

WASTEWATER UTILITY PUMPING STATION SPECIFICATIONS

PART 1 - GENERAL

1.1 PRECAST PUMPING STATION DESIGN CRITERIA

Specifier: Edit scope of section description below to correspond to project requirements; coordinate with section content.

Retain this article and edit as required. Delete information below if shown on Drawings.

1.2 Description: Site assembled precast wastewater utility pumping

1.3 SECTION INCLUDES

A. Site assembled and tested precast wastewater utility pumping stations, including:

1. Precast concrete wet well and valve vault.
2. Pumps and mountings.
3. Control panels.
4. Piping and Valves integral to pumping station.
5. Odor control system.

1.4 ACTION SUBMITTALS

- A. Product Data: Provide manufacturer's technical data including station capacities and operating characteristics.
- B. Pump Performance Curves.
- C. Shop Drawings: Show precast fabrication and installation details.

1.5 CLOSEOUT SUBMITTALS

- A. Field Reports: Provide quality-control test reports documenting station operation performance.
- B. Warranty: Copy of manufacturer's warranty.
- C. Operation and Maintenance Manual: Include component manufacturer's O&M manuals, approved station design, completed start-up report, and component manufacturer's schedule for maintenance requirements.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: NPCA-certified plant with experience and demonstrated capability to produce work specified in this Section
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of pumping stations that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including precast concrete structures, hatches, and other accessories.
 - b. Faulty operation of pumps, controls, or pumping and piping system accessories.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 2. Warranty Period for Complete Packaged Pump Station provided by a Single Source Supplier (Including Concrete, Pumps, and Control Panel): One year from date of delivery.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design: Provide site assembled precast wastewater utility pumping station, including specified controls, pumps, valves, internal piping, and precast concrete well and valve vault manufactured and furnished by **Jensen Precast**, (855) 468-5600, PumpStations@jensenprecast.com, www.JensenPrecast.com/Water-Resources.

2.2 PRECAST PUMPING STATIONS DESIGN CRITERIA

Specifier: Edit scope of section description below to correspond to project requirements; coordinate with section content.

Retain this article and edit as required. Delete information below if shown on Drawings.

- A. Description: Site assembled precast wastewater utility pumping station including controls, pumps, valves, internal piping, precast concrete well, and valve vault.
1. Pump Station Peak Design Flow: ___ gpm.
 2. Force Main: [New] [Existing] [, as shown on Drawings].
 - a. Length: ___ feet.
 - b. Inlet Pipe Size: ___ NPS.
 - c. Discharge Pipe Size: ___ NPS.
 - d. Pipe Type: [Ductile iron] [PVC] [HDPE DR11] [304 Stainless Steel].
 - e. Discharge Elevation: ___ feet
 3. Design Elevations: [As indicated].
 - a. Inlet Piping: ___ feet
 - b. Wet Well Finish Grade: ___ feet

- c. Wet Well Rim: ___ feet
- d. Wet Well Discharge Piping: ___ feet
- 4. Wet Well: Precast concrete.
 - a. Capacities and Characteristics: Provide base, barrel, flat top, and riser precast sections [as follows] to correspond to height of precast structures indicated [, as shown on Drawings].:
 - 1) Diameter or Dimensions: ___ inches.
 - 2) Inlet Pipe Size: ___ NPS.
 - 3) Discharge Spool Pipe Size: ___ NPS.
- 5. Valve Vault: Precast concrete.
 - a. Capacities and Characteristics: Provide precast sections [as follows] [, as shown on Drawings].:
 - 1) Diameter or Dimensions: ___ inches.
 - 2) Height: ___ inches.
 - 3) Inlet Pipe Size: ___ NPS.
 - 4) Discharge Spool Pipe Size: ___ NPS.
- 6. Flow Meter Vault: Precast concrete.
 - a. Capacities and Characteristics: Provide precast sections [as follows] [, as shown on Drawings].:
 - 1) Diameter or Dimensions: ___ inches.
 - 2) Height: ___ inches.
 - 3) Inlet Pipe Size: ___ NPS.
 - 4) Discharge Spool Pipe Size: ___ NPS.

2.3 PRECAST CONCRETE STRUCTURES

- A. General: Size indicated, with provision for sealant at joints, meeting ASTM C 913, designed according to ASTM C 890 for A-16 (AASHTO HS20-44), heavy traffic, structural loading.
- B. Round Precast Concrete Wells: ASTM C 478, precast, reinforced concrete.
 - 1. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
 - 2. Flexible Resilient Pipe Connectors: ASTM C 923:
- C. Precast Concrete Vaults: ASTM C 890, precast, reinforced concrete.
 - 1. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
- D. Joint Sealant: ASTM C 990, bitumen or butyl rubber.

