SECTION 333213 - PACKAGED WASTEWATER PUMPING STATIONS

This Section specifies excavation, submersible pump basins, pumps, control panels, and accessories for packaged wastewater or sewage pumping stations for residential, commercial, industrial, or institutional use.

This Section divides materials for pumping stations by system, as follows:

- Basin system, including attendant cover with vent and access door, inlet and discharge, rail assembly for mounting pumps and controls, ball valves, junction box, and level controls.

- Pumping system, including pumps, breakaway fittings, piping, check valves, and pump brackets.

- Control system, including panel enclosure, internal components, and wiring.

This Section specifies single (simplex) pump or multiple (duplex, triplex) pump installations, with automatic pump operation such that sewage in pump basin is discharged into gravity interceptor or to treatment facility.

1. GENERAL
	* + 1. SUMMARY
				1. Section Includes: Packaged wastewater pumping stations.
				2. Related Requirements:

List other Sections directly related to or affecting Work of this Section. Include Sections specifying information expected to be found in this Section as well as Sections required to describe complete system or assembly requirements.

Section 033000 - Cast-in-Place Concrete: Requirements for cast-in-place concrete pad for basin.

Section 087100 - Door Hardware: Hardware for access doors.

Section [**099114 - Exterior Painting**]: Coating for pumps.

Section 220513 - Common Motor Requirements for Plumbing Equipment: Requirements for electric motors specified in this Section.

Section 310001 - Earthwork Materials: Soil material requirements for backfill to finish grade.

Section 310000 - Earthwork: Basin and related excavation. Requirements of excavation needed by this Section; Requirements for direct-burial cable to be placed by this Section.

Section 330561 - Concrete Manholes: Pumping station basin.

Section 330563 - Concrete Vaults and Chambers: Pumping station basin pad.

Section 330573 - Polyethylene Manholes: Pumping station basin.

Section 330576 - Fiberglass Manholes: Pumping station basin.

Section 406700 - Control System Equipment Panels and Racks: Pump control panel and accessories for a duplex wastewater pumping station.

* + - 1. REFERENCE STANDARDS

List reference standards included within text of this Section, with designations, numbers, and complete document titles.

LEED requires compliance with specific editions of referenced standards. Consider including publication dates for referenced standards in this Section to ensure that correct standard is used for LEED compliance.

* + - * 1. American Association of State Highway and Transportation Officials:

AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 10-lb Rammer and a 457-mm 18-in. Drop.

* + - * 1. American Bearing Manufacturers Association:

ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

ABMA 25.2 - Rolling Bearings, Linear Motion Recirculating Ball, Sleeve Type - Inch Series.

* + - * 1. ASTM International:

ASTM A48 - Standard Specification for Gray Iron Castings.

ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.

ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

ASTM A709 - Standard Specification for Structural Steel for Bridges.

ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).

ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3).

ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.

ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

* + - * 1. National Electrical Manufacturers Association:

NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

* + - * 1. UL Inc.:

UL 83 - Thermoplastic-Insulated Wires and Cables.

* + - 1. PREINSTALLATION MEETINGS
				1. Convene minimum [**one week**] <**\_\_\_\_\_\_\_\_**> [**weeks**] prior to commencing Work of this Section.
			2. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data:

Manufacturer information for basin, cover, hinged door, slide rail assembly, discharge piping, valves, junction box, level controls, and control panel.

Manufacturer information for pumps, including performance curve, breakaway fittings data, and access frame data.

Control panel data and panel wiring schematic.

* + - * 1. Shop Drawings:

Indicate [**layout of pumping station at scale of**] <**\_\_\_\_\_\_\_\_**> [**station layout as designed by station manufacturer**].

Indicate size, materials, and components of system.

Indicate basin size, inlet and discharge locations, cover dimensions, vent location, lifting [**rope**] [**cable**] location, check valve locations, ball valve locations, pump locations, discharge piping location, wiring diagrams, junction box locations, guide rail assembly location, level control locations, and ballast support flange dimensions.

* + - * 1. Manufacturer's Certificate: Certify that products meet or exceed specified sustainable design requirements.

Include separate paragraphs for additional certifications.

Include following paragraph if Contractor is responsible for designing products or assemblies. List affected products when Section specifies more than one product.

