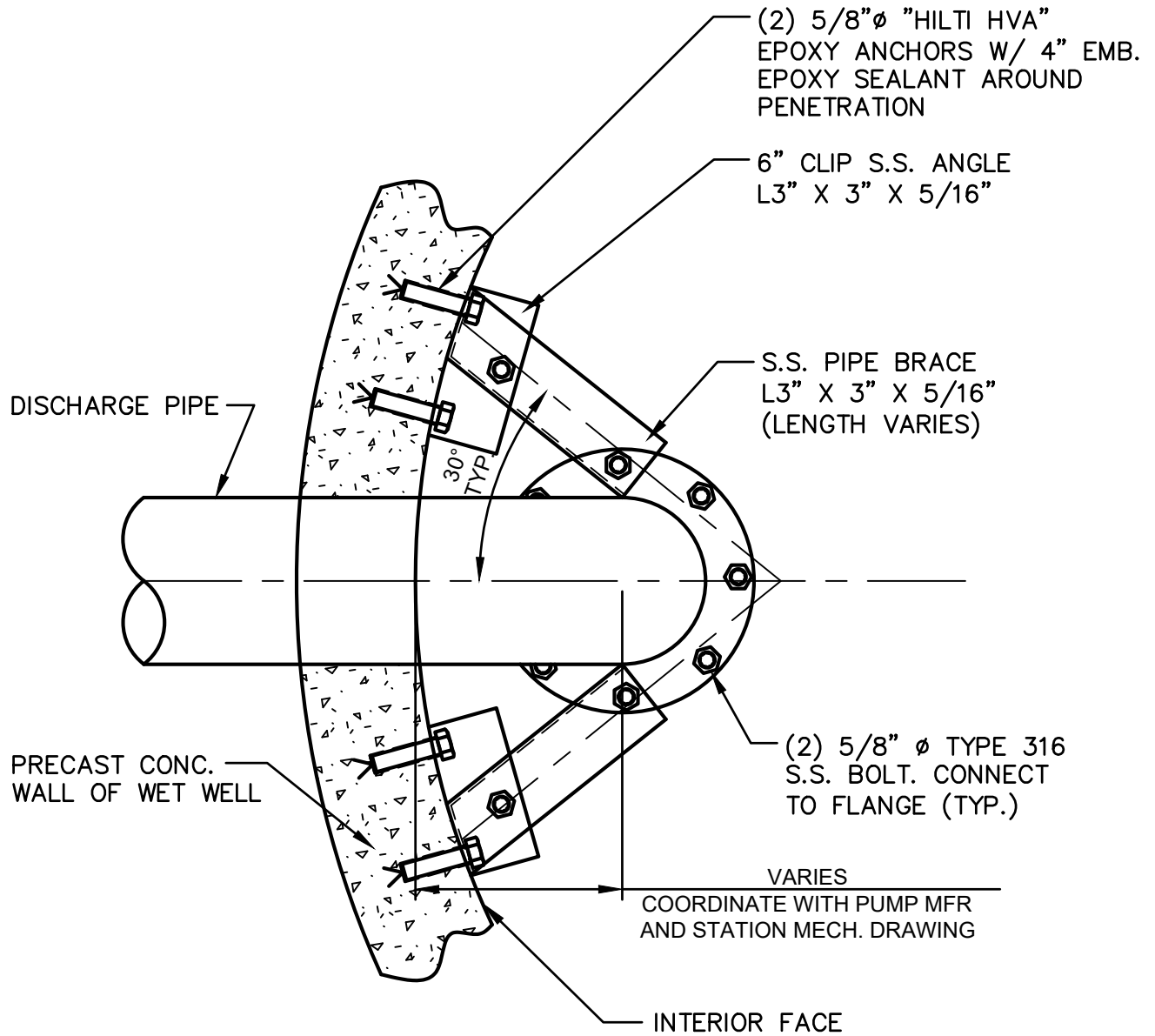


SP-4
VACTOR SUCTION
PIPE DETAIL

PUBLIC WORKS ENGINEERING

DATE: 10/5/21

DWG: SP-4



PLAN VIEW

