

CITY OF PORT TOWNSEND
GOLF COURSE
WELL PUMP INSTALLATION & IRRIGATION SYSTEM IMPROVEMENT
PROJECT
TECHNICAL SPECIFICATIONS

June 1, 2021

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GENERAL

This project is installation of a vertical turbine well pump in an existing well, construction of a well building, design and installation of power, and mechanical pipe installation for an irrigation well. While this well will be used primarily for irrigation purposes, the well also serves as a backup domestic water supply; therefore, all work shall be done in accordance with AWWA standards of practice for drinking water supplies. The location is the City of Port Townsend Golf Course at 1948 Blaine Street. The well pump assembly and all instrumentation will be provided by the City. City forces will install all underground piping downstream from water meter vault. The construction Contractor will be responsible for assembling the remaining complete project as described below:

The division of work shall be as follows:

Construction Contractor (this contract)

- Well house construction, pumping works installation, and controls, in their entirety
- Electrical design and all wiring and conduits, power panels, and assembly including installation of city provided pump control / telemetry panel.

- Underground piping between the water meter and well house,
- Installation of the water meter and associated piping inside the City provided vault
- Provide all materials and assembly not specified as being provided by the City or others.

City of Port Townsend

- The City will provide the pump, column/shaft, and motor complete for the contractor to install.
- The City will provide a pump control / telemetry panel for the contractor to install.
- The City will install the water meter vault and piping between the vault and the mainline intertie.
- The City will install the buried water main from water meter vault to the system intertie site
- The City will install the water system intertie, including
 - A double check valve and connection piping, in a buried vault,
 - Two bypass vaults, and
- The City will separate the irrigation system from the existing domestic system at F Street

City of Port Townsend work will be completed before construction contractor work begins.

Construction plans attached and these specifications describe the work. Detail on items of work follow:

WELL HOUSE / PUMP STATION

Install a two-foot-long suction pipe with strainer, the eleven-stage pump, discharge piping and drive shaft, and the electric motor. The well depth, from pump mounting flange to top of well screen is 86.5 feet. The pump assembly, from discharge flange to strainer, including the electric motor, will be provided by the City.

Additionally, in the well house / pump station, the Contractor shall furnish and install the following:

- a 3" x 6" reducer;
- a 3" Cla-Val 60-32 (back pressure sustaining) pump control valve;
- two 3" gate valves;
- one 1" combination air valve (air release / vacuum relief);
- one 1.5" pressure relief valve with 1.5" ball valve (City supplied/Contractor installed);
- one 1.5" electronic water meter (City supplied/Contractor installed);
- one steel 3" x 4" reducer with a 1" FPT nipple;
- one 3" x 12" pipe spool including a 1.5" FNPT tap;

- pipe supports;
- 3" ductile iron (DI) pipe and fittings;
- 1.5" stainless steel, schedule 40 pipe and fittings;
- an 86-gallon fiberglass pressure tank with 1-1/4" schedule 80 PVC piping and a 1-1/4" PVC ball valve;
- two – 3" buried conduits from PUD transformer to well house building, two - 3" under-slab panel to motor electrical conduits, one – 1" conduit for pressure transducer cable, one – 1" conduit for 1 1/2" flow meter and pressure transmitter cables and one – 2" conduit for telemetry antenna cable;
- Building door contact switch with disable connected to control panel;
- All mechanical plumbing and electrical parts not specifically listed to make the project complete.

The pump station building shall consist of a concrete slab-on-grade foundation (2500 psi 28 day compressive strength) with 2x6 insulated stud walls, a mono pitch removable flat roof with steel roofing, one door, and four wall vents; all as shown on the plans and as specified herein.

POWER & CONTROLS

The power system shall be Contractor designed. The contractor shall provide engineered design shop drawings for submittal and approval. All electrical work shall be in accordance with the latest edition of the National Electrical Code, National Electrical Safety Code, Washington State Electrical Code, and local ordinances. All products shall be UL listed. The contractor shall be responsible for obtaining an L&I electrical permit and all other required electrical permits.

The Contractor shall design, provide, and install the meter base, a power disconnect switch, the power panel, a 480V to 120V power transformer, and all required electrical systems shown and not shown on the Plans. The contractor shall install the pump control panel / telemetry panel provided by the City. The Contractor shall submit an electrical design, prepared by a Washington licensed electrical engineer, for City approval. The design shall have the features and functions described below. The Contractor shall obtain.