* + - * 1. Delegated Design Submittals: Submit Shop Drawings with design calculations and assumptions. Shop Drawings shall be signed and sealed by a Professional Engineer licensed in the State of New York.
				2. Test and Evaluation Reports: Submit written report showing that factory and field pump inspections, tests, and startup have been successfully performed.
				3. Manufacturer Instructions: Submit manufacturer's installation instructions and instructions for basin, pump, and panel systems procedures.
				4. Source Quality-Control Submittals: Indicate results of [**shop**] [**factory**] tests and inspections.
				5. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
				6. Manufacturer Reports:

Submit report of each visit of manufacturer's [**personnel**] [**representative**] <**\_\_\_\_\_\_\_\_**> to provide technical assistance during installation.

Submit startup report before final acceptance of pumps to document that pumping station operation meets performance requirements.

* + - * 1. Qualifications Statements:

Coordinate following subparagraphs with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer, installer, and licensed professional.

Submit manufacturer's approval of installer.

Remove paragraph if not a LEED project.

* + - 1. SUSTAINABLE DESIGN SUBMITTALS
				1. Section 018113 - LEED Documentation Requirements: Requirements for sustainable design submittals.
				2. Manufacturer's Certificate:

Certify that products meet or exceed specified sustainable design requirements.

Insert material certifications list below to suit products specified in this Section and Project sustainable design requirements. Specific certificate submittal and supporting data requirements are specified in Section 018113.

Materials Resources Certificates:

Certify source and origin for [**salvaged**] [**and**] [**reused**] products.

Certify recycled material content for recycled content products.

Certify source for regional materials and distance from Project Site.

* + - * 1. Product Cost Data:

Submit cost of products to verify compliance with Project sustainable design requirements.

Exclude cost of labor and equipment to install products.

Provide cost data for following products:

Edit list of material cost data below to suit products specified in this Section and Project sustainable design requirements. Specific cost data requirements are specified in Section 018113.

Salvaged, refurbished, and reused products.

Products with recycled material content.

Regional products.

<**\_\_\_\_\_\_\_\_**>.

* + - 1. CLOSEOUT SUBMITTALS
				1. Section 017716 - Contract Closeout: Requirements for submittals.
				2. Project Record Documents: Record actual locations of packaged pumping stations, including basins and control panel.
				3. Submit certification of pumping stations after performance testing.
			2. MAINTENANCE MATERIAL SUBMITTALS
				1. Operation and Maintenance Manual:

Provide Manufacturer’s Operation and Maintenance manuals for all components of the pumping station. Operation and Maintenance manuals shall be provided in a bound binder with separation between various system components. Provide three (3) hard copies to the Director’s Representative as well as a PDF electronic version.

* + - * 1. Spare Parts: Furnish [**one**] <**\_\_\_\_\_\_\_\_**> spare ball check valve and [**one**] <**\_\_\_\_\_\_\_\_**> spare ball valve.
				2. Extra Stock Materials: Furnish [**two**] <**\_\_\_\_\_\_\_\_**> pump rebuild kits.
			1. QUALITY ASSURANCE

Include following paragraph only when cost of acquiring specified standards is justified.

* + - * 1. Maintain <**\_\_\_\_\_\_\_\_**> [**copy**] [**copies**] of each standard affecting Work of this Section on Site.
			1. QUALIFICATIONS

Coordinate following paragraphs with requirements specified in SUBMITTALS Article.

* + - * 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
				2. Installer: Company specializing in performing Work of this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience [**and approved by manufacturer**].
				3. Licensed Professional: [**Professional Engineer**] <**\_\_\_\_\_\_\_\_**> experienced in design of specified Work and licensed [**in the State of New York**].
			1. DELIVERY, STORAGE, AND HANDLING
				1. Section 016500 - Materials and Equipment: Requirements for transporting, handling, storing, and protecting products.
				2. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
				3. Handling: Support basin with nylon slings connected to structural lift points when moving.
				4. Store materials according to manufacturer instructions.
				5. Protection:

Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

Provide temporary end caps and closures on piping and fittings, and maintain in place until installation.

Provide additional protection according to manufacturer instructions.

* + - 1. AMBIENT CONDITIONS
				1. Conditions: Do not install [**basin**] [**and**] [**concrete basin base**] if bedding is wet or frozen.
			2. EXISTING CONDITIONS
				1. Field Measurements:

Verify field measurements prior to fabrication.

Indicate field measurements on Shop Drawings.

* + - 1. EXTENDED WARRANTY

This Article extends warranty period beyond one year. Extended warranties may increase construction costs and State enforcement responsibilities. Specify warranties with caution. Note that Extended Warranties are not typically used and need to be approved by the OGS Project Manager.

* + - * 1. Furnish [**five**] <**\_\_\_\_\_\_\_\_**>-year prorated manufacturer's warranty for pump seals.
1. PRODUCTS
	* + 1. SYSTEM DESCRIPTION
				1. Pumping Station:

Configuration: [**Simplex**] [**Duplex**] <**\_\_\_\_\_\_\_\_**>.

