SECTION 02535
SANITARY SEWER LIFT STATIONS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Installation of permanent, replacement and temporary sanitary sewer lift stations and equipment.

B. This Technical Specification is intended as a general description of sanitary sewer lift station requirements and does not purport to describe all details of the equipment to be furnished. See the individual Sections for detailed specifications on equipment.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:

1. Payment for sanitary sewer lift station components shall be broken down into a schedule of values and shall be paid according to the percentage finished of each value.
2. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum):

1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES

A. ASTM – American Society for Testing and Materials.

1. ASTM C443 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
2. ASTM C478 Standard Specification for Precast Reinforced Concrete Manhole Sections.
3. ASTM D1784 – Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
4. ASTM D3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
5. ASTM D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

B. AWWA – American Water Works Association.

1. AWWA C151 – Standard Pressure Classes – Wall thickness and nominal wall thickness.
2. AWWA C500 – Metal-seated Gate Valves for Water Service.
3. AWWA C508 – Swing-Check Valves for Waterworks Service, 2 in. through 24 in. NPS
4. AWWA C509 – Resilient-Seated Gate Valves for Water Service.
5. AWWA C550 – ERTA Protective Interior Coatings for Valves and

Hydrants.

C. CFTS – City of Friendswood Technical Specifications.
D. NEC – National Electrical Code.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.
B. Submit product data for each type of pipe and equipment that shall be incorporated in the Work.

1.5 QUALITY ASSURANCE

A. The Project Manager shall be responsible for the day to day inspection of the Work and overall quality inspection. The City's Building Division shall be responsible for verifying the Contractor has complied with all Federal, State and City Codes, Regulations and Ordinances.
B. In matters of building codes, the Building Inspector shall govern over all aspects. The Chief Building Official shall be the final determining authority over matters or questions on codes, ordinances and regulations.
C. The Contractor shall comply with the start up procedure as stated in paragraph 3.11 in this Section.

PART II: PRODUCTS

2.1 WET WELLS

A. The wet well shall consist of a circular basin a minimum of seven feet (7 Ft) in diameter and a minimum of ten feet (10 Ft) in depth. The wet well shall be constructed of reinforced concrete meeting the requirements of Section 03300 – Structural Concrete. The wet well walls shall be designed to withstand the external earth loadings when wet well is empty.
    1. Precast wet wells shall be installed according to Section 02305 – Precast Concrete Manholes. Materials for Precast sections shall conform to ASTM C478 and cylinders shall be joined by watertight gasketed joints per ASTM C443.
    2. The base wet well shall consist of a minimum of twelve inches (12 In) of reinforced concrete. The base shall be installed on top of a seal slab with the thickness as shown on the Drawings.
    3. All pipe openings shall be core drilled into the wet well walls.
    4. All openings and base slab shall be sealed with a non-shrink grout meeting the specifications of Section 03105 – Grout.
    5. All wet wells shall be coated with Raven or Spectrashield.
B. Air Vent: The wet well shall have a minimum three inch (3 In) diameter ductile iron or stainless steel air vent extending through the top slab with a one hundred eighty degree (180°) turn sealed by an approved insect screen.
C. Guide Rails: Provide type 304 stainless steel pump guide rails, two (2) per pump, in the wet well securely fastened to the top opening of the wet

well to allow the pumps to accurately mate with the pump bases which shall be secured to the bottom with stainless steel bolts.

D. Pump Bases: Pump bases shall be as specified by the manufacturer and approved by the Project Manager. Bases shall have a minimum four inch (4 In) ductile iron (Class 200) discharge pipe. Pumps shall be provided with a stainless steel lifting chain capable of raising the pumps to the top slab.

E. Floats: Floats for control of the pumps and alarms shall be provided by the pump manufacturer and shall be installed so as that they are not affected by incoming flow.

F. Access Hatch: Access to the wet well shall be through a rectangular aluminum hatch with 316 stainless steel hardware and rated for a three hundred pound (300 Lb) load, and of a size which provides the maximum size opening required for work in the wet well. The top of the hatch shall be a minimum of twelve inches (12 In) higher than the surrounding area. The finish shall be either checkered, diamond plate or other approved non-slip surface. Hatch shall open and lock automatically with stainless steel “hold open” arm with aluminum release handles.

G. Ladder: Human access to the wet well will not normally be required but steps shall be provided and embedded in the wet well. Rungs shall have sixteen inch (16 In) spacing. Ladder and all hardware shall be stainless steel.