Meter Base and Service Disconnect

The contractor designed power shall include coordination with the Jefferson County PUD for providing and installation of a meter base and service disconnect switch.

Power Load Center

The contractor designed power load center panel shall consist of a NEMA rated wall mount enclosure of welded steel construction with gasketed heat sink and door. The load center panel shall include main breakers sized for the pump well and appurtenances. The

power center shall include a stepdown transformer sized for 40 amps for house power including lights and a 20-amp GFI receptacle and one spare 20 amp circuit. The load center and appurtenances shall be designed, provided, and installed by the contractor interior to the building.

Manual Transfer Switch

The contractor designed manual transfer switch shall be rated for the building and appurtenances. The contractor will provide the switch and all the wiring. The Contractor will provide and install a Crouse Hinds AR1047 S22 100amp 4-wire 4-pole receptacle plug receptacle on the exterior of the building to match the City's mobile auxiliary generator plug.

Pump Control Panel

The pump control panel will be provided by the City. All wiring to panel will be contractor furnished and installed. It will consist of a NEMA rated wall mount enclosure of welded steel construction with gasketed heat sink and door, assembled and pre-wired for circuit breaker type overcurrent protection. The panel will provide the following functionality (programming to be supplied by City).

- pump motor soft start,
- individual circuit breaker,
- thermal overload relays,
- hand / off / auto switch
- emergency stop button
- green run indicating light
- red fail indicating light
- alarm condition signal
- pump run elapsed time meter
- operation start counter
- dry contacts for pump run and pump fail telemetry
- power protection for surge and phase loss with pump shutdown control.
- mechanical high pressure pump off control.
- mechanical low pressure pump off control with delay for pump startup
- programmable logic controller (PLC) will include:
 - Pump control capabilities as follows:
 - Time based pump operations
 - Flow based pump operations
 - High and low pressure-based pump operations
 - Alarm based fail safe pump shut-downs
 - Pump control delay capabilities
 - A combination of the above control programming capabilities
 - Data collection and recording as follows:
 - Timer driven pump start and stop control with remote over-ride

- Remote manual pump start and stop controls
- Pump run time
- Well flow and totalizer
- Power quality
- Pressure upstream of control valve
- Pressure downstream of control valve
- Well water level
- Pressure relief flow meter and totalizer
- Alarm conditions (e.g., security, pump failure, low well water level)

Telemetry (City supplied)

The radio telemetry shall automatically transmit programmable logic controller data to the City’s water treatment plant data system. Antenna and cable will be City supplied and contractor installed.

Exterior Pump Run Lights

The contractor shall design, provide, and install LED exterior red and green lights above the door to indicate “green” when the pump is running and “red” when there is a pump fail condition.

As-Constructed Records and Warranty

The contractor shall provide “as-built” information on all items and work shown in the plans and specifications.

All work and materials shall have a minimum warranty period of one year from the date of contract acceptance. The contractor shall provide all equipment warranties

WATER METER VAULT

Furnish and install one 3” x 4” DI reducer, two 3” gate valves, a 3” Seimens SITRANS FM D80 electronic water mater (City supplied), 3” DI pipe and fittings, pipe supports, in a buried 5’ x 4’ x 4’ deep concrete utility vault with 3’ x 3’ access door (City supplied).

BURIED PIPING (PROVIDED BY THE CITY)

Approximately 80 lineal feet of 4” DI pipe, Class 52, and fittings between the water meter vault and the system intertie.

SYSTEM INTERTIE (PROVIDED BY THE CITY)

One 4” gate valve, two 6” gate valves, two by-pass vaults with blow-off hydrants, 4” and 6” DI fittings, and thrust blocks: as shown on the Plans.

DOUBLE CHECK VALVE VAULT (PROVIDED BY THE CITY)

4" Ames Series 2000SS double check valve assembly, pipe supports, and a buried 6' x 3' x 4' concrete utility vault with 3' x 3' access door.

DISCONNECT SITE (PROVIDED BY THE CITY)

Remove an approximate 3-foot length of existing 6" PVC pipe. Furnish and install two 6" restrained joint couplings, each with a blind flange, and thrust blocks; as shown on the plans.

INSTALLATION

1. Pipe and Fittings Installation

Materials and methods shall be in accordance with Uniform Plumbing Code, latest edition, and local codes and regulations which are applicable.