Assembly: [**Shop**] [**Field**].

Basin Material: [**PE**] [**Fiberglass**] [**Precast concrete**] <**\_\_\_\_\_\_\_\_**>.

Pump Type: [**Submersible**] [**Nonclog**] <**\_\_\_\_\_\_\_\_**>.

Controls:

Multiple float switches.

Operation: Automatic.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Pumping Station:

Configuration: [**Simplex**] [**Duplex**] [**Triplex**] <**\_\_\_\_\_\_\_\_**>.

Assembly: [**Shop**] [**Field**].

Basin Material: [**PE**] [**Fiberglass**] [**Precast concrete**] [**Cast-in-place concrete**].

Pump Type: [**Submersible**] [**Self-priming**] [**Nonclog**] [**Grinder**] <**\_\_\_\_\_\_\_\_**>.

Controls:

Multiple float switches.

Operation: Automatic.

* + - 1. PERFORMANCE AND DESIGN REQUIREMENTS
				1. Pumps:

Capable of continuous submergence underwater without loss of watertight integrity to depth of 65 feet.

Design Flow Rate: <\_\_\_\_\_\_\_\_> gpm.

Design Flow Total Dynamic Head: <\_\_\_\_\_\_\_\_> feet.

Minimum Efficiency at Design Flow Rate: <**\_\_\_\_\_\_\_\_**> percent.

Minimum Flow Rate: <\_\_\_\_\_\_\_\_> gpm.

Minimum Flow Total Dynamic Head: <\_\_\_\_\_\_\_\_> feet.

Minimum Efficiency at Minimum Flow Rate: <**\_\_\_\_\_\_\_\_**> percent.

Maximum Flow Rate: <\_\_\_\_\_\_\_\_> gpm.

Maximum Flow Total Dynamic Head: <\_\_\_\_\_\_\_\_> feet.

Minimum Efficiency at Maximum Flow Rate: <**\_\_\_\_\_\_\_\_**> percent.

NPSH Available: <\_\_\_\_\_\_\_\_> feet.

Service Liquid: Municipal sewage.

Service Liquid Temperature Range:

Continuous Exposure: [104] [200] <\_\_\_\_\_\_\_\_> degrees F.

Intermittent Exposure: [160] <\_\_\_\_\_\_\_\_> degrees F.

Specific Gravity: <**\_\_\_\_\_\_\_\_**>.

Maximum Pump Speed: <**\_\_\_\_\_\_\_\_**> rpm.

Maximum Motor Speed: <**\_\_\_\_\_\_\_\_**> rpm.

Capable of handling municipal wastewater with solids concentration of <**\_\_\_\_\_\_\_\_**> percent.

Discharge Connection Elbow: Permanently installed in chamber with discharge piping.

Connection: Automatic to discharge connection elbows when lowered into place, and easily removed for inspection or service.

Guide Bracket:

Integral part of pump unit.

Entire weight of pump unit guided by not less than two guide bars, and pressed tightly against discharge connection elbow with metal-to-metal contact.

Discharge Interface Seal: Diaphragm.

Do not permit any portion of pump to bear directly on floor of sump.

* + - * 1. Basin:

Wall Thickness: Sufficient to withstand water-saturated sand load of 120 pcf.

Live Load: [150] <\_\_\_\_\_\_\_\_> psf.

* + - * 1. Operation:

First subparagraph below is for simplex systems and second subparagraph is for duplex systems. Edit for systems using more than two pumps.

Simplex:

Locate three float switches, LS-1, LS-2, and LSH-1, in basin as indicated on Drawings.

When level in basin rises to Elevation <**\_\_\_\_\_\_\_\_**>, float switch LS-1 is activated to energize pump automatically.

When level in basin drops to Elevation <**\_\_\_\_\_\_\_\_**>, float switch LS-2 is activated to de-energize pump automatically.

If level in basin continues to rise to Elevation <**\_\_\_\_\_\_\_\_**>, float switch LSH-1 is activated to annunciate HIGH-LEVEL alarm.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Duplex:

Locate four float switches, LS-1, LS-2, LS-3, and LSH-1, in basin as indicated on Drawings.

When level in the basin rises to Elevation <**\_\_\_\_\_\_\_\_**>, float switch LS-1 is activated to energize lead pump automatically.

When level in basin drops to Elevation <**\_\_\_\_\_\_\_\_**>, float switch LS-2 is activated to de-energize lead pump automatically.

