

**HARRISON COUNTY REGIONAL SEWER DISTRICT
HARRISON COUNTY, INDIANA**

STANDARD

SANITARY SEWER

CONSTRUCTION SPECIFICATIONS

Adopted: January 24th, 2007

DIVISION 1 - SANITARY SEWERS

In addition to the recommended standards specified by the latest revision of the "Recommended Standards for Sewage Works" (Ten State Standards), the following minimum standards for wastewater sanitary sewer design and installation; have been adopted by the Harrison County Regional Sewer District (HCRSD).

- 1.1 Sanitary sewer pipe for sizes 4 inch up to 21 inch, shall be polyvinyl chloride (PVC) SDR 26, meeting the requirements of ASTM D-3034 or ASTM F-949 (latest revisions), with "O" ring type joints. Wye fittings shall be SDR 26.
- 1.2 Gravity sewer pipe, over 21 inches in diameter, shall be Reinforced Concrete Sanitary Sewer Pipe, Class III, meeting the requirements of ASTM C76 (latest revision), with 'O' ring type joints.
- 1.3 Ductile Iron Pipe Sanitary Sewer (where shown on the plans) shall be pressure rated for 350 psi, conforming to ANSI/AWWA C151/A21.51-91 (latest revision). Metal design shall be 40,000 psi Bursting Tensile strength and 90, psi Modules of Rupture. Joints and Sleeves shall have the same pressure rating as the pipe.
- 1.4 Ductile Iron Pipe shall have Mechanical Joints, conforming to the latest revision of ANSI/AWWA C 151/A21.11880. Rubber joint gaskets shall be first grade rubber, free of imperfections and porosity with a hardness of 70 to 75 durometer.
- 1.5 Where Ductile Iron Pipe is connected to PVC pipe, a Ductile Iron Mechanical Joint Transition Sleeve shall be used.
- 1.6 Laterals are to be traced with a minimum size of 14 gauge wire from the wye to the terminus. The contractor for the building or home will extend the wire from this terminus to the building cleanout adjacent to the building.

2.0 SEWER PIPE SIZES

- 2.1 Sewer main size shall be as shown on the plans.

3.0 MANHOLES

- 3.1 Manholes shall be precast concrete in accordance with ASTM C-478 and Section 720. Manhole step spacing shall be no more than 16-inches. Inside barrel diameter of manholes shall be four (4) feet, cones and collars shall be provided where required on the plans. Pre-cast concrete rings shall be required between the cone or collar and the casting. Manholes shall have connectors as shown on the manhole detail drawing (see Standard Details Sheet).
- 3.2 Manhole covers shall be cast iron conforming to Neenah Foundry Co., R-1772-C with Type B, self sealing machined lid, with the word "Sanitary Sewer" across the middle. Waterproof casting shall be Neenah R1916-F1 and stamped SANITARY SEWER.

- 3.3 Concrete for manhole bases, pavement patches and miscellaneous repairs shall be Portland Cement concrete containing five (5) bags of cement per cubic yard of concrete and which shall achieve a compressive strength of 3,000 psi in 28 days.
- 3.4 Manholes shall be set on a level base of 6 inch (minimum) clean compacted #8 stone.
- 3.5 Manholes shall be air tested for leakage in accordance with ASTM C1244-93, Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.
 - A. Installation and operation of vacuum equipment and indicating devices must be in accordance with manufacturers and performance specifications which have been provided by the manufacturer and accepted by the HCRSD. The vacuum equipment must be capable of testing the entire manhole, including the casting and riser rings.
 - B. With the vacuum tester set in place:
 - 1. Connect the vacuum pump to the outlet port with the valve open.
 - 2. Draw a vacuum of ten (10) inches of mercury and close the valve.
 - C. Accepted standards for leakage will be established from the elapsed time for a negative pressure change from ten (10) inches to nine (9) inches of mercury. The maximum allowable leakage rate for a four (4) foot diameter manhole must be in accordance with the following:

Manhole Depth	Minimum Elapsed Time for a Pressure Change of 1 Inch Hg
10 feet or less	60 seconds
>10 feet but <15 feet	75 seconds
>15 feet but <25 feet	90 seconds

For manholes five (5) feet in diameter, add an additional fifteen (15) seconds and for manholes six (6) feet in diameter, add an additional thirty (30) seconds to the time requirements for four (4) foot diameter manholes. For all manholes deeper than twenty-five (25) feet, the HCRSD will determine the applicable minimum elapsed time.

- D. If the manhole fails the test, necessary repairs must be made and the vacuum test and repairs must be repeated until the manhole passes the test.
- E. If manhole joint sealants are pulled out during the vacuum test, the manhole must be disassembled and the joint sealants replaced.
- F. Manholes will be subject to visual inspection with all visual leaks being repaired.

