MICHIGAN

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**DOSING TANK**

UTL:CJD 1 of 4 APPR:NJM:DBP:10-18-22

**a. Description.** This work consists of furnishing and installing a 5000 gallon precast dosing tank as detailed on the plans, including PVC connection pipes and fittings, manhole covers and grade rings, precast concrete riser, access door and grade blocks, effluent pumps and vault, check valves, discharge assembly, liquid level sensors, electrical panels, casings, seals, circuit breakers and switches, high-water alarm and lights, low-water alarm and lights, pump cycle timers, electrical relays, cable and conduit, tank foundation, and all other required materials, electrical devices, and wiring.

Ensure the dosing tank complies with all federal, state, and local regulations which apply to its construction, installation, and use in a septic system.

**b. Materials.** Furnish a dosing tank of precast concrete construction in accordance with *ASTM* C1227 of the capacity and dimensions as shown on the plans. Ensure the dosing tank is certified by a Professional Engineer licensed in the State of Michigan to meet HS-20 loading.

Ensure all piping, except the three-inch discharge lines, are Schedule 40 PVC pipe in accordance with *ASTM D2665*. Ensure the three-inch discharge lines from the pumps are in accordance with the Special Provision for Polyvinyl Chloride Sanitary Force Main.

Furnish two high-head turbine type pumps, Nationally Recognized Testing Laboratory (NRTL) listed for wastewater application. Ensure the pump motor is capable of meeting the pump operating point (flow rate and total dynamic head) as shown on the plans.

Set the pumps to operate alternately. Ensure if one pump fails, the remaining pump is set up to pump exclusively until the other pump is repaired. Ensure pumps are equipped with a series of liquid level sensors for on/off, emergency, and alarm operations.

Furnish a 12-inch nominal diameter PVC Orenco System pump vault assembly equipped with discharge assembly, two-inch check valves, filter, and five-inch diameter PVC flow inducers for the effluent pumps. Furnish a drain port with neoprene flap check valve in the bottom of the pump vault. Ensure the pump vault has a row of inlet holes. Suspend the pump vault in the dosing tank using supports as provided by the pump assembly supplier and position the pumps to allow removal without entering the tank. Ensure lifting devices are stainless steel cable. Furnish a two-inch nominal diameter discharge hose and assembly with PVC isolation ball valve, flexible PVC connection hose, and PVC discharge piping per discharge assembly manufacturer’s requirements. Furnish a two-inch polypropylene cam lever female quick-coupler disconnect for the assembly.

Furnish all materials necessary for electrical feed to the pumps including electrical relays, wiring, cable, conduit, liquid level sensors, electrical panels, casings, seals, circuit breakers and switches, high-water alarm and lights, low-water alarm and lights, pump cycle timers and all other required materials, electrical devices, and wiring. Size electrical components to ensure proper operation of the dosing system as approved by the Engineer.

Furnish a single phase, 115/230-volt (V) circuit breaker for the pumps with a control "Power On" indicating light.

Furnish a hands-off-automatic selector switch and run light for the pumps.

Furnish a liquid-level sensor consisting of a mercury switch mounted in a smooth, chemical-resistant, waterproof, and shock-proof casing, suspended on its own cable. Ensure the liquid-level sensor circuit is intrinsically safe in accordance with the *NFPA 70* *NEC, Class I, Division I, Group C and D* and compatible with the pumps supplied.

As indicated on the plans, install a redundant stop level control sensor to stop the pumps in the event of stop level sensor malfunction. Ensure the control sensor also energizes a red indicating light. Equip the pump to start again on rising level while the red light stays energized until the redundant reset button is pressed manually.

Furnish a high-water alarm system controlled by a normally closed liquid level sensor. Ensure the alarm circuit is fed from a separate branch circuit and includes "power on" light, red warning light, and alarm test button. Incorporate the alarm and redundant shut off intrinsically safe relays on the control circuit. Install the warning light to be manually turned off after the pumps have resumed operation.