If level in basin continues to rise to Elevation <**\_\_\_\_\_\_\_\_**>, float switch LS-3 is activated to energize lag pump automatically.

If level in basin continues to rise to Elevation <**\_\_\_\_\_\_\_\_**>, float switch LSH-1 is activated to annunciate HIGH-LEVEL alarm.

When level in basin drops to Elevation <**\_\_\_\_\_\_\_\_**>, float switch LS-2 is activated to de-energize both pumps automatically.

Alternation: Set pumps to automatically switch lead and lag designations after each pumping cycle.

* + - * 1. Sound, Vibration, and Thermal Control:

Dampen or suppress noise, and absorb vibration.

Accommodate thermal expansion and stresses.

Adjust or correct for misalignment in piping systems.

* + - 1. BASINS
				1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=8783&mf=04&src=wd):

Barnes, (937) 773-2442, A Crane Pumps and Systems Brand, 420 Third St., Piqua, OH 45356.

Goulds Water Technology, (315) 239-2499, 2881 East Bayard St. Ext., Seneca Falls, NY 13148.

Liberty Pumps, (800) 543-2550, 7000 Apple Tree Ave., Bergen, NY 14416.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Submersible [**simplex**] [**duplex**] <**\_\_\_\_\_\_\_\_**> basin system, including cover with vent and door, rail assemblies, discharge and fittings, union ball valves, junction boxes, and level controls.

Inlet Size: [**4**] <\_\_\_\_\_\_\_\_> inches.

Discharge Size: [**1-1/4**] [**1-1/2**] [**2**] [**2-1/2**] <\_\_\_\_\_\_\_\_> inches.

Structure: As specified in Section [**330561 - Concrete Manholes**] [**330573 - Polyethylene Manholes**] [**330576 - Fiberglass Manholes**].

Covers are available in steel, with access door. Covers are also available in concrete for concrete basins, with steel or aluminum doors based on various loadings.

* + - * 1. Cover:

Material: Steel with black asphalt coating.

Access Door:

Hardware: As specified in Section 087100 - Door Hardware.

Type: Lockable.

Vent: 2-inch diameter, bug free.

Hinges and Hardware: Stainless steel.

Consider using hubs, fittings, and couplings for fiberglass or PE basins, and consider grouting inlet and discharge pipes in concrete basins. Flexible discharge couplings may be used to minimize noise, vibration, expansion, and stress, as well as for correcting pipe misalignment.

* + - * 1. Inlet Fitting:

Flexible Fitting: Conform to [**PVC SDR3.5, ASTM D2241**] [**PVC Schedule 40, ASTM D2466**] [**PVC Schedule 80, ASTM D2467**].

Size: [**4**] [**6**] <\_\_\_\_\_\_\_\_> inches.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Consider using following paragraph for PVC or ABS gravity sewers.

* + - * 1. Inlet Hub:

PVC adapter.

Size: 4 inches.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Consider using following paragraph for cast-iron, ceramic, plastic, or ductile-iron gravity sewer piping.

* + - * 1. Inlet Hub:

Material: Cast iron.

Size: [**4**] [**6**] <\_\_\_\_\_\_\_\_> inches.

* + - * 1. Discharge Hub:

Material: Stainless steel.

Size: [**1-1/2**] [**2-1/2**] <\_\_\_\_\_\_\_\_> inches.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Flexible Discharge Coupling:

Description: 300 series, stainless-steel inner corrugated hose with outer braid.

Size: [**1-1/4**] [**1-1/2**] [**2**] [**2-1/2**] inches.

* + - * 1. Rail System:

Description: Slide rail assembly, consisting of Type 304 stainless-steel upper and lower rail brackets and pump guide brackets.

Material: Type [**304**] <**\_\_\_\_\_\_\_\_**> stainless steel.

Valving specified in this Section is for use within basin. Edit this Section as required to include separate valve box construction located after discharge and separated from basin.

* + - * 1. Ball Valves:

Description: Type 1 Schedule 80 PVC, Cell Classification 1254-B, with full-flow bore.

O-Rings: EPDM.

Pressure Rating: 150 psig, non-shock, at 73 degrees F.

End Connections: Union "quick disconnect" design.

Operation:

Extension Handle: Stainless steel.

OPEN-CLOSE: One-quarter turn.

Shutoff: Leak-tight.