4.0 PIPE BEDDING AND BACKFILL

- 4.1 All pipe shall be bedded on four (4) inches and covered by twelve (12) inches of Indiana No. 11 crushed limestone.

- 4.2 Where pipe is installed in EARTH AREAS, not immediately adjacent to a street or road, the remainder of the trench shall be backfilled with selected earth materials, humped over the trench to allow for settling.
- 4.3 Where pipe is installed in a GRAVELED AREA, the remainder of the trench shall be backfilled with Bank Run sand to a point eight (8) inches below original grade and then filled with Indiana No. 73 crushed limestone to original grade.
- 4.4 WHERE PIPE IS INSTALLED IN AN ASPHALT PAVED AREA, AND THE TRENCH IS LESS THAN ONE HUNDRED (100) FEET LONG, the remainder of the trench shall be backfilled with Bank Run Sand to a point nine (9) inches below original grade. The trench shall then be trimmed back six (6) inches along each side and backfilled with eight (8) inches of 3,000 psi concrete. After all construction is completed and the concrete is well set up, the trench shall be cleaned, primed and paved with a one (1) inch compacted thickness of INDOT HAC Surface to be flush with the surrounding area. All patch seams shall be saw cut only, cut smooth, straight and tarred.
- 4.5 WHERE THE TRENCH IS GREATER THAN ONE HUNDRED (100) FEET LONG in an asphalt paved street, the remainder of the trench shall be backfilled with Bank Run Sand to a point twelve (12) inches below original pavement surface grade. After compaction, the trench shall be backfilled with compacted Dense Graded Limestone Aggregate to a point three (3) inches below the original pavement surface grade. The trench shall then be paved with compacted Asphalt Binder to original pavement surface grade. When all construction is complete, a notch from ten (10) feet beyond each end of the trench in asphalt, shall be milled out one (1) inch deep. The entire width of the road shall then be cleaned, tack coated and paved with one (1) inch compacted INDOT surface asphalt mix to be flush with all surrounding pavement surfaces. All seams shall be tarred. NOTE: WHEN DONE YOU MUST PAVE THE ROAD FROM END TO END, SIDE TO SIDE.
- 4.6 WHERE PIPE IS INSTALLED IN AN ASPHALT OVER CONCRETE PAVED AREA, the remainder of the trench shall be backfilled with bank run sand to a point ten (10) inches below original grade. The trench shall then be trimmed back six (6) inches along each side and backfilled with 3,000 psi concrete to a point one (1) inch below original grade. After all construction is complete the trench shall be cleaned, primed and paved with Hot Asphalt Concrete, Surface type, to be flush with the surrounding area. All patch seams shall be saw cut only, cut smooth and straight and tarred.
- 4.7 WHERE PIPE IS INSTALLED IN A CONCRETED AREA, the remainder of the trench shall be backfilled with bank run sand to a point nine (9) inches below original grade. The trench shall then be trimmed back six (6) inches along each side and filled with 3,000 psi concrete flush with original grade. All patch seams shall be saw cut only, smooth and straight.
- 4.8 All cutting of the trench in existing asphalt or concrete pavements shall be done with a saw only to provide a straight, smooth joint when new paving is done.
- 4.9 CONTRACTOR shall replace all pavement markings destroyed during construction.

5.0 TESTING

- 5.1 All sanitary sewer lines upon completion will be required to pass a low pressure air test. Said test shall be conducted according to ASTM 1417-92, and shall be witnessed by a representative of the HCRSD. The testing shall be in accordance with Table 1. Add 0.5 psig for each foot of water above the sewer line being tested.
- 5.2 Infiltration or outward leakage of any section of constructed sewer shall not exceed 200 gallons per inch of sewer diameter per mile of pipe per day.
- 5.3 Deflection tests shall be performed on all PVC pipe no sooner than 30 days after installation. No pipe shall deflect more than 5%. Pipe deflecting greater than 5% shall be replaced. A rigid ball or mandrel shall be used for the deflection test having an outside diameter not less than 95% of the base inside diameter or average inside diameter of the pipe depending on what is specified in the ASTM specifications (with appendix) to which the pipe was manufactured. The test shall be performed without mechanical pulling devices. The deflection test shall be performed with a nine-point mandrel. Proving rings shall be available.
- 5.4 The ends of laterals are to be plugged tight with a braced plastic disc or cap capable of withstanding a low pressure air test without leakage.
- 5.5 Tests shall be conducted by the CONTRACTOR. The HCRSD shall be notified 24 hours in advance of when tests are to be conducted.
- 5.6 Infiltration tests and pressure tests shall be conducted by the CONTRACTOR. The HCRSD shall be notified when tests are to be conducted, 24 hours in advance.