Install ductile iron water mains in accordance with AWWA C600-93. Install pipes in accordance with manufacturer's recommendations. Use types and sizes of pipes as specified herein and/or as shown on the Plans. Where sizes of small pipe are omitted from the Plans and not mentioned in the specifications, use sizes corresponding to code requirements, and as required by equipment and plumbing fixtures and appurtenances. In any event, properly size any undesignated pipe sizes for functions to be performed.

Carefully lay pipe and supported at proper lines and grades. Follow piping runs shown on the Plans as closely as possible, except for minor adjustment to avoid architectural and structural features. Make major relocations, if required, in a manner acceptable to Engineer.

Keep openings in pipes closed during progress of work. Form thrust blocking so that bolts, joints, gaskets, and flanges of adjacent joints are clear of concrete and so that bolts and joints can be dismantled without removing concrete. All concrete blocking shall have a minimum compressive strength of 2500 psi. Pipe passing through concrete walls or slabs shall be made watertight.

2. Water Main Inspection and Testing

A. General

Furnish all required personnel and equipment and make all tests required to demonstrate the integrity of finished installation for approval of City and all agencies having jurisdiction. Testing shall meet AWWA standards.

B. Water Main Disinfection

After preliminary purging of system, chlorinate entire potable water portion of the system in accordance with C651-92 and C654-87 and any subsequent modifications thereof of American Water Works Association (AWWA) for flushing and disinfecting water mains, and wells in accordance with all other pertinent rules and regulations. Upon completion of sterilizing, thoroughly flush entire potable water system at a velocity of 3 feet per second, allowing four complete exchanges of contents. Do not discharge chlorinated material to storm or surface water systems without thoroughly neutralizing the chlorine residual remaining in the water.

In addition to meeting AWWA Standards, the contractor shall place all well equipment and above grade piping and appurtenances in 50 mg/L chlorine bath. Contractor shall take care to prevent contamination of equipment during installation.

After final flushing and before the potable water pipe is connected to or placed in service, the Contractor shall request that the Owner arrange to have a sample or samples collected for bacteriological testing. At least one sample will be collected from each branch of the pipe. A copy of the test results shall be delivered to the Contractor for review. The Contractor shall not connect the water pipe to the existing distribution system prior to acceptance of the bacteriological test by the Engineer.

C. Hydrostatic Pressure Testing

All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and other equipment necessary for performing the test shall be furnished and operated by the contractor. All thrust restraints shall be in place prior to testing. The contractor shall supply temporary thrust restraint and remove after testing. The contractor is responsible for disposal of any waste, including water. The contractor shall supply water necessary for testing. Should the test fail to meet testing requirement, the contractor shall, at his own expense, locate and repair the defects and then retest.

Prior to calling out the owner to witness the pressure test, the contractor shall have all equipment set up completely ready for operation and shall have successfully performed the test to assure that the piping is in a satisfactory condition. If tests fail, additional trips required by the Owner or Engineer to witness another test shall be done at the contractor's expense.

Before testing, air shall be completely expelled from piping. Pressure testing shall be performed in two stages.

- a. Piping and appurtenances between the pump and the first isolation valve shall be tested under a hydrostatic pressure equal to 250 psi. For approval, no pressure drop will be allowed during this test. The test shall extend for a minimum duration of 15 minutes and up to a maximum of 60 minutes as directed by the engineer.

- b. Piping and appurtenances downstream of the first isolation valve shall be tested under a minimum hydrostatic pressure of 145 psi but absolutely not more than 275 psi. The contractor shall maintain a pressure in this range for a minimum of 15 minutes. For approval, the engineer shall be satisfied there are no leaks after performing visual inspection during the test.

3. Well Level Transducers

A well level transducer for this project will be provided by the City and installed by the Contractor. The transducer cable shall be installed as an un-spliced run from the pump control panel, and down inside a 1.5-inch PVC conduit strapped to the pump discharge pipe column. The contractor shall provide and install the PVC conduit.

The transducer will be a fully active Wheatstone Bridge type submersible, with 4-20ma output.

4. Testing, Startup and coordination with pump supplier and pump control / telemetry panel provider

Contractor shall be responsible for working with the pump supplier (Wastewater Solutions) for pump calibration, startup, and initial performance evaluation to meet specifications herein. The following is the specifications for the pump supplier:

The City's pump supplier will provide a trained, qualified manufacturer's representative to check installation and connection, perform field tests as indicated, and certify to Contractor and City that its performance does meet all specifications.