H. Discharge connection elbows shall be permanently installed in the wet well.

2.2 PUMPS AND MOTORS

A. Pumps for installation in sanitary sewer lift stations shall be Flygt or ABS compatible with Flygt dual guide rail systems. **No exceptions**.

B. The pump and motor units shall be the submersible type designed to pump raw sewage through a minimum four inch (4 In) discharge force main. All nuts, bolts, washers and other fastening devices coming into contact with raw sewage shall be constructed of Type 304 stainless steel.

C. Pumps shall have single or double shrouded, balanced, non-clogging impellors and shall be capable of handling solids, fibrous materials heavy sludge and shall be capable of passing three inch (3 In) diameter spheres. Pumps shall be driven by three phase (3 Ø), four hundred sixty volt (460V), sixty hertz (60 Hz) motors.

D. Pump motors shall be induction type with a squirrel cage rotor, shell type design, housed in an air filled or oil field watertight chamber, NEMA B type. The pump power cable shall be sized according to the NEC standards and shall be oil resistant chloroprene rubber. Motor and cable shall be capable of continuous submergence without loss of watertight integrity to a dept of sixty-five feet (65 Ft).

E. Hydraulic Sealing Flange: Pumps shall be supplied with a universal coupling which bolts to the pump discharge and shall accept the discharge elbow provided by the manufacturer. Seal of the pump

discharge flange shall be accomplished by a simple downward motion of the pump with the entire weight of the pump guided to and pressing against the discharge connection; no part of the pump shall bear directly on the sump floor and no rotary motion of the be shall be required for sealing. Sealing at discharge shall be affected directly by a rubber lip to ensure a positive leak proof system and for ease of removal.

2.3 PIPING AND VALVING

A. All piping and fittings in the wet well shall be ductile iron, class 260 in accordance with AWWA C151. The connection outside shall be made with a ductile iron mechanical joint solid sleeve.

B. Gate Valves: Gate valves shall be in accordance with AWWA C500 and AWWA C509 and have hand wheel operators. All valves shall be open left (counter-clockwise)

C. Swing Check Valves: Check valves shall have exterior weighted arms and conform to AWWA C508. Valves shall be cast iron body with bronze mounted, single disc, one hundred seventy-five pounds per square inch (175 psi) working pressure, and cushioned closing type. Valve shall be coated in accordance of AWWA C550. Check valves shall be air cushioned, horizontal swing bolted bonnet, removable seat and disc flanged. A stainless steel pressure gauge shall be installed on the upstream side of the check valve.

D. Surge Relief Valves: Force mains with a total dynamic head greater than eighty feet (80 Ft) shall be required to have a surge relief valve.

2.4 STORAGE CAPACITY

A. The sanitary sewer lift station shall have additional storage capacity to handle flows at peak demand period, during a power failure or other malfunction, of at least two hours (2 Hrs).

2.5 PAVING

A. All paving and areas around the lift station shall have a minimum of eight inches (8 In) stabilized subgrade and seven inches (7 In) of concrete. Driveway shall have a minimum width of fourteen feet (14 Ft).

1. Subgrade: Excavate and proof roll natural ground and remove any soft spots. Install eight inches (8 In) of stabilized subgrade and compact to ninety-five percent (95%) Standard Proctor.
2. Place seven inches (7 In) of concrete in accordance with Section 03300 – Structural Concrete.

2.6 FENCING

A. Install eight foot (8 Ft) high opaque wood fence around perimeter of the sanitary sewer lift station with a mow strip. This fence shall be level across the top for the perimeter of the lift station and/or property line. Refer to Section 02930 - Cedar Fence for more details.

2.7 ELECTRICAL COMPONETS AND CONTROLS

A. The electrical, control and alarm system shall be as specified in the Division sixteen (16) of these specifications and installed in accordance with the National Electrical Code. The complete system shall be furnished and installed by one (1) supplier. The Contractor shall call the local power distribution company and install all lines to the control panel and meter in accordance of their requirements. The electric meter shall be installed as close to the lift station as allowed by the local power distribution company. Electrical equipment as listed below are the basics, and all details would need to be reviewed on the Drawings and Division sixteen (16) – ELECTRICAL.

1. Enclosures, Power Distribution Blocks, Surge suppression, Circuit Breakers, Contactors, Relays, Transformers, time delays, and Fuses.
2. Alarm light, Alarm system and SCADA Monitoring System.
3. SCADA system shall conform and be compatible with current City of Friendswood SCADA system.