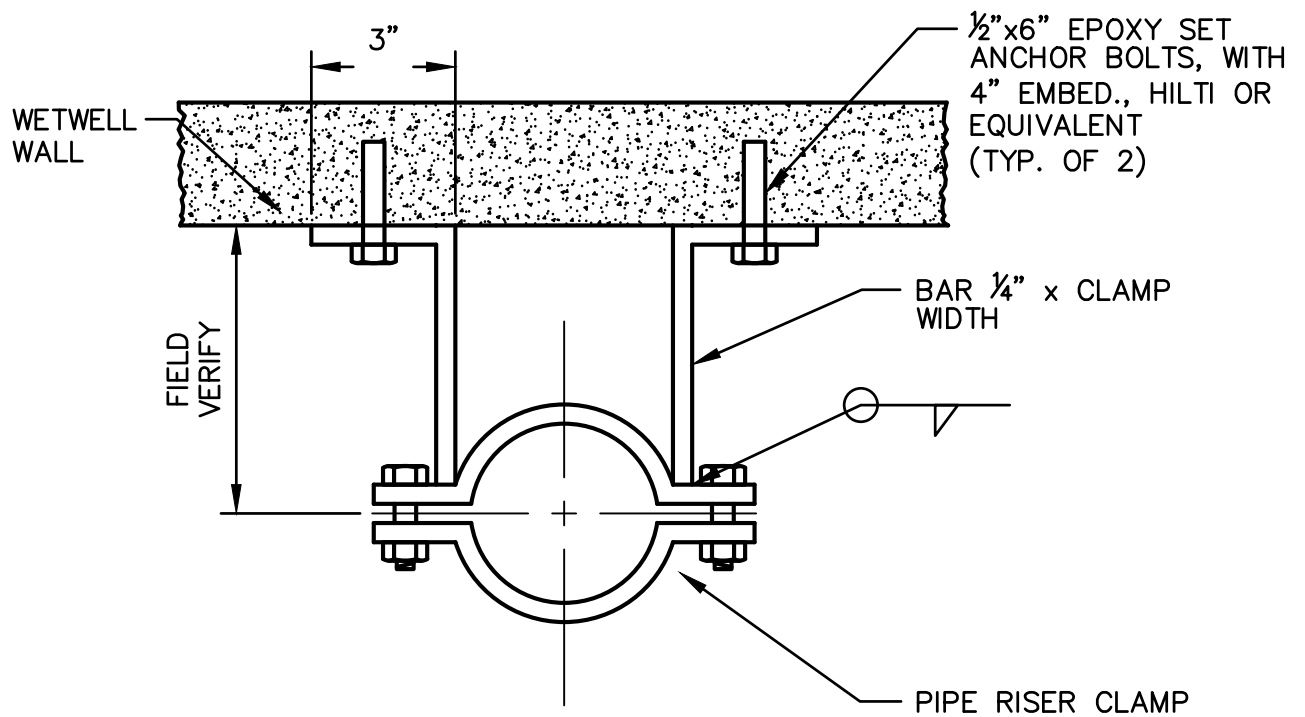


SP-5
THRUST RESTRAINT
PIPE SUPPORT DTL

PUBLIC WORKS ENGINEERING

DATE: 10/5/21

DWG: SP-5



NOTES:

1. ALL HARDWARE AND BRACE MATERIALS TO BE STAINLESS STEEL

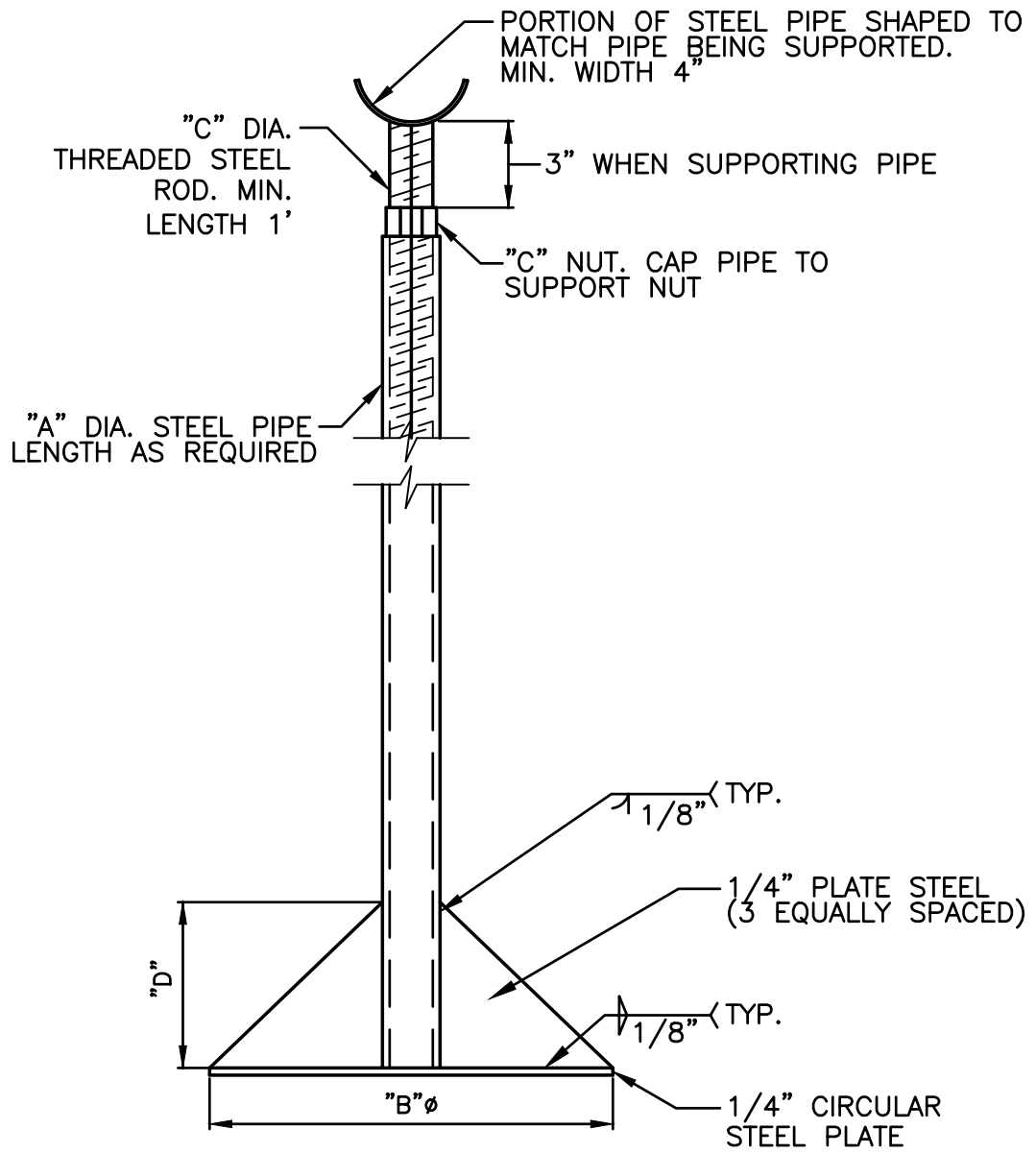


SP-6 PIPE BRACE DETAIL

PUBLIC WORKS ENGINEERING

DATE: 10/5/21

DWG: SP-6



A	B	C	D
2"	1'-0"	1-1/2"	0'-6"