Prior to acceptance of installed pumps, manufacturer's representative shall demonstrate proper operation of pumps at capacities stated, at which time data shall be taken on total dynamic head, efficiencies and flow of the pumps. Certification shall be if pumps meet all requirements set forth in these specifications and submittal literature.

Repair and retest units failing field tests. If unit fails second test, unit will be rejected, and supplier shall furnish a unit that will perform as specified.

The Contractor shall also be responsible for working with Quality Controls Corp (QCC) for programming of the PLC and testing of the pump control panel.

The contractor shall provide 3 weeks advanced notice of the startup date to the City and suppliers. The advanced notice shall include a schedule of events for startup and testing. The schedule shall be coordinated with the suppliers to ensure that an orderly

testing and startup process is established.

MATERIALS

1. Ductile Iron Pipe

Ductile iron pipe shall be thickness class 52 and shall be cement-lined, unless otherwise specified, and shall conform to standards of ANSI Standard A21.51 (AWWA C151). Rubber gasket pipe joints are to be push-on-joint (Tyton) or mechanical joint (MJ) in accordance with ANSI Standard A21.11 (AWWA C-111), unless otherwise specified. Flanged joint shall conform to ANSI Standard B16.1. Standard thickness cement lining shall be in accordance with ANSI Standard A21.4 (AWWA C104).

Restrained joint pipe shall be ductile iron manufactured in accordance with requirements of ANSI / AWWA C151 / A21.51. Push-on joints for such pipe shall be in accordance with ANSI/AWWA C111 / A21.11. Pipe shall be Griffin Bolt-Lok or equal. Pipe thickness shall be designed in accordance with ANSI/AWWA C150/A21.50 and shall be based on laying conditions and internal pressures as specified in Section 15.2.A. Standard thickness cement lining shall be in accordance with ANSI/AWWA C104/A21.4.

When requested, furnish certification from manufacturer of pipe and gasket being supplied that inspection and all of the specified tests have been made and the results comply with requirements of this standard.

2. Ductile Iron Fittings

All fittings shall be ductile iron where possible. Ductile iron fittings shall be short body, cement-lined, and for Class 52 pressure rating. Metal thickness and manufacturing processes shall conform to applicable portions of ANSI Standards A21.20, A21.11, B16.2, and B16.4. Standard cement lining shall be in accordance with ANSI Standard A21.4 (AWWA C104). Mechanical joint (MJ), ductile iron, compact fittings 3 inches through 24 inches and 54 inches through 64 inches shall be in accordance with AWWA C153.

Ductile iron flange (FL) fittings shall be 150 pound in accordance with AWWA C110. Gasket material for flanges shall be neoprene, buna n, chlorinated butyl, or cloth-inserted rubber. Gaskets shall be full face ring type.

Type of ends shall be specified as mechanical joint (MJ), restrained joint (RJ), plain end (PE), or flanged (FL).

3. Steel Pipe and Fittings

Steel pipe and fittings shall conform to ANSI Standard D36.10 and ASTM A53, Type SE, or Grade B with thickness to meet the requirements of Section 15.2.A.

4. Stainless Steel Pipe and Fittings

Stainless steel pipe and fittings shall be alloy 316, schedule 40, and shall conform to ANSI Standard 316 and ASTM A312.

5. Resilient Wedge Gate Valves

All gate valves for water lines 2" and larger shall be of the resilient, wedge-type, non-rising stem and shall meet or exceed the performance requirements of AWWA C509 and be suitable for installation with the type and class of pipe being installed. The wedge shall be fully encapsulated with vulcanized SBR rubber. Ends to be as specified. Valve opening direction shall be counterclockwise.

Install valves and fittings in accordance with manufacturer's recommendation and as shown on the Plans. Verify alignment and adjustments after installation.

Install valves in strict accordance with manufacturer's instructions and as shown on the Plans. Provide buried valves with all operators or valve boxes installed so that wrenches and operators perform freely and without binding or other interference. Bed and backfill buried valves according to requirements of the pipe to which they are attached.

6. Combination Pump Control, Back Pressure Valve

The combination pump control, back pressure valve shall be a Cla-Val Model 60-32 (back pressure sustaining), or equal.