* + - * 1. Junction Boxes: NEMA 250 Type 6, with cable grips for incoming direct-burial cable.
				2. Electrical Cable: Provide cable grips for direct-burial field installation.
				3. Level Controls:

Level Control System

The level control system shall be a pressure transducer type, comprising of a submersible pressure transducer: The submersible transducer shall be supply with a 4-20mADC level signal. The transducer shall have a temperature range of -40 to 125 degrees C and have an inaccuracy of plus or minus 0.1% of total range. The transducer shall be cable suspended and not dependent upon position. The sensor’s wetted materials shall be 316 stainless steel, provided with surge suppressor, polyurethane vented cable with bellows kit. The transducer shall be a Geotech pressure transducer or equal.

Secondary Level Sensing System

As a secondary sensing system, three (3) <Insert Note Here> float backup circuits shall be provided: The float switches shall consist of a mechanically activated SPDT micro switch encased in a polypropylene float. Mercury activated switches shall not be allowed. The interrupting capacity of the switch shall be 250V AC IOA resistive load, 250V AC 3A inductive load, or a 30V DC 5A. The plastic components shall be screwed or welded together. Plastic casings joined by adhesives shall not be allowed. The cable shall consist of 3 conductors in a PVC sheath. The float switch shall operate in media temperatures of 0 to +60 degrees C, and in media densities of 0.65 to 1.5 g/cm3. The float switch shall be ENM10 by ITT Flygt or equal.

Mounting: To float pole.

* + - * 1. Float Pole:

Comply with ASTM D1785.

Material: PVC, Schedule 40.

Diameter: 1/2 inch.

Pumps shall be closely coordinated with the OGS Project Manual and Facility for any specific requirements.

* + - 1. PUMPS
				1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=8773&mf=04&src=wd):

Barnes; A Crane Pumps and Systems Brand, (937) 773-2442, 420 Third St., Piqua, OH 45356.

Goulds Water Technology, (315) 239-2499, 2881 East Bayard St. Ext., Seneca Falls, NY 13148.

Zoeller Company, (502) 778-2731, 3649 Cane Run Rd., Louisville, KY 40211.

 Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

Sewage pumps differ primarily in their ability to handle solids. Submersible nonclog centrifugal pumps are generally available in 2- through 8-inch discharge sizes. Nonclog pumps typically handle spherical solids of up to 4 inches for unscreened sewage or industrial waste applications, generate heads of up to 258 feet, and have capacities of up to 5,400 gpm.

Submersible grinder pumps reduce residential, commercial, institutional, and light industrial sewage and objects to finely ground slurry for small-diameter [e.g., 1-1/4- or 2-inch] discharge piping. Grinder pumps are available for capacities of up to 104 gpm and heads of up to 160 feet.

Submersible effluent pumps are capable of handling septic tank effluent and raw domestic sewage. These pumps handle spherical solids of up to 3/4 inch in diameter with discharge piping of up to 3 inches in diameter.

* + - * 1. Description:

Submersible [**nonclog**] [**effluent**] [**grinder**] type with [**vertical**] [**horizontal**] discharge, fittings, piping, check valve, and pump brackets.

Discharge Size: [**1-1/4**] [**1-1/2**] [**2**] [**2-1/2**] <\_\_\_\_\_\_\_\_> inches.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Discharge Size: As indicated on Drawings.

Following requirements use grinder pump characteristics; edit accordingly for other types of pumps.

* + - * 1. Volute, Motor Housing, and Seal Plate:

Material: Cast iron.

Comply with ASTM A48, Class 30.

* + - * 1. Impeller:

Design: 10-vane, vortex type, with pump-out vanes on back side, dynamically balanced.

Material: Bronze.

* + - * 1. Shredding Ring and Cutter: Hardened 440C stainless steel to Rockwell C-55.
				2. Shaft: Type [**416**] <**\_\_\_\_\_\_\_\_**> stainless steel.
				3. Rings: [**Buna-N rubber**] <**\_\_\_\_\_\_\_\_**>.
				4. Hardware: Type <**\_\_\_\_\_\_\_\_**> stainless steel.
				5. Finish:

Air-dry enamel.

As specified in Section [**099114 - Exterior Painting**].

* + - * 1. Seal:

Design: Tandem mechanical, oil-filled reservoir.

Materials:

Rotating Faces: Carbon.

Stationary Faces: Ceramic.

Elastomer: Buna-N.

Hardware: Type <**\_\_\_\_\_\_\_\_**> stainless steel.

* + - * 1. Electrical Cable:

Length: 15 feet.

Furnish pressure grommet for sealing and strain relief.

* + - * 1. Upper Bearing:

Design: Single row, ball.

Comply with ABMA 9.

Lubrication: Oil.

Load: Radial.

