SECTION 33 32 18

COMMERCIAL GRINDER PUMP STATIONS

PART 1 GENERAL

1.1 DESCRIPTION

A. Summary:
   1. Commercial and industrial duplex pump stations shall be privately permitted in the Owner's name and shall be operated and maintained by the Owner.

B. Section Includes Installation of:
   1. Commercial grinder pump station.

C. Related Requirements:
   1. CFPUA Material Specification Manual (MSM).
   2. Section 31 23 34 – Excavation, Trenching, Dewatering and Backfilling.
   3. Section 33 01 12 – Identification for Utilities Piping.
   4. Section 33 31 23 – Sanitary Sewer Force Mains, Valves, and Appurtenances

1.2 REFERENCE STANDARDS

A. American Water Works Association:
   1. AWWA C600 – Installation of Ductile Iron Mains and Their Appurtenances.
   2. AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings

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

1.3 ADMINISTRATIVE REQUIREMENTS

A. Section 01 30 00 – Administrative Requirements

B. Coordination:
   1. Coordinate inspections and field start-up with Manufacturer, Owner, Engineer and CFPUA to run all pump station equipment through its proper functions.
   2. The existing sewer system must be kept in operation at all times. Where connections are made to existing mains or other shutdowns are necessary, permission must be obtained and arrangements must be made with the CFPUA Wastewater Collections ORC, Utility Services Division.
   3. No valves are to be operated unless a CFPUA representative is present. Any valves operated without a CFPUA representative present, or a directive may be subject of penalties in accordance with CFPUA's ordinance.
   4. Notify CFPUA no less than two business days prior to an event requiring a CFPUA representative to be present.

5. The Contractor shall, at least two business days in advance, notify citizens subject to interruption of service by means of door hangers or any other approved method of the starting time and duration of such interruption.
6. Bypass pumping and hauling operations may be required to interrupt service. A bypass pumping plan shall be submitted in accordance with Section 01 50 00 - Bypass Pumping. Shutdowns must be held to a minimum in both number and duration.

1.4 SUBMITTALS

A. Section 01 33 00 – Submittals

B. Product Data/Source Quality:
   1. Manufacturer's literature and specifications, as applicable, for products specified in this Section.

C. Manufacturer Certificates:
   1. Certificates of compliance with referenced standards, where applicable, including those of AWWA and others required by Engineer.

1.5 CLOSEOUT SUBMITTALS

A. 01 70 00 – Execution and Closeout Requirements

B. Project Record Documents:
   1. Maintain accurate and up-to-date record documents showing modifications made in the field, in accordance with approved submittals, and other Contract modifications relative to buried piping Work.
   2. Record actual locations of piping mains, valves, connections, thrust restraints, elevations, and other utilities found and not indicated on design plans.

1.6 QUALITY ASSURANCE

A. Perform Work according to AWWA, ASTM and PVC Pipe Association standards.

PART 2 PRODUCTS

2.1 CFPUA MATERIALS SPECIFICATION MANUAL

A. Refer to CFPUA Material Specification Manual (MSM) for the following products:

MSM Section	Material
A	Pipe
B	Fittings and Accessories
C	Joint Restraints
D	Valves and Accessories
F	Service Saddles and Tapping Devices
I	Castings & Aluminum Access Covers

