SAMPLE SPECIFICATIONS FOR PREFABRICATED FRP LIFT STATIONS

SECTION 1-GENERAL

1 DESCRIPTION

a. **Scope of Work:**

i. Contractor shall furnish labor, materials, equipment, and performance of all work necessary or incidental to furnish and install a simplex/duplex-prefabricated fiberglass reinforced polyester (FRP) lift station. The lift station shall be a complete factory-installed unit, requiring only minor adjustments and reassembly in the field.

2 QUALITY ASSURANCE

a. **Qualifications of Manufacturer:**

i. The manufacturer shall demonstrate the ability to fabricate the various lift station components, as shown in the plans and as specified herein, utilizing adequate number of skilled workmen, equipment, tools, facilities, and subcontractors. The complete fiberglass lift station shall be manufactured by Topp Industries, Inc., Rochester, Indiana, or pre-approved equal.

b. Referenced Standards

i. ASTM A36 (Latest Revision): Standard Specification for Structural Steel
ii. ASTM A283d (Latest Revision): Standard Specification for intermediate and Low Tensile Strength Structural Steel
iii. ASTM D883 (Latest Revision): Definitions of Terms Relating to Plastics
iv. ASTM D3753 L Latest Revision): Standard Specifications for Glass-Fiber-Reinforced Polyester Manholes
v. ANSI B16.2 (Latest Revision): Standard Specifications for 125 lb. Standard Flat Face Cast Iron Flanges

3 SUBMITTALS

a. **Shop Drawings and Manufacturer's Literature:**

i. The prefabricated FRP lift station manufacturer shall prepare shop drawings for the complete lift station including structural and opening details, equipment mounting and location details, and manufacturer's cut sheets for each item of equipment in the lift station. The main component of the submittals shall be an 8-1/2" x 11" drawing of the complete prefabricated FRP lift station prepared by the manufacturer. Manufacturer's cut sheets shall indicate capacities, dimensions, and materials of construction for all equipment in the prefabricated FRP lift station.

b. Operating and Maintenance Manuals:

i. The prefabricated FRP lift station supplier shall prepare a complete operations and maintenance (O&M) manual for the complete lift station. The O&M manual shall include routine and maintenance requirements and spare parts lists for each major item of equipment in the lift station. The names and telephone numbers of companies where spare parts and/or trained service technicians are available shall also be included for each item of equipment.

4 DELIVERY AND HANDLING

a. **Conditions for Delivery and Handling:**

i. The manufacturer of the prefabricated FRP lift station shall coordinate with the contractor so that the lift station is delivered to the jobsite on time for installation. Handling instructions shall be provided by the lift station manufacturer with the lift station to insure proper handling of the lift station structure. After delivery to the jobsite, the contract shall store the motor and control panel off the ground in a dry location until such time as it is mounted and supplied with electrical service. The contractor shall also insure that all pump, power, control cables, and float cables are protected from submergence until they are properly installed and sealed.

5 GUARANTEE

a. **Guarantee:**

i. The prefabricated FRP lift station manufacturer shall guarantee the complete prefabricated FRP lift station to be free from defects in materials and workmanship for period of one year from date of delivery.

SAMPLE SPECIFICATIONS FOR PREFABRICATED FRP LIFT STATIONS

(continued)

SECTION 2-PRODUCTS

1. MATERIALS

a. Fiberglass Reinforced Polyester Wet Well (and Integral Valve Box): Unless otherwise indicated the plastics terminology used in this specification shall be in accordance with the definitions given in American Society for Testing and Materials (ASTM) designation D883-Definitions of Terms Relating to Plastics.

i. Resins:

1. The resins shall be commercial grade polyester and shall be evaluated as a laminate by test or determined by previous service to be acceptable for the intended environment. The resins used may contain the minimum amount of filters or additives required to improve handling properties. Up to 5% by weight of thixotropic agent, which will not interfere with visual inspection, may be added to the resin for viscosity control. Resins may contain pigments and dyes by agreement between manufacturer and engineer, recognizing that such additives may interfere with visual inspection of FRP laminate quality.

ii. Reinforcement Material:

1. The reinforcing material shall be commercial grade of glass fiber (continuous strand, chopped-hoop, continuous mat, and non continuous mat) having a coupling agent, which will provide a suitable bond between the glass reinforcement material and resin.

iii. Laminate Structural:

1. Laminate Structural:
   a. The FRP laminate shall consist of a resin rich inner surface; chop-spray interior liner; and a chop-hoop filament-wound structural exterior layer.
2. Inner Surface:
   a. The resin rich inner surface shall be free of cracks and crazing with a smooth finish and with an average of not over two pits per square foot, providing the pits are less than0.125 inches in diameter and 0.3125 inches in depth and are covered with sufficient resin to avoid exposure of any fiberglass reinforcement material. Some waviness shall be permissible as long as the surface is smooth. Between 0.01 to 0.02 inches of resin rich surface shall be provided.
3. Chop-Spray Interior Liner:
   a. The interior liner shall be reinforced by 25 to 35% by weight of chopped strand glass fiber lengths from 0.5 to 2.0 inches. The chop-spray interior liner protects the chop-hoop filament-wound structural exterior liner from corrosion damage by "wicking" of the wet well liquid contents. A minimum or 0.100 inches of chop-spray interior shall be provided.
4. Chop-Hoop Filament-Wound Structural Exterior Layer:
   a. The structural reinforcement of the wet well shall be by the chop-hoop filament-wound manufacturing method only. The axial reinforcement shall be by continuous-strand glass fiber. The longitudinal reinforcement shall be chopped-strand glass fiber. The glass fiber reinforcement content of the chop-hoop filament wound structural exterior layer shall be 50 to 80% by weight. The exterior surface of the wet well shall be relatively smooth with no exposed fivers or sharp projections. Hand finish work is permissible to prevent reinforcement fiber exposure. The wall thickness of the shop-hoop filament-wound structural exterior layer shall vary with the wet well height to provide the aggregate strength necessary to meet the tensile and flexural physical properties requirement.
5. Physical Properties:
   a. Wet Well FRP Wall Laminate:
      i. The wet well FRP wall laminate must be designed to withstand wall collapse or buckling based on the following assumptions and third party specifications.
         1. Hydrostatic Pressure of 62.4 lbs. Per square foot.
         2. Saturated Soil Weight of 120 lbs. Per cubic foot.
         3. Soil modulus of 700 lbs. Per square foot.
         4. Pipe Stiffness Values as specified in ASTM D3753

         The wet Well FRP Laminate, must be constructed to withstand or exceed two times the assumed loading on any depth of the wet well.

SECTION 2-PRODUCTS (continued)

ii. Wet Well FRP Bottom Laminate:
   1. The wet well FRP bottom laminate shall have less than 0.375 inches of center elastic deflection (deformation) when in service in totally submerged conditions.

iii. FRP Laminate Surface Hardness:
   1. The finished FRO Laminate will have a Barcol Hardness of at least 90% of the resin manufacturer's specified hardness for full cured resin. The Barcol Hardness shall be the same for both interior and exterior surfaces.

iv. Wet Well Top Flange:
   1. The wet well top flange shall have an outside diameter at least 4.0 inches greater than the inside diameter of the wet well. A six-hole pattern shall accommodate the mounting of a cover with at least 0.375 inches in diameter 300 series stainless steel fasteners. Noncorroding stainless steel threaded inserts shall be fully encapsulated with noncontinuous mat or shopped-strand glass fiber reinforcement. The inserts shall be an offset tab to prevent stripping or spinning out when removing and reinserting cover fasteners.

6. Steel Anti-Floatation Flange:
   a. The steel anti-floatation flange shall be constructed from 0.1875 inches thick ASTM A36 structural steel plate, encapsulated in at least 0.125 inches of chopped-strand glass fiber reinforcement on all sides. The steel anti-floatation flange shall be square with outside dimensions of at least 4.0 inches greater than the wet well inside diameter. The steel anti-floatation flange shall be attached to the wet well bottom with chopped-strand glass fiber reinforcement. Contractor shall place the wet well on a concrete pad and fill with grout covering the entire steel anti-floatation flange. The amount of grout shall be sufficient to prevent floatation of the wet well based on the jobsite conditions. The steel anti-floatation flange shall not requite boltholes to secure it to the concrete pad.
7. Pump Quick Disconnect Mounting Studs:
   a. 300 series stainless steel threaded studs of at least 0.375 inches in diameter shall be used. The studs shall first be threaded into the 0.1876 inches thick ASTM A36 structural steel anti-floatation flange/bottom of the wet well and then welded into place. Once installed, the studs shall be sealed with at least two layers of noncontinuous glass fiber mat or chopped-strand glass fiber reinforcement.
8. Discharge Coupling:
   a. 1-1/4" and 2" Systems
      i. A 1-1/4" / 1-1/2" NPT full-coupling, full-welded in the center of an 8.0" x 8.0" 14 gauge steel plate, finished with black enamel, shall be factory installed with at least ¼" in diameter 300 series stainless steel fasteners. The wet well wall penetrations shall be sealed with silicone sealer.
   b. 3" and 4"Systems
      i. A sufficient quantity and type of "Link Seal" type modular, mechanical, interlocking, synthetic rubber links shaped to continuously fill the annular space between the discharge pipe and the PVC wall sleeve shall be sued to provide a hydrostatic seal. The PVC sleeve shall be encapsulated in the wet well wall with noncontinuous mat or chopped strand glass fiber reinforcement material.
9. Electric Coupling:
   a. A 1-1/2" NPT full-coupling, full welded in the center of an 8.0" x 8.0" 14 gauge steel plate, finished with black enamel, shall be factory installed with at least ¼" in diameter 300 series stainless steel fasteners. The wet well wall penetrations shall be sealed with silicone sealer.