Bearing life is percentage of failure at rated hours; for example, L-10 life at 40,000 hours means 10 percent of bearings may be expected to fail at 40,000 hours.

Minimum L-10 Life: 40,000 hours.

* + - * 1. Intermediate Bearing:

Design: Single row, ball.

Comply with ABMA 9.

Lubrication: Oil.

Load: Radial and thrust.

Minimum L-10 Life: 40,000 hours.

* + - * 1. Lower Bearing:

Design: Sleeve.

Comply with ABMA 25.2

Lubrication: Oil.

Load: Radial.

Minimum ABMA L-10 Life: 40,000 hours.

* + - * 1. Operation:

Electrical Characteristics:

As specified in <\_\_\_\_\_>.

<\_\_\_\_\_\_\_\_> hp <**\_\_\_\_\_\_\_\_**> [**RLA**].

Voltage: <**\_\_\_\_\_\_\_\_**> V, [**single**] [**three**] phase, 60 Hz.

Maximum [**Fuse Size**] [**Circuit Breaker Size**] [**Overcurrent Protection**]: <**\_\_\_\_\_\_\_\_**> A.

Minimum Circuit Ampacity: <**\_\_\_\_\_\_\_\_**>.

Minimum Power Factor: <**\_\_\_\_\_\_\_\_**> percent at rated load.

Controls: Mount double electrode in seal chamber to actuate remote alarm when water is detected in seal chamber.

Motors:

As specified in Section 220513 - Common Motor Requirements for Plumbing Equipment.

Type: Squirrel cage, induction.

Design: Shell type.

Housing: Air-filled, watertight chambers.

Insulation: Class B.

Non-overloading throughout entire pump performance range based on 1.0 service factor.

Duty: Continuous, capable of sustaining minimum of 10 starts per hour.

Indefinite operation without overheating when unsubmerged and operating in air.

Stators:

Dipped and baked three times in Class F varnish.

Heat-shrink-fitted into stator housings.

Furnish thermal sensors to monitor stator temperatures.

Include three thermal switches embedded in end coils of stator winding, for one switch in each stator phase.

Stator Windings and Leads: Insulated with moisture-resistant Class F insulation capable of resisting temperature of 311 degrees F.

Cooling System:

Water jacket encircling stator housing.

Furnish cooling media channels.

Junction Chamber:

Furnish terminal board.

Seal from motor by elastomeric compression seal (O-ring).

Furnish connection cable conductors and stator leads with threaded, compressed-type binding post permanently affixed to terminal board.

* + - * 1. Breakaway Fittings Movable Subassembly:

Antisyphon Ball Check Valves, 1-1/4 and 2 Inches:

Housing: Cast iron, ASTM A48, Class 30.

Ball: Natural rubber.

Plug: PVC, ASTM D2466, Schedule 40.

Rated Temperature:

176 degrees F.

Peak: 212 degrees F.

Pressure Rating: 150 psig.

Antisyphon Ball Check Valves, 4 and 6 Inches:

Housing: Cast iron, ASTM A48, Class 30.

Seal: Natural rubber.

Ball: Natural rubber-covered hollow iron.

Hardware: 18-8 stainless steel.

Access Plate: Cast iron, ASTM A48, Class 30.

Rated Temperature:

176 degrees F.

Peak: 212 degrees F.

Pressure Rating: 125 psig.

Antisyphon Ball Check Valves, 1-1/4, 1-1/2, and 2 Inches:

Housing: PVC.

Ball: [**Nitrile**] [**or**] [**Buna-N rubber**].

Plug: PVC.

Rated Temperature: 176 and 212 degree F peak.

Pressure Rating: 150 psig.

Pump Brackets: Type [**304**] <**\_\_\_\_\_\_\_\_**> stainless steel.

Movable Components: Cast iron.

Discharge Piping: Stainless steel, Schedule 40.

* + - * 1. Lifting Device:

Description: Polypropylene rope.

Diameter: 3/8 inch.

Twisted three strand, with knots in 18-inch increments.

Breaking Strength: 2,440 lbf.

Weight: 0.028 lb/ft..

* + - 1. CONTROL PANEL
				1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=8784&mf=04&src=wd):

Aqualogics Systems, Inc., (315) 413-0400, 5 Dwight Park Dr., Syracuse, NY 13209.

Flygt, (914) 323-5700, 1 International Dr., Rye Brook, NY 10573.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description.

As specified in Section 406700 - Control System Equipment Panels and Racks.

Factory fabricated, self-contained.

* + - * 1. Devices:

Switches:

HAND-OFF-AUTO.