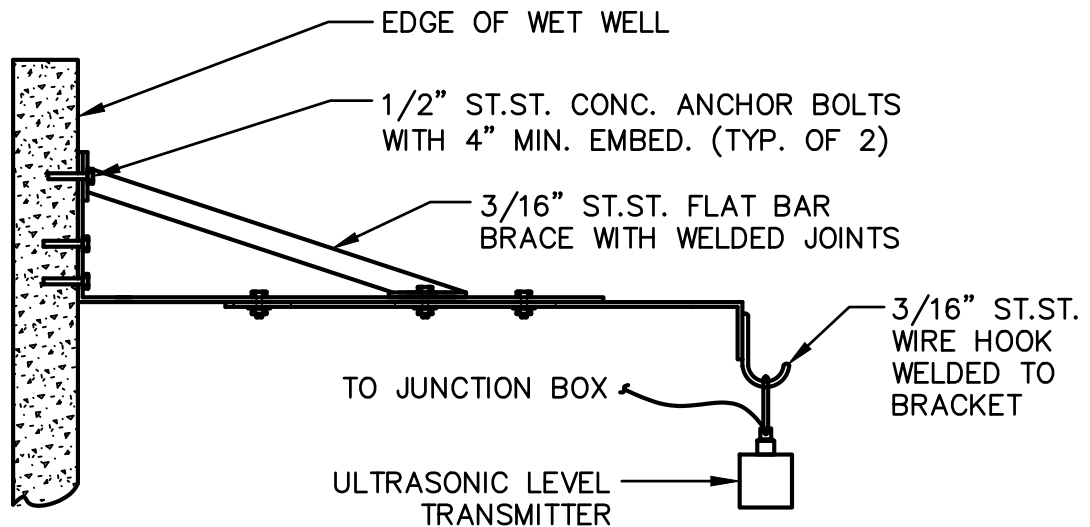
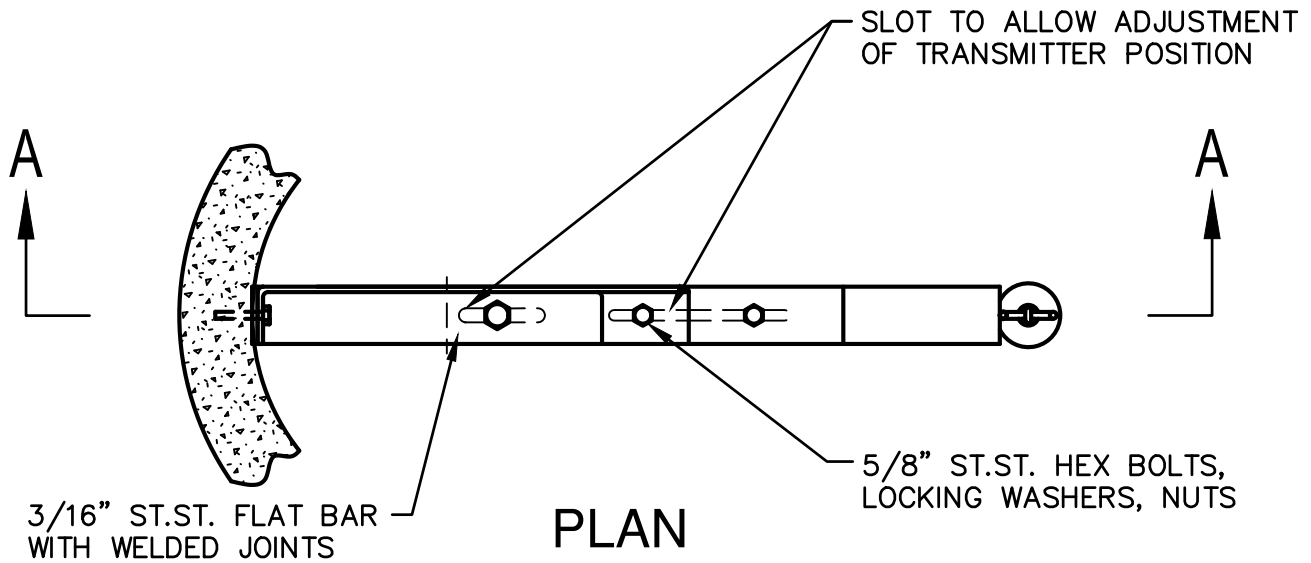


SP-7
TYP. STEEL PIPE
SUPPORT DETAIL

PUBLIC WORKS ENGINEERING

DATE: 10/5/21

DWG: SP-7



NOTES:

1. SEE PUMP STATION MECHANICAL PLAN FOR PROPER ORIENTATION.
2. FIELD ADJUST TO AVOID CONFLICTS WITH PUMP REMOVAL AND TO OPTIMIZE TRANSMITTER PERFORMANCE.
3. PROVIDE DIMENSIONED SHOP DRAWING SUBMITTAL.