Specifier: Retain waterproofing paragraph where required by project.

- E. Well and Vault Bituminous Waterproofing: Carboline 300M, Xypex, or comparable product acceptable to Engineer.

2.4 PRECAST CONCRETE MATERIALS AND MIX DESIGN

- A. General: Precast concrete according to ACI 318/318R.
- B. Concrete Design Mix: 4,000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

2.5 ACCESS DOORS AND FRAMES

- A. Access Door: [Single] [Double] [Triple]-leaf opening. ___" X ___" [Aluminum] [Steel] angle frame access hatch manufactured by Jensen MetalTech. Includes: TraxPlate™, lift assist, bituminous paint, flush lifting handle, 316 stainless steel nuts & bolts, hinges, and hold-open arm.
 - 1. Fabricated access hatches, doors, grates or covers required for equipment or maintenance access into Utility Structure shall be designed and fabricated in accordance with ASTM C1802 for the applicable Load Level. Fabricated access covers shall be manufactured using aluminum, or steel with slip-resistant material and torsion-assisted assemblies.
- B. Safety Accessories: Safety [chains] [net] [railing] [grate]

Specifier: Retain All applicable Sections in Part 2.6 where required by project.

2.6 WET-WELL ACCESSORIES

- A. Pipe Supports: Manufacturer's standard.
- B. Guide Rail Assembly: Guide rails, stainless steel, Type 304, with pump guide brackets configured to match requirements of selected pumps.
- C. Flexible Resilient Pipe Connectors: Flexible connector, ASTM C 923.
- D. Well Protective Liner: Liner shall be Dura Plate 100 as manufactured by A-LOK® Products, Incorporated, Tullytown, Pennsylvania.
 - 1. Liner Composition - The liner, channel joints, H-joints and corner joints shall be manufactured from an Acrylic PVC Alloy.
- E. Ventilation: [Ductile Iron] [PVC] piping, with internal insect screening.
- F. Odor Control Unit: Odor control valve shall be a Wager 1800 or 2050 series as manufactured by Robert H. Wager Company, Rural Hall, North Carolina.
 - 1. Control Valve - [Wager 1800-12lb. Odor Media Canister] [Wager 2050-50 lb. Odor Media Canister with mist eliminator] with a [4"], or [6"] flanged connection.
- G. Lifting Crane: Crane shall be a portable davit crane as manufactured by Thern Incorporated, Winona, Minnesota.
 - 1. Crane shall be sized according to manufacturer's recommendation as required for project.

2.7 PUMPS

- A. Basis of Design: Furnish and install ([1] [2] [3] [4]) [HOMA] [Barnes] [KSB] [Grundfos] submersible [non-clog] [vortex] [grinder] [chopper] type centrifugal pump with a self-engaging Autocoupling Assembly, or a comparable product approved by Engineer prior to bid.
- B. General Conditions:
1. As this pump will be utilized for solids handling, it must be capable of either repeatedly passing spherical solids up to 3 inch in diameter OR have the ability to macerate all solids prior to the solid entering the volute by using a rotating cutter mounted on the shaft immediately adjacent to the impeller.
 2. Pumps shall be designed to handle raw, unscreened sewage, stormwater, sludge, or similar contaminated liquid, with induction type electric motor assembled in a single body, watertight NEMA Type B chamber.
 3. The pumps shall be capable of maintaining their watertight integrity submerged under 80 feet of water.
 4. For all sewage pump stations, the pumps must comply with NEC Class 1, Division 1, Group C & D hazardous locations.
- C. **Materials of Construction:**
1. Primary materials of construction are listed below.
 - a. Major castings: ASTM A48 Class 40B Cast Iron.
 - b. Wear Ring: ASTM B144 Bronze.
 - c. Shaft: AISI 430F Stainless Steel.
 - d. Fasteners: AISI 304 Stainless Steel.
 - e. O-Rings: Nitrile Rubber.
 - f. Shaft Seals: Silicon Carbide/Silicon Carbide (impeller and motor side).
 - g. Cable Jacket: Neoprene.
 - h. Cable Entry: elastomer grommet, stainless steel washers.
 - i. Protective Coating: High Solids Epoxy
 2. Specific applications may warrant alternative materials. Alternate selections must be reviewed and approved by the Engineer of Record (EOR) prior to bid.
- D. Pump System Characteristics: As required to meet performance requirements.
1. Number of Pumps: [One] [Two] [Three] [Four].
 2. Capacity: ___ gpm.
 3. Motor Size: ___ hp.
 4. Total Dynamic Head: ___ feet.
 5. Static Head: ___ feet.
 6. Motor Speed: ___ rpm.
 7. Hydraulic Operating Efficiency: ___ percent, minimum.
 8. Shut-off Head: ___ feet.
- E. Pumping Station Electrical Characteristics:
1. Electrical Service:
 - a. Volts: [120] [208] [240] [480] V.
 - b. Phases: [Single] [Three].

c. Frequency: 60Hz.