Size: 1/2 inch.

NEMA 250 Type 1.

Lights:

Size: 1/2 inch.

NEMA 250 Type 1.

* + - * 1. Direct-Burial Cable:

Size: [**18/4**] [**18/6**] [**18/12**] [**10/4**]; Type TC, THHN, THWN [**, and TEFN**].

Comply with UL 83 for Types THHN and THWN.

Diameter: [**0.312 to 0.375**] [**0.438 to 0.500**] <\_\_\_\_\_\_\_\_> inch.

Remove paragraph if not a LEED project.

* + - 1. SUSTAINABILITY CHARACTERISTICS

Insert sustainable design characteristics in this Article to suit content of this Section and Project sustainable design requirements as specified in Section 018113.

* + - * 1. Section 018113 - LEED Documentation Requirements: Requirements for sustainable design compliance.
				2. Material and Resource Characteristics:

Recycled Content Materials: Furnish materials with maximum available recycled content [**including:**] [**.**]

Insert list of materials specified in this Section required to have recycled content.

<**\_\_\_\_\_\_\_\_**>.

Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project Site [**including:**] [**.**]

Insert list of materials specified in this Section required to be regional materials.

<**\_\_\_\_\_\_\_\_**>.

* + - 1. ACCESSORIES
				1. Sealant: Industrial silicon sealant for pipe penetrations in basin.
				2. Anchor Bolts, Nuts, and Washers:

Bent Anchor Bolts: Comply with ASTM A709, Grade 36.

Nuts: Comply with ASTM A307, Grade A.

Washers: Comply with ASTM A126.

Galvanize bolts, nuts, and washers according to ASTM A153.

* + - 1. SOURCE QUALITY CONTROL
				1. Provide shop inspection and testing of completed assembly.
				2. Inspection:

Verify that motor voltage and frequency is as shown on nameplate.

Verify that motor and cable insulation test for moisture content or insulation defects comply with UL 83.

* + - * 1. Testing:

Submerged Pump Run: Test to determine that pump meets hydraulic performance requirements.

Document and certify testing results in written report.

Include one or both of following paragraphs to require Director’s Representative inspection or witnessing of test at factory.

* + - * 1. Director’s Inspection:

Make completed [**packaged**] pump assembly available for inspection at manufacturer's factory prior to packaging for shipment.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspection is allowed.

* + - * 1. Director’s Witnessing:

Allow witnessing of factory inspections and tests at manufacturer's test facility.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspections and tests are scheduled.

Include following paragraph if reliance on manufacturer's approved quality-control program is sufficient for Project requirements.

* + - * 1. Certificate of Compliance:

If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

Specified shop tests are not required for Work performed by approved manufacturer.

1. EXECUTION
	* + 1. EXAMINATION
				1. Verify that inlet and discharge piping connections are size, location, and elevation as indicated on Drawings.
			2. PREPARATION
				1. Establish elevations of packaged pumping station with minimum <\_\_\_\_\_\_\_\_> feet of cover.
				2. Establish minimum separation of <\_\_\_\_\_\_\_\_> feet from [**other services**] [**sanitary sewer piping**] <**\_\_\_\_\_\_\_\_**> piping according to <**\_\_\_\_\_\_\_\_**> code.
				3. Protect piping [**system pieces**] [**systems**] from entry of foreign materials and water by using temporary covers, by completing sections of Work, and by isolating parts of completed system.
			3. INSTALLATION
				1. Excavation:

Excavate direct-burial cable trench as specified in Section [**310000 - Earthwork**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

Excavate to required elevation to install basin on undisturbed subgrade, as specified in Section [**310000 - Earthwork**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>, with minimum clearance of 4 inches between basin and surrounding earth.

* + - * 1. Basin:

Install basin as specified in Section [**330561 - Concrete Manholes**] [**330573 - Polyethylene Manholes**] [**330576 - Fiberglass Manholes**].

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Place, compact, and level aggregate bedding [**to minimum 8 inches**] [**as indicated on Drawings**].

Form and place concrete base pad, and trowel top surface level.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Attach basin support flange to precast concrete pad with anchor bolts, as specified in Section 330563 - Concrete Vaults and Chambers, before placing basin in excavation.

Install basin at proper grade and to alignment indicated on Drawings on [**aggregate base**] [**cast-in-place concrete base pad**].

Following two options do not apply to precast concrete pad construction.

Fasten basin support flange to concrete pad, with anchor bolts around basin perimeter.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Ballast basin with aggregate, over ballast support flange and around entire basin perimeter, to specific weight of not less than 63 lb per cubic foot of basin volume.