K	Miscellaneous
L	Electrical
M	Coatings and Sealants
N	Concrete
O	Structures

2.2 MATERIALS & ACCESSORIES

A. Grinder Pump Systems:
   1. Commercial sewer grinder pumps shall be
      a. Duplex Barnes or Flygt Semi-Positive Displacement Pump, or approved equal
      b. The Engineer shall model the system and select a pump with the appropriate discharge head conditions to operate satisfactorily under all operating conditions.
   2. Duplex grinder pump station shall have a minimum storage capacity based on the daily design flow as described in 15A NCAC 02T .0114 above the Lag Pump (Pump 2) On level; pump discharge brass adapter socket, aluminum lid with bug free screen mushroom vent on tank lid, extended base for anchoring the anti-flotation concrete ballast to tank, Contractor shall provide ballast as required.
      a. Floodplain applications shall include a watertight lid, no mushroom vent on lid; a (2) inch NPT female hub shall be provided in place of the mushroom vent for installation by the Contractor for side wall venting of the tank utilizing Schedule 80 PVC vent piping.
   3. Pump and motor shall be a vertical rotor, motor driven, solids handling type; Double O-ring seal at all casting joints, pump castings cast iron, fully epoxy coated 8-10 mils nominal dry thickness; rotor shall be stainless steel, through hardened, polished' maximum discharge pressure shall not exceed 150 psi.
   4. Grinder shall be direct driven, fastened to the pump motor by means of a threaded connection; cutter teeth hardened to Rockwell 50-60 abrasion resistance; solids must be fed in an upward flow.
   5. Integral check valve shall be factory installed, gravity operated; Flapper type integral check valve built into the stainless-steel discharge piping; Must provide a full-ported passageway when open; Working parts construction of 316 stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance.
   6. Duplex station shall have an audible and visual high-level alarm with a battery backup for alarm circuitry.

B. Commercial sewer service laterals:
   1. (2) inch minimum, SDR-9 or Polyethylene (PE), with a minimum pressure rating of (200) psi.

C. Bedding, Cover, and Backfill:
   1. As specified in Section 31 23 34 – Excavating, Trenching, Dewatering and Backfilling.

D. Pipe Location Wire: As specified in Section 33 01 12 – Identification for Utilities Piping.

E. Vaults and Utility Boxes: As specified in Section 33 05 13 – Precast Concrete Manholes and Utility Structures.

F. Electrical Equipment: Electrical equipment shall be capable of operating successfully at full-rated load, without failure, with ambient outside air temperature of 0 degrees F to 104 degrees F.

G. Control Circuit:
   1. All wiring workmanship and schematic wiring diagrams shall be in compliance with applicable standards and specifications for industrial controls set forth by the Joint Industrial Council (JIC), National Machine Tool Builders Association (NMTBA), National Electrical Code (NEC), electrical requirements of these specifications and other pertinent electrical codes and standards.
   2. All control circuit wiring shall be stranded copper, color coded and clearly marked at each end to match schematic wiring diagrams, and of adequate size to safely carry required electrical loads. All control wires shall be marked using T&B Shurcode sleeve markers. All wires on the back panel shall be contained in wire troughs with removable covers to facilitate field repairs and addition of optional/additional components. Splices shall not be used.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 – Execution and Closeout Requirements.

B. Identify project horizontal and vertical control points, establish easement and right-of-way lines, stakeout construction points for work and pipeline alignments, establish limits of disturbance.

C. Determine exact location and size of sewer force mains, valves, and appurtenances from Drawings.

D. Verify location and elevation of existing facilities prior to excavation and interconnection.

3.2 PREPARATION

A. Section 01 70 00 – Execution and Closeout Requirements.

B. All materials found during the progress of work to have flaws, cracks, or other defects will be rejected regardless of whether or not it has been installed and shall be replaced by and at the expense of the Contractor.

C. Slings, hooks, or tongs used for lifting shall be padded in such a manner as to prevent damage to exterior surfaces, interior linings, and components. If any part of the coating, lining or components is damaged, the repairs or replacement shall be made

by the Contractor at his expense and in a manner satisfactory to CFPUA prior to attempting installation.

D. Pipe Cutting:
   1. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.
   2. Use only equipment specifically designed for pipe cutting; use of chisels or hand saws is not permitted.
   3. Grind edges smooth with beveled end for push-on connections.