6.0 SEWER PIPE RELATION TO WATER MAIN

- 6.1 Where sewer pipe runs parallel to a water main, there shall be a minimum of ten (10) feet of separation between the pipes.
- 6.2 Where a sewer main crosses a water main, there shall be at least eighteen (18) inches of vertical separation between the pipes.

7.0 PROPERTY SERVICES

- 7.1 Property Services shall be constructed and located as shown on the plans.
- 7.2 CONTRACTOR shall install an SDR 26 "Wye" fitting only, where shown and as directed by HCRSD, for future connection.

7.3 Every unused property service shall be stoppered watertight and shall be marked for future connection by tying a length of brightly colored plastic rope to the end of the property service and extending the rope through the backfill to the surface of the ground.

8.0 WASTE MATERIAL

8.1 All waste material such as debris, roots, trees, brush, stumps, rock, broken asphalt or concrete shall be disposed of offsite by CONTRACTOR.

9.0 BLASTING

9.1 Where blasting is required, the CONTRACTOR shall post a suitable Blasting Insurance Certificate with the owner and notify the HCRSD before any blasting is performed.

TABLE 1

MINIMUM SPECIFIED TIME REQUIRED FOR A 1.0 psig

DROP FOR SIZE AND LENGTH OF PIPE INDICATED

Pipe Diameter In.	Minimum Time, min:s	Length for Minimum Time, ft	Time for Longer Length, S	Specification Time for Length (L) Shown, mins:s							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:58	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	26:27	44:54	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:57	129:48
30	28:20	80	21.366 L	96:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	86	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

DIVISION 2 - LIFT STATIONS

In addition to the recommended standards specified by the latest revision of the "Recommended Standards for Sewage Works" (Ten State Standards), the following minimum standards for wastewater lift station design and installation; have been adopted by the Harrison County Regional Sewer District (HCRSD).

All wastewater lift stations shall be of the submersible type. With prior approval, lift stations, with average minimum flow between 0.25 MGD and one (1) MGD, may be designed as wet well/dry pump pit type. Lift stations larger than one (1) MGD will require extensive pre-design discussions.

1.1 Wet Well

- A. Circular wet well(s) shall be fabricated of pre-cast reinforced concrete base sections, riser sections, and flat slab tops. Base sections, riser sections, and flat slab tops shall conform to the requirements of ASTM Specifications C478, latest revision. Joints between pre-cast sections shall be sealed with two (2) rings of flexible butyl rubber sealant. Concrete wet wells shall be coated outside with an approved bituminous seal coating. Interior Joints shall be sealed with high strength non-shrink grout. All inlet and outlet pipes through the wet well wall shall be through a cast-in-place opening and provided with a resilient seal. Seal around pipes on the inside and outside of the barrel with non-shrink grout.
- B. The wet well base shall be placed on at least twelve (12) inches of leveled and compacted clean #8 stone.
- C. The wet well access hatches shall have aluminum frames and doors with hinged double doors, locking provisions and self-opening shocks. The door shall be 1/4" thick aluminum floor plate reinforced to 300 PSF live load. Hinges and all hardware shall be of stainless steel. Bumper blocks shall be placed to block vehicles from driving onto or across the wet well hatches. The minimum opening shall be 30" x 30".
- D. The wet well shall be designed large enough to allow at least twelve (12) minutes elapsed time between successive equipment starts during average flow conditions, and small enough to prevent the wastewater from going septic. Engineer shall submit all computations used to size wet well, including depth of wet well and to determine pump size(s).
- E. Except as requested by the HCRSD, the wet well floor shall have a fillet at the inner base wall of the wet well to prevent the accumulation of solids.
- F. Wet well shall have a minimum inside diameter of six (6) feet and a minimum depth of six (6) feet from the bottom to the invert of the lowest incoming pipe. In addition, the highest "alarm level" float shall be at least one (1) foot below the lowest incoming pipe and the lowest "pump off" float shall be set at the top of the pump for complete submersion of the pump.