The high-water alarm level switch must also act as a redundant control sensor, activating the second pump while simultaneously activating the alarm system.

House the control panel in a *NEMA Type 4* enclosure with hinged door and neoprene gasket. Mount all power and control circuit breakers, indicating lights, push buttons, and selector switches in the enclosure. Ensure power and control circuit breakers are not mounted on the door. Install the control panel within line-of-sight of the rest area building as shown on the plans and as approved by the Engineer. The color of the control panel must match all other electrical panels on the site. Mount the red indicating light on the control panel and as approved by the Engineer. Install a lightning arrester at the control box.

Furnish a redundant audio/visual alarm and install in the rest area’s janitor’s room as approved by the Engineer.

Physically isolate all intrinsically-safe circuit devices and wiring from equipment and wiring operating at line voltage. Identify all control and power devices on a plate mounted adjacent to the device.

Furnish heavy-duty type disconnects and circuit breakers rated at 600 V.

Furnish heavy-duty industrial type control relays, push buttons, and selector switches.

Miniature type relays are prohibited. Ensure all indicating lights are "push-to-test" type. Ensure all electrical equipment is NRTL approved.

Install a runtime meter for each pump within the control panel. Ensure the runtime meter records the length of time each pump operates, cumulatively adding up the operation time after each successive use.

Ensure all cables within the dosing tank are intrinsically safe and continuous with no splices or terminal connections unless such splices or connections are contained in a watertight, *NEMA Type 7* enclosure.

Equip the pumps with a line voltage alternating current (AC) magnetic starter with melting alloy-type thermal overload relay to be mounted in the pump control panel.

Furnish a 4-foot by 4-foot inside dimension, precast reinforced concrete riser over the pump vault as shown on the plans and seal to the tank with mastic or similar sealant.

Ensure the access cover over the pumps is an aluminum, double leaf hatch with a minimum 36-inch by 48-inch clear opening and safety secondary hatch fall through prevention system meeting HS-20 loading. Install at the location and orientation as shown on the plans.

Furnish a manhole frame and cover Q in accordance with Standard Plan R-1 Series.

Ensure concrete collars (grade rings) or alternate materials used to adjust manhole covers to grade, are approved by the Engineer.

Ensure granular material Class IIIA is in accordance with section 902 of the Standard Specifications for Construction. Ensure bedding material is from a natural source. The use of fine material generated from crushing recycled concrete is prohibited.

**c. Construction.** Perform excavation and backfill in accordance with sections 206 and 402 of the Standard Specifications for Construction, respectively. Ensure the electrical installations are inspected and approved by the State of Michigan Electrical Inspector. Furnish documentation of electrical approvals to the Engineer.

Set the tank on a six-inch compacted, level, granular material Class IIIA base. Seal all joints with a double coat of bituminous waterproofing or as recommended by the tank's manufacturer for use in a septic system. Also, where detailed, apply joint waterproofing in accordance with section 710 of the Standard Specifications for Construction.

Fill the dosing tank with water and monitor for leakage for 48 hours before backfilling. No leakage is allowed. Submit a written inspection report to the Cheboygan County District Health Department Number 4.

Place access covers on the dosing tank as detailed and adjust to the proper final grade to the satisfaction of the Engineer.

Furnish wiring diagrams for the control panel schematic. Ensure wiring diagrams are approved by the Engineer.

Submit shop drawings in PDF for all components associated with the Dosing Tank. Ensure shop drawings are reviewed and approved prior to beginning work on the Dosing Tank.

**d. Measurement and Payment.** The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

**Pay Item Pay Unit**

Dosing Tank Lump Sum

**Dosing Tank** includes furnishing and installing the dosing tank complete and ready for operation. Excavation, backfill, dewatering, if necessary, disposal of surplus materials, final cleanup, and other related work and materials required for the completion of the dosing tank will not be paid for separately, but are included in the pay item **Dosing Tank**.