E. Remove scale and dirt on inside and outside before assembly.

F. Prepare pipe connections to equipment with flanges or unions.

3.3 INSTALLATION

A. Grinder Duplex System
   1. Wet well shall not be installed in the rear of the facility; removal of the pumps and / or operation of discharge valve shall not require personnel entry into the tank or disconnection. Alarm shall be visible from the road.
   2. Top of wet well shall be installed flush with final grade.
   3. Minimum six (6) inches of separation between all penetrations including cable hangers and discharge piping.
   4. Floodplain applications shall include a watertight lid, no mushroom vent on lid; a (2) inch NPT female hub shall be provided in place of the mushroom vent for installation by the Contractor for side wall venting of the tank utilizing Schedule 80 PVC vent piping.

B. Sewer service laterals:
   1. No joints are permitted in the service lateral from the main to the valve box. Valve boxes shall contain an isolation plug valve and check valve with the isolation valve installed between the main and the check valve to allow for check valve replacement.

C. Control Panel:
   1. Control panel and accessory equipment shall be installed in strict accordance with the manufacturer's instructions and good practice in a workmanship manner.
      a. Control panel must be within line of sight of the wet well.
      b. A schematic wiring diagram shall be permanently affixed to the inside of the panel door. An installation and service manual shall be provided

D. Valves:
   1. Valves shall be set and joined to the pipe and each type of joint as specified for pipe.
   2. Cast iron valve boxes shall be firmly supported, maintained centered and plumb over the operating nut of the valve. Outside of paved areas, valve boxes shall be set in a 2' diameter x 6" thick concrete collar. The box cover shall be flush with the surface of the finished pavement. All force main valve box lids shall have the word “SEWER” cast in the lid.

3. All reasonable effort must be made to locate valves/valve boxes, back of curb, in grass areas and at street corners, whenever possible.
4. Valve boxes in areas that will require sod at a later date must be left one to two inches above existing grade (to allow for sod thickness).
5. All valves must be centered over the operating nut/wheel and all valves, after being fully opened, will be backed off one-quarter turn to prevent them from being jammed open. This procedure should take place only after the main has passed pressure testing and has been certified by the Engineer.
6. Should the operating nut be more than three feet below the final grade, an extension shall be supplied and installed by the Contractor. The extension shall bring the nut to within twelve (12) inches of final grade.

E. Installation of Tapping Sleeves and Valves
1. Install the tapping sleeve and valve and pressure test prior to making the tap.
2. If leaks are present, the Contractor shall repair them to the satisfaction of the Engineer or Resident Project Representative.
3. Complete the tapping operation and close tapping valve.
4. Tapping valve shall not be opened until new main has been tested and certified for operation.

F. Polyethylene (PE) encasement when indicated for ductile iron pipe and fittings:
1. Encase piping in PE as indicated on Drawings to prevent contact with surrounding soil material or insulation from adjacent cathodic protection system.
2. Comply with AWWA C105.
3. Where pipe exits ground, terminate encasement 3 to 6 inches above surface.

G. Vent Pipe (If determined necessary by Engineer due to existing flood elevations):
1. (2) inch Schedule 80 PVC, vented through the side wall of the grinder tank, and shall replace the standard top mounted vent, and the vent pipe opening shall be screened and terminate a minimum of (2) feet above the (100) year flood elevation or as directed by the Engineer.

H. Pipe Markers: According to CFPUA Details and Material Specification Manual.

3.4 FIELD QUALITY CONTROL

A. Section 01 70 00 – Execution and Closeout Requirements.

B. Start-Up Testing:
1. Test instrumentation system for proper function and sequencing of all motors, indication, and remote notification capabilities in accordance with the Manufacturer's recommendations.
2. Conduct a test for observation by CFPUA's representative to demonstrate operation in accordance with the drawings and specifications.
3. At a minimum, the pumps shall run through two (2) cycles for proper functioning.
4. Certified records of the test shall substantiate the operation of the equipment at the design head, capacity, and horsepower as specified.

END OF SECTION