1.2 Valve Vault

- A. A rectangular valve vault shall be installed on the discharge piping for ease of accessibility and maintenance of the check and plug valves. It shall be designed so that no part of a valve or pipefitting flange is closer than twelve (12) inches to a wall, floor or ceiling to allow easy maintenance access.
- B. The valve vault shall be constructed in accordance with the specifications for wet well construction. The valve vault shall be a rectangular pre-cast or cast-in-place concrete structure with minimum inside diameter of 4' x 4'. The discharge piping shall be at least three (3) feet below finished grade of the area. The valve vault base shall be placed on at least twelve (12) inches of leveled and compacted #8 stone. The valve vault shall not be placed on unstable (uncompacted) fill due to over-excavation of the lift station area. All inlet and exit piping through the wall of the valve vault shall be through cast-in-place openings provided with a resilient seal. A drainpipe shall be placed in the valve vault with the discharge end placed in the wet well. An approved backflow device shall be placed on the end of the drainpipe in the wet well.
- C. The valve vault shall be coated on the outside with an approved bituminous seal coating.
- D. A hinged single hatch with locking provisions, access hatch assembly shall be installed on the top of the valve vault. The hatch, frame, and accessories shall be constructed of aluminum with stainless steel hardware and fasteners, having a minimum opening of 30" X 30". The hatch shall be 1/4" thick aluminum floor plate reinforced to 300 PSF live load. The hatch shall open away from the electrical control panel/junction box.

1.3 Pumps, Motors and Seals

- A. REQUIREMENTS: Submersible, non-clog type pumps

The following manufactures are preferred:

- Flygt
- Hydromatic
- Myers

Other manufacturers may be accepted on a case-by-case basis. All pump documentation shall be submitted for approval, prior to ordering equipment, to the HCRSD.

1.4 Valves, Discharge Piping, and Force Main

- A. Discharge piping shall be ductile iron pipe with flanged ductile iron fittings, and long radius elbows.
- B. Valves and piping shall be a minimum 4-inch in size. Piping shall be designed to minimize station head loss yet maintain the cleaning velocity of at least two (2) fps. All discharge piping shall be of the same size as the force main, (increase to this size at pump discharge).

- C. A swing-type **Check Valve** and **Plug Valve** shall be installed in the discharge line of each pump and located in the valve vault. **Plug Valves** shall conform to AWWA C504-80 and rated for 150 psi. **Check Valves** shall conform to AWWA C1111, be rated at 150 psi, and shall have a spring-loaded external lever arm. The **Plug Valves** shall be Dezurik, eccentric type. The connection of the piping after the valves will be made utilizing a wye connection. Design engineer shall include provision for a "slow-closing" check valve when conditions require such a valve.
- D. An emergency pump auxiliary connection shall be provided on all lift stations. This connection will allow the bypass pumping of the wet well in emergency conditions. The pipe shall extend out of the ground one (1) foot to connect a pump hose. The connection end of the pipe shall be six (6) inches with a six (6) inch male cam lock fitting.
- E. Ductile iron Class 51 and 52 pipe for use in force mains sized four (4) inches and larger shall be constructed per ANSI Specification A21-51-1976 covering thickness design of ductile iron pipe, and AWWA Specification C151-76 covering overall specifications and requirements for ductile iron pipe.
- F. PVC C-900 Class 150 pipe for use in force mains four (4) inches and larger shall be constructed per AWWA Specification C-900-89. All PVC force mains shall be laid with a 12 gauge shielded copper tracing wire and tape placed on the top of the pipe. The wire must be accessible at the valve vault, discharge manhole, air relief valve manholes, and at access boxes when the distance between the above structures exceeds 1000 feet.
- G. Force main fittings shall be 150 psi (minimum) ductile iron mechanical joints. Fittings and piping shall be restrained per AWWA specifications using Meg-a-lug restrainer glands and blocking.
- H. A.R.I., or equal, automatically operating combination air and vacuum relief valves shall be placed at all high points on the force main. They shall be placed in minimum 48" diameter manholes for ease in access and maintenance. The air relief valves shall be of stainless steel or nylon construction.
- I. Force mains shall be hydrostatically tested for leakage at 150% of maximum operating pressure.

1.5 Guide Rails

- A. Guide rails for the pumps shall be a minimum two (2)-inch stainless steel pipe, **equipped and installed to be "Non-Sparking"**. A stainless steel lifting chain with a safety factor of five (5) shall be provided with each pump.

1.6 Electrical

- A. Electrical enclosures shall be type NEMA 4X for outside use, and type NEMA 12 for inside use within the mechanical building (control enclosure to have a hinged dead front panel). All outside cabinets shall be stainless steel.
- B. All electrical components shall be installed in the appropriate (prior referenced) enclosures.
- C. The lift station shall have electric-utility-delivered 480 volt, 3-phase, 60Hz, 4-wire wye, or delta power. All stations powered by 480 primary voltage shall have a minimum 7.5 KVA single-phase, 480 to 120/240 VAC transformer.
- D. Motor starters shall be NEMA-rated magnetic type with a 120 volt control coil, and three thermal overload relays for three (3) -phase and single-phase services with a minimum size of NEMA-1.
- E. Primary level control shall be by the means of a Pressure Systems, Inc. KPSI series 700 level transducer with an operating range of 0-20 feet and an output of 4-20 milliamps. The level transducer shall be protected with the optional transient voltage surge protection device. There shall be a programmed level setting for the following: pumps off; lead pump on; lag pump on; high wet well level and low wet well level.