PART III: EXECUTION

3.1 GENERAL

A. The work covered by this Section of the Technical Specifications shall consist of furnishing all specified materials with all necessary equipment, machinery, tools and labor and performing all work required to install and/or construct the sanitary sewer lift stations, incorporating all change orders, directives and modifications, all to shall be complete, in place, accepted and ready for use. Failure to comply with these Technical Specifications will result in the rejection of the Work by the Project Manager.

3.2 STRUCTURES

A. All structures such as the wet well and the control panel base shall be constructed as detailed on the Drawings and as directed in these Technical Specifications. All access frames and covers shall be properly set and installed as recommended by the manufacturer.

3.3 PUMP AND MOTOR INSTALLATION

A. The pump and motor units shall be carefully installed as recommended by the manufacturer and the seals between pumps and pump bases must mate as intended. The pump and motor shall be properly wired and field checked to see that it can easily be removed and replaced by means of lifting the chains and do not bind on the guardrails. Actual pump tests shall be required by placing water in the wet well and timing the withdrawal rates.

3.4 ELECTRICAL AND CONTROLS

A. Permanent power shall be installed and all systems operating checked and verified. All electrical equipment, wiring and devices shall be installed in accordance with the National Electrical Code and shall be inspected by the City of Friendswood Building Division.

3.5 PIPING

A. Piping shall be installed as shown on the Drawings and in accordance with all relevant Technical Specifications.

3.6 PAVING

A. Paving shall be provided for the access road and for all areas inside the fence and shall consist of materials as specified in this Section. Paving shall be smooth grade and sloped to provide proper drainage, especially away from the lift station facilities. All paving shall have a light to medium broom finish and shall have been treated with curing compound.

3.7 FENCING

A. Fencing and access gates shall be installed as shown on the Drawings and as approved by the Project Manager using the materials stated in this Section.

3.8 TESTING

A. Testing shall consist of verification on all piping and wet wells that there is no infiltration. All backfill and subgrade shall be tested as required. Independent Testing Laboratory shall be contracted by the City.

3.9 SITE CLEANUP, RESTORATION AND GRADING

A. After the Work has been completed, the Contractor shall clear the site of all construction materials and other debris. Grading shall consist of providing proper drainage and all sites shall be left in a neat, clean and acceptable condition. All property that has been disturbed by or during the Work, shall be restored to a condition that is equal to, or better than, the condition before the Work was started. In any existing or proposed lawn areas, the final restoration shall include sodding.

3.10 OPERATION AND MAINTENANCE MANUALS AND RECORD DRAWINGS

A. The Contractor shall supply two (2) sets each of Operation Manuals and Maintenance Manuals. Only one (1) copy of the original manufacturers' data sheets for miscellaneous components shall be required. City staff shall be instructed on the operation and maintenance of all equipment installed at the lift station.

B. Record Drawings and documents shall consist of all revised Drawings, all Contract Documents and the As-Builts for the Work. The as-builts shall be rendered to the City on a CD in an acceptable AutoCAD format to be verified by the Project Manager. All Mylars used for the production of the Drawings shall become the property of the City.

3.11 START UP PROCEDURE

A. After the verification of completed substantial completion punch items, a final walkthrough shall be scheduled to include the Director of Public Works, the Water/Wastewater Superintendent, the Project Manager, the Contractor and all Subcontractors necessary for the startup procedures. The Contractor shall perform the following start up procedure in the presence of the City personnel.

1. Have wet well filled with water and a tank standing by. Simulate all conditions so that the floats can control the normal operations of the pumps.
2. Pumps shall be tested for flow rate by attaching a flow test meter to the discharge pipe, and cycling the pump. Flow rate shall have a tolerance of plus or minus ten percent (±10%).
3. Simulate all conditions likely to be encountered during normal operations including, but not limited to, running pumps in manual, setting off causes for alarm and verifying the dialer program is working.
4. Verify that SCADA system is online and working. This also includes communications with current SCADA system.

B. If any of the tests fails or does not perform to specifications or expectations the Project Manager shall reject the Work as being unacceptable and incomplete for final acceptance. The Contractor shall make any and all necessary repairs to bring the lift station to final completion. The Contractor shall schedule and perform a new start-up procedure at no extra cost to the City.

END OF SECTION