SAMPLE SPECIFICATIONS FOR PREFABRICATED FRP LIFT STATIONS
(continued)

SECTION 2-PRODUCTS (continued)

10. Inlet Hub:
    a. A 4.0-inch nominal pipe diameter thermoplastic pipe grommet shall be field installed by the contractor in a 5.0-inch hole in the wet well wall. The pipe grommet shall provide a mechanical seal and shall not require any secondary sealing materials.
11. Float Bracket:
    a. Float bracket shall be fabricated from 30o series stainless steel with four compression style cord grips to maintain float level position. It shall be factory installed with at least ¼" in diameter 300 series stainless steel fasteners. The wet well penetrations shall be sealed with silicone sealer
12. Ventilation:
    a. Wet well ventilation shall comply with all applicable codes.
13. Slide Rail Assembly:
    a. The slide rail assembly shall include pump quick disconnect discharge elbow, sealing flange will rail guide, upper guide rail bracket, lifting cable, and guider ails.
        i. Pump Quick Disconnect (QDC) Discharge Elbow:
            1. The QDC discharge elbow, made of cast iron, designed to mount directly on the wet well floor, shall be supplied for each pump. It shall have a standard ANSI B16.1 125 lb. Flange, flat faced and drilled on the discharge side, with a machined mating pump connection. The design shall be such that connection between the pump and QDC is made without the need for any bolts, nuts, or gaskets.
        ii. Sealing Flange with Rail Guide:
            1. The sealing flange with rail guide shall be mounted on each pump discharge. It shall have a machined mating flange mating flange witch matches the QDC discharge elbow. Sealing for this pump and discharge piping connection shall be accomplished by a simple linear downward motion of the pump along the guide rails culminating with the entire weight of the pump along the guide rails culminating with the entire weight of the plumbing unit supported by the QDC discharge elbow.
        iii. Upper Guide Rail Bracket:
            1. The upper guide rail bracket, made from ASTM A283d structural steel, shall align and support the two guide rails at the top of the wet well. It shall bolt directly to the hatch frame (or aluminum upper guide rail bracket in the wet wells with solid fiberglass covers) and incorporated beveled stainless steel inserts for secure rail installation.
        iv. Lifting Cable:
            1. The lifting cable shall be 300 series stainless steel with a diameter of at least 0.250 inches and a normal breaking strength of at least 5,000 lbs.
        v. Guide Rails:
            1. The guide rails shall be _____ inches schedule 40 galvanized steel pipes. There shall be two guide rails per pump to insure proper alignment with the QDC discharge elbow and stationary piping.
14. Submersible Pumps:
15. Motor Control Panel:
16. Discharge Piping and Fittings:
17. Valves:
18. Solid Fiberglass Cover:
    a. The solid fiberglass cover shall be constructed with continuous mat or chopped-strand glass fiberglass reinforced with a minimum thickness of 0.325 inches. The cover shall be green in color. The cover shall be mounted to the wet well with six 300 series stainless steel fasteners of at least 3/8" in diameter.

SAMPLE SPECIFICATIONS FOR PREFABRICATED FRP LIFT STATIONS
(continued)

SECTION 2-PRODUCTS (continued)

19. Steel Hatch Cover:
    a. The wet well (and integral valve box) cover shall be constructed of 3/8" thick black enameled ASTM A36 structural steel plate wit black enameled steel hardware. The access hatch shall have folding handle and locking hasp or staple. The hatch shall be held open in the vertical position by means of a positive locking arm of corrosion resistant design. The cover shall be mounted to the wet well (and integral valve box) with at least six 300 series stainless steel fasteners of at least 3/8" in diameter.
20. Aluminum Hatch Cover:
    a. The wet well (and integral valve box) cover shall be constructed of ¼" thick mill finish aluminum diamond plate with 300 series stainless steel hardware. The hatch shall be held open in the vertical position by means of a positive locking arm of corrosion resistant design. The cover shall be mounted to the wet well (and integral valve box) with at least six 300 series stainless steel fasteners of at least 3/8" in diameter.

SECTION 3-EXECUTION

1. LIFT STATION INSTALLATION

a. Installation:
    i. The contractor according to the lift station manufacturer's polished instructions shall install the prefabricated FRP lift station

2. FIELD QUALITY CONTROL

a. Start-Up Service:
    i. The initial start –up of the prefabricated FRP lift station shall be preformed by a qualified factory representative of the FRP lift station supplier. It shall be the responsibility of the supplier's representative to supervise the start-up and instruct the owner's personnel in the proper operation and maintenance procedures of the entire prefabricated FRP lift station, including pumps, level control system, and control panel.