The valve shall be pilot-operated designed for pump discharge installation to eliminate pipeline surges caused by starting and stopping the pump and to provide adjustable back pressure on pump while it is running. The valve shall have a built-in lift-type check feature to automatically close the valve upon electric power failure or anytime pressure reversal occurs, to protect the pump from back spinning. Provide valve adjusted for 125 psi back pressure with a pressure adjustment range between 20 and 200 psi.

7. Combination Air Valve

The combination air valve (air release / vacuum relief) shall be a 1" Val-Matic model 201C.2, single body, or equal. The valve shall be diaphragm-actuated, single seat, hydraulically operated and shall have cover chamber sealed from the body by a flexible, synthetic rubber diaphragm. Control of valve shall be from single, direct-acting, adjustable spring-loaded diaphragm valve. Valve shall be equipped with air relief and vacuum breaker attachments. In operation, the valve is designed to be open when there is no pressure in the pilot system. Upon pump startup, the valve

relieves air from the inlet side of the valve. As water begins to flow into the air release valve, the main valve body closes. Upon loss of pressure on the inlet side of the valve, the valve automatically re-opens.

8. Water Meters (City supplied)

The flow meters shall be 3" Siemens SITRANS FM Mag 5100 W electromagnetic flow sensor, or equal and 1.5" paddle wheel meter. They shall have 150-pound flanges (3") and FNPT (1.5") and shall be equipped with a compatible data transmitter.

9. Pressure Relief Valves (City supplied)

The pressure relief valve shall be a 1.5" Straval RVC-05-NPT, or equal. Valve shall be calibrated with an adjustment range of 50 to 175 psi and factory set to open at 90 psi and capable of a 65-gpm discharge.

10. Double Check Valve Assembly (Provided by City)

The double check valve assembly shall be an Ames Series 2000SS, or equal. The assembly shall be complete with OS&Y isolation gate valves and flanged or mechanical joint couplings.

11. Pressure Gauges with Transmitter (Provided by City)

Install pressure gauges with transmitter at the locations shown on the Plans. Gauge shall be calibrated for 0 to 200 psi and be completely suitable for measuring potable water. The transmitter shall operate on 12 to 24 V DC with a 4 to 20 ma output. Overall accuracy shall be ± 1.0 percent of full scale.

12. Reserved

13. Flange Coupling Adaptor

The flange coupling adaptors shall have thrust restraint set screws, Romac Industries RFCA for DI pipe or RFCA-PVC for PVC pipe, EBBA iron, or equal.

14. Concrete Utility Vaults (Provided by City)

The buried concrete utility vaults shall be pre-cast by a manufacturer routinely engaged in the pre-cast business. The sizes shall be as shown on the plans, without bottom, with a top slab opening for a 3' x 3' Bilco access door, and with pipe cut-outs at each end. The vaults do not need to be traffic rated.

15. Utility Vault Access Doors (Provided by City)

The utility vault access doors shall Bilco Type J-Channel Framre-300 PSF, or equal. The frame shall be ¼" A36 steel, a diamond pattern steel tread plate cover (rated for 300 psf), heavy brass hinges with stainless steel pins, a type 316 stainless steel slam lock handle, and lift assistance piston withhold-open arm and grip release handle. All ferrous metal shall be hot dip galvanized.

16. Pressure Tank

The pressure tank shall be a Well Mate Model WM-25WB fiberglass, 86.7-gallon capacity, or equal. The tank is 24" diameter, 55-1/4" tall with a 1-1/4" MNPT connection. The tank shall have a factory set maximum pressure of 90 psi.

17. Adjustable Pipe Supports

Pipe supports shall be Standon S89, Adjustable Pipe Support, or equal. Secure pipe support to floor with (2) 1/2-inch diameter x 4-inch-long stainless-steel anchor bolts and to piping with flange bolts. Provide at locations shown on the plans.

18. Fixed Pipe Supports

Fixed pipe supports shall be cast-in-place concrete, 16" x 16" square x as required from top crushed rock to pipe spring-line.

19. Blow-off Hydrant and By-Pass Vault (Provided by City)

The by-pass vault shall include an Eclipse Mainguard #78 blow-off hydrant in an HDPE utility vault with an 18" x 18" bolt down lid and a 24" minimum depth, as shown on the plans.