SECTION A-A

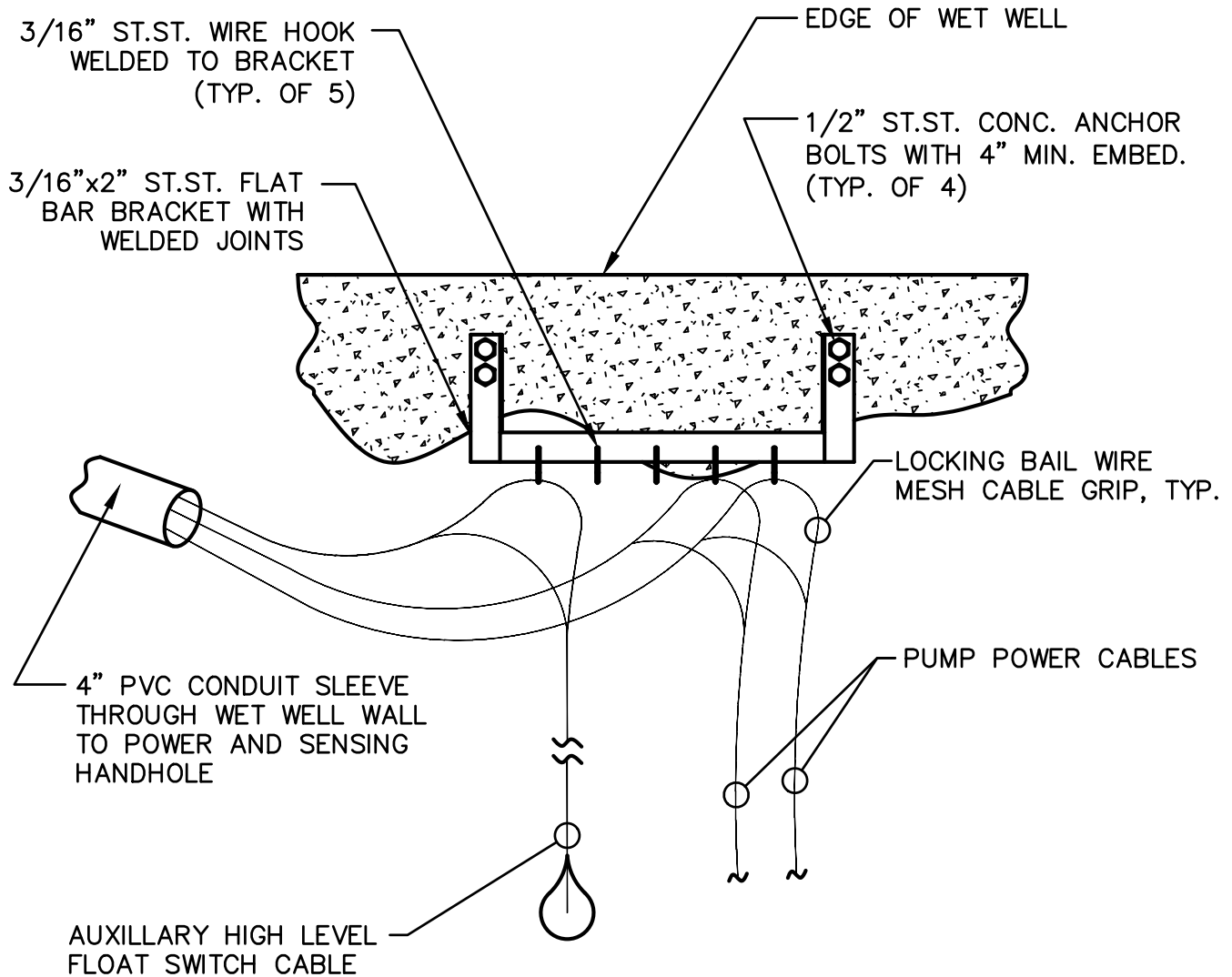


**SP-8: ULTRASONIC
LEVEL TRANSMITTER
AND BRACKET DETAIL**

PUBLIC WORKS ENGINEERING

DATE: 10/5/21

DWG: SP-8



NOTES:

1. SEE LIFT STATION MECHANICAL PLAN FOR PROPER ORIENTATION.
2. FIELD ADJUST TO AVOID CONFLICTS WITH PUMP REMOVAL AND TO OPTIMIZE FLOAT SWITCH PERFORMANCE.
3. PROVIDE DIMENSIONED SHOP DRAWING SUBMITTAL.