Seal cover penetrations [**as specified in Section**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**> [**with industrial silicone sealant**].

Set cover frames and covers level, without tipping, to indicated elevations.

Assemble basin components, including inlet hub/fitting, discharge hub, cover, pump support rail system, level controls, and junction box.

Connect to inlet and discharge piping with flexible connector.

Seal joints watertight where inlet and discharge pipes penetrate sump wall.

* + - * 1. Pumps:

Install pumps, including fittings, brackets, discharge piping, check valve to basin rail assembly, lifting device, and discharge.

Wire pump to junction box.

* + - * 1. Control Panel: Mount and wire control panel, including [**simplex**] [**duplex**] <**\_\_\_\_\_\_\_\_**> motor controls, circuit breaker, starter, control transformer, fuse box, terminal block, alternator, alarm, and running lights.
				2. Backfilling:

Backfill basin and direct-burial cable as specified in Section [**310000 - Earthwork**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

Maintain optimum moisture content of fill material to attain required compaction density.

After hydraulic test [**and seven days after placing cast-in-place concrete pad**] <**\_\_\_\_\_\_\_\_**>, evenly backfill around entire periphery of basin by hand, placing backfill material and hand tamping in [**4**] [**6**]-inch compacted layers to finish grade, and compact to [**95**] <**\_\_\_\_\_\_\_\_**> percent maximum density.

Do not use wheeled or tracked vehicles for tamping.

* + - 1. FIELD QUALITY CONTROL
				1. Inspection:

Check pump and motor for high bearing temperature and excessive vibration.

Check for motor overload by taking ampere readings.

* + - * 1. Preoperational Inspection:

Check pump and motor alignment.

Check for proper motor rotation.

Check pump and drive units for proper lubrication.

* + - * 1. Startup and Performance Testing:

Notify Director’s Representative [**three**] <**\_\_\_\_\_\_\_\_**> days prior to startup and performance testing.

Operate pump using clean water at design point for continuous period of two hours, under supervision of manufacturer's representative and in presence of Director’s Representative.

Verify pump performance by performing time/draw-down test or time/fill test.

Coordinate and operate pumps in conjunction with other Work of [**sewer**] [**treatment facility**] <**\_\_\_\_\_\_\_\_**>.

Select test standards referenced in following optional paragraphs appropriate to fill materials and to Project requirements. Consult geotechnical report.

* + - * 1. Compaction Testing: As specified in Section [**310000 - Earthwork**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Compaction Testing:

Select from among test standards referenced in following subparagraph appropriate for fill materials and Project requirements.

Consult geotechnical report to select compaction test method appropriate to fill materials being used and to Project requirements.

Comply with [**ASTM D1557**] [**ASTM D698**] [**ASTM D6938**].

If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

Testing Frequency: [**One**] [**Two**] <**\_\_\_\_\_\_\_\_**> for each lift.

* + - * 1. Equipment Acceptance:

Adjust, repair, modify, or replace system components failing to perform as specified and rerun tests.

Make final adjustments to equipment under direction of manufacturer's representative and in the presence of the Director’s Representative.

Document adjustments, repairs, and replacements in manufacturer's field services certification.

* + - * 1. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than <**\_\_\_\_\_\_\_\_**> days on Site for installation, inspection, startup, field testing, and instructing Facility personnel in maintenance of equipment. Coordinate with Director’s Representative.
				2. Equipment Acceptance:

Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

Make final adjustments to equipment under direction of manufacturer's representative and in the presence of the Director’s Representative.

* + - * 1. Furnish installation certificate from equipment manufacturer's representative attesting equipment has been properly installed and is ready for startup and testing.
			1. ADJUSTING
				1. Adjust basin, pump, and control panel systems such that station operates to performance requirements and according to Specifications. Coordinate with Director’s Representative.
			2. DEMONSTRATION
				1. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Facility personnel. Coordinate with Director’s Representative.
			3. ATTACHMENTS

When relying on separate schedules, tables, illustrations, or forms to specify product requirements, include list of each attachment. Include identical list of attachments in Project Manual table of contents.

Consider including schedule if Project includes more than one pumping station.

Insert attachments following END OF SECTION. Consider following examples when developing Project schedule.

* + - * 1. Packaged Wastewater Pumping Station Schedule:

Basin No. 1:

Diameter: 24 inches.

Depth: 60 inches.

Pump Discharge: 1-1/4 inches.

Basin No. 2:

Diameter: 30 inches.

Depth: 96 inches.

Pump Discharge: 2 inches.

END OF SECTION 333213