2. Full-Load Amperes: ____.

2.8 PUMPING STATION CONTROLS

- A. Control Sequence of Operation: Cycle each pump on and off automatically to maintain well wastewater level. Automatic control operates both pumps in parallel if well level rises to starting point of lag pump, until shutoff level is reached. Automatic alternator, with manual disconnect switch, changes sequence of lead-lag sewage pumps at completion of each pumping cycle.
- B. Motor Controllers: Magnetic, full voltage, non-reversing. Include under-voltage release, thermal-overload heaters in each phase, manual reset buttons, and hand-automatic selector switches. Include circuit breakers to provide branch-circuit protection for each controller.
- C. Install labels to identify switches and controls.
- D. Control Panel: Complying with UL 508A, with weatherproof enclosure, covered compartments sized to accommodate controllers, circuit breakers, transformers, alternators, and programmable logic controller.
 - 1. Basis of Design Product: Provide California Motor Control Systems, Inc., [Zelio Series] [PV2 Series] [PV600 Series] [PV1200 Series] [Simplex] [Duplex] [Triplex] Control Panels, or a comparable product approved by Engineer prior to bid.
 - 2. Enclosure: NEMA 250, Type [3R] [4] [4X], [fiberglass], [powder-coated sheet steel], or [stainless steel].
 - 3. Control panel must be supplied with a dead front panel door.
 - 4. Secondary Main Disconnect: A secondary main disconnect panel must be installed in the immediate vicinity of the primary control panel. This main disconnect must have the ability to be locked out/tagged out during control panel maintenance.
- E. Level Control System: Senses variations of wastewater level in well. The system shall utilize mercury and lead free float switches as the primary level detection device. Redundant high level and low level back up floats are required.
 - 1. Basis of Design (Float Switch): [OPTI-FLOAT], [NOLTA] internally weighted, mercury and lead free Float Switch.

2.9 PIPING, VALVES, AND FITTINGS

- A. Ductile-Iron, Mechanical-Joint Pipe and Fittings:
 - 1. Ductile-Iron Pipe: AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless flanged ends are indicated.
 - a. Provide flanged ends within well and vault.
 - 2. Ductile-Iron Fittings: AWWA C110/A21.10, mechanical-joint, ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
 - 3. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
 - 4. Application: Buried service between well and vault.

B. Stainless-Steel Pipe and Fittings:

1. Pipe and Fittings: ASME A112.3.1, socket and spigot ends.
2. Application: Within submersed portion of well where indicated on approved Shop Drawings.

Specifier: If flow meter is required, retain requirement for meter vault above.

C. Flow Meter: Flanged magnetic type: Badger Meter or approved comparable product.

D. Check Valves: [AVK] [Val-Matic] [Milliken] [Flo-Matic] Flanged swing or ball check valves, suitable for use in raw wastewater and equipped with the following:

1. Ball Check Valves: [NBR Ball] [polyurethane ball]
2. Swing Type Check Valves: [base model] [lever & spring] [lever & weight] [dual lever & weight], [bronze disc] [backflow actuator] [mechanical indicator]

E. Isolation Valves: [AVK] [Val-Matic] [Milliken] [Flo-Matic] flanged [gate valve], or [eccentric plug valve].

F. Air Vacuum/Air Release Combination Valves: Manufacturer's standard.

2.10 FABRICATION

A. Precast Concrete Structures:

1. ASTM C 478 for precast wells.
2. ASTM C 890 for precast vaults.
3. Fabricate structures with continuous joints to provide watertight construction.
4. Prepare valve and meter vaults with factory installed piping, valves, sleeves and other devices required.

PART 3 - EXECUTION

3.1 PRECAST CONCRETE STRUCTURES

A. Install precast concrete structure sections with sealants per ASTM C 891 and ASTM C 1821.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a pump station manufacturer's authorized service representative to assist in testing and startup.

B. Tests and Inspections:

1. Test completed piping systems according to requirements of authorities having jurisdiction. Submit reports.
2. After installing wastewater pumping stations and after electrical circuitry has been energized, test pumps and controls for compliance with requirements.
3. After electrical circuitry has been energized, start units to confirm the station can run at pre-specified design parameters.
4. Test piping for leaks and defects.
5. Test and adjust controls and safeties.
6. Force Main: Test at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than 150 psig.

- C. Remove and replace components of the wastewater pumping stations that do not pass tests and inspections and retest as specified above.