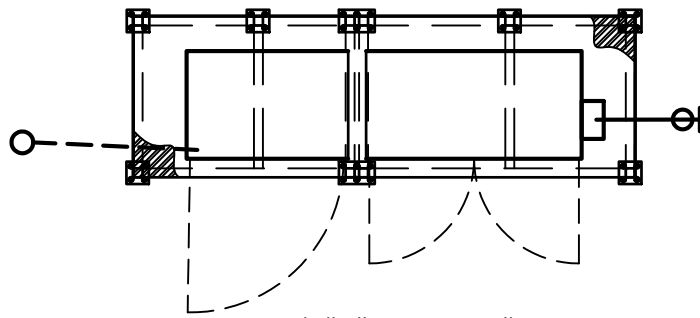


SP-9 CABLE SUPPORT BRACKET DETAIL

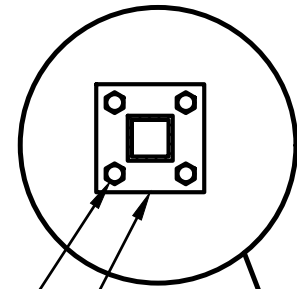
PUBLIC WORKS ENGINEERING

DATE: 10/5/21

DWG: SP-9



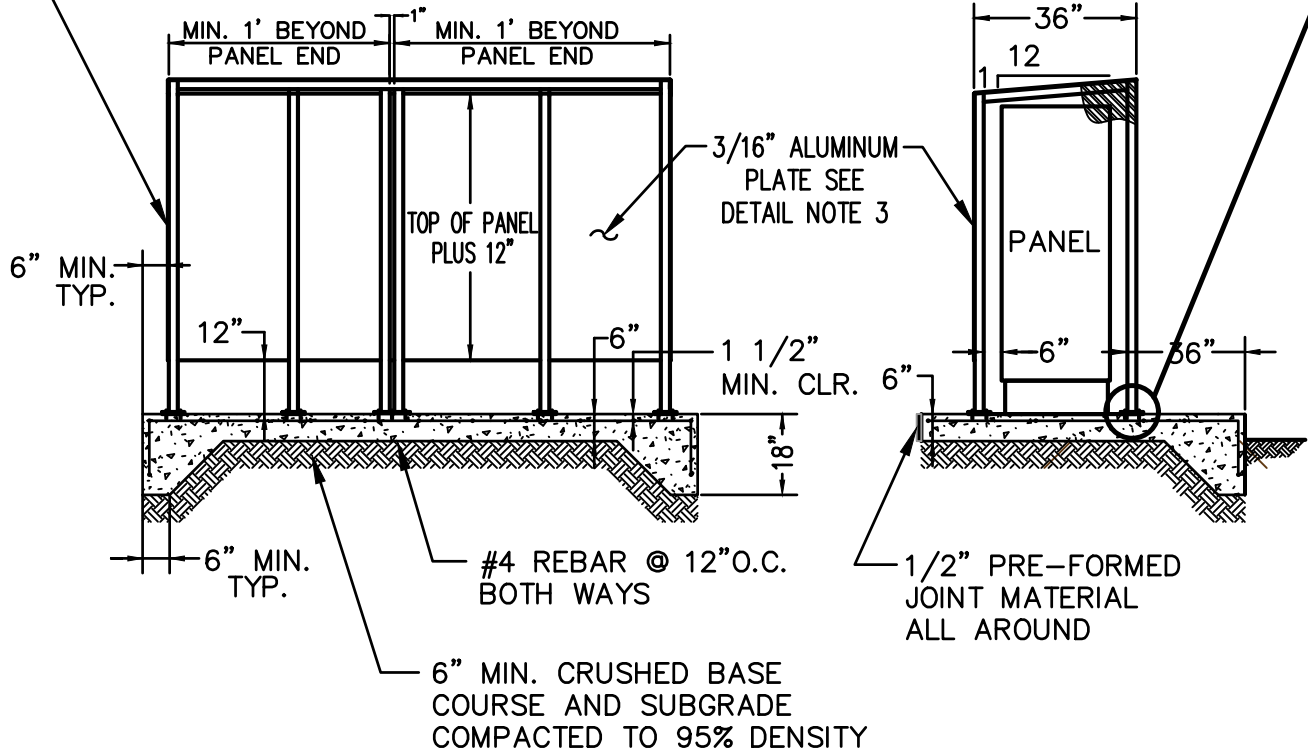
5/8" "REDHEAD" CONCRETE ANCHOR BOLT WITH 4" MIN. EMBED. TYPICAL OF 4 PER VERTICAL SUPPORT



PLAN

5"x5"x3/16" FLAT BASE PLATE

2"x2"x1/4" ALUMINUM TUBING (TYP). SEE DETAIL NOTE 3



NOTES:

1. ALL PANELS SHOP FABRICATED AND ANODIZED AFTER FABRICATION.
2. DOORS TO FACE NORTH (±)
3. ALUMINUM MAY BE SUBSTITUTED WITH HOT-DIPPED GALVANIZED STEEL.
4. PROVIDE DIMENSIONED SHOP DRAWING SUBMITTAL.



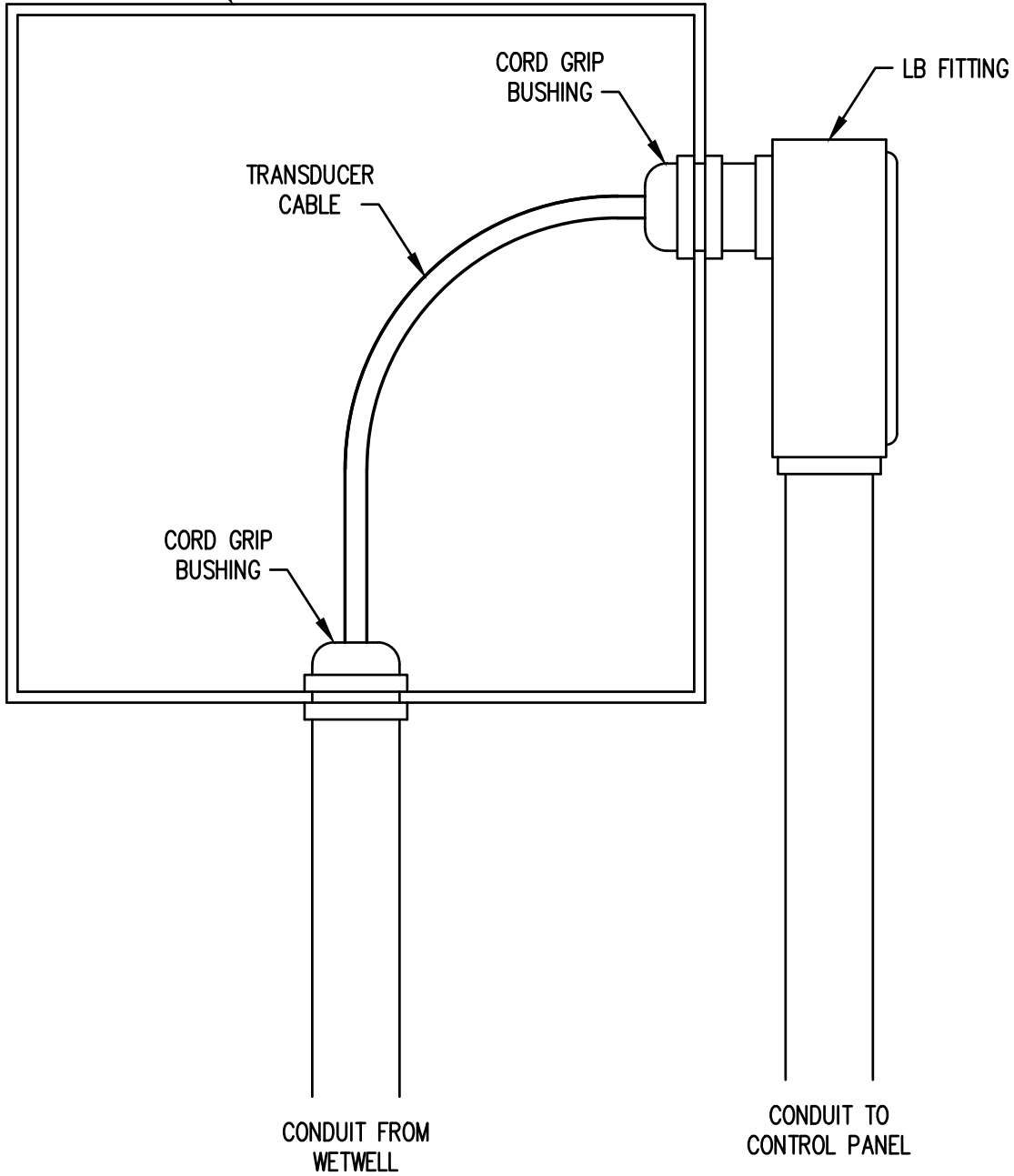
SP-10
PUMP STATION SUN
SHELTER DETAIL

PUBLIC WORKS ENGINEERING

DATE: 10/5/21

DWG: SP-10

NEMA 3R
ENCLOSURE
(6"X6"X4" MIN)



SP-11
TRANSDUCER CABLE
J-BOX DETAIL

PUBLIC WORKS ENGINEERING

DATE: 10/5/21

DWG: SP-11