In the event of failure of the primary level control, there shall be a secondary level control system consisting of **(1) high level alarm float**; (1) pumps off float; (1) lead pump on float; (1) lag pump on float. Activation of the lead pump float shall also cause an alarm condition. The float switches shall be mercury switch type sealed in a polyurethane float with 35 feet of type SJTO-W/A cable.

- F. A minimum of one (1) 120 volt, 20 amp receptacle, and a GFI duplex receptacle shall be mounted in the control enclosure. An internal panel light, with switch, shall be installed in the electrical enclosure.
- G. A NEMA 4X junction box for pump make-up connections shall not be located in the wet well but shall be mounted on a pedestal on top of the wet well slab. The junction box shall be mounted a minimum of 18 inches above the wet well top slab. The pedestal shall provide an air gap between the wet well and junction box. One, two (2) inch diameter schedule 80 PVC conduit per pump must be installed from this junction box to the pumps. The conduit, and all connections, must be sealed at both ends with manufacturer-approved watertight seals, or silicone. The wet well shall be considered as a Class I, Division 1 hazardous location.
- H. An automatically resetting phase monitor shall be installed in the electrical enclosure. Status contacts from the phase monitor shall be wired to the pump control panel. An electrical surge protection device shall be placed in

the controls, for each pump control circuit.

- I. An Aricrite receptacle, body grounded, Catalog number AR2042, 200-amp, 600 VAC/250 VDC 3 wire, 4 Pole, female receptacle shall be installed for use as an emergency electrical pump connection.
- J. An externally mounted NEMA 3R red-flashing globe-type alarm light, with a lexan-type cover and wire shield shall be installed on the outside of the mechanical building, visible from the road. The light shall be activated upon a HIGH or LOW wet well level and normal power failure.
- K. A power distribution sub-panel, with the appropriate number of breakers, shall be mounted in the electrical enclosure to provide protection to the various circuits.
- L. Each electrical panel shall be wired as per the wiring schematic, and labeled with wire markers.
- M. All internally mounted electrical components and terminal points shall be clearly labeled.

1.7 Pump Control Panel

- A. A pump control panel shall be provided to house the Programmable Logic Controller (PLC), radio, back-up battery power supply, and pump monitoring equipment.
- B. The pump control panel shall be mounted within the electrical enclosure and supplied with a thermostatically controlled 120 V AC heater sized to maintain panel internal temperature of a minimum 55°F. and shall include a low temperature switch, set at 40°F, within the enclosure to alarm failure of heater.
- C. Equipment within the pump control panel shall be designed to operate on 24 V DC. A back-up battery power supply with charger shall be provided to allow operation of the PLC and radio on loss of 120 VAC power. This unit shall be sized to operate controls for a period of 6 hours.
- D. The CONTRACTOR shall retain the services of the HCRSD's communications system supplier for the purposes of designing and installing the Radio Telemetry System the same as and compatible with the existing systems in use and to establish a reliable radio path to the Wastewater Treatment Plant designated by the HCRSD to provide field services on the relocation of the system, and certify the correctness of said installation. Specific communications system supplier shall include and/or perform the following:
 - Performance of a physical radio path study, using radio equipment mounted at the new lift station and HCRSD's existing radio repeater, to ensure a viable radio path between the new lift station and the HCRSD's existing radio repeater, and

- to determine the required radio antenna mounting height. Computer based path study is not acceptable.
- Preparation of FCC license application forms as required. Forms shall be completed to the extent only the name and signature of HCRSD's representative will need to be completed by the HCRSD. License application fees shall be included as part of the lift station.
 - Selection of specific radio modem equipment.
 - Selection of radio antenna and antenna cable.
 - Recommendations for grounding methods and surge protection equipment for radio and antenna.
 - Verification of proper communications between the new radio modem and the HCRSD's existing radio repeater after installation of the system is complete.
- E. A radio telemetry monitoring system shall be provided. The radio modem shall be Microwave Data Systems (MDS), linked to the master PLC located at the Wastewater Treatment Plant through the telemetry system. Radios shall utilize HCRSD's licensed frequency. A yagi-type radio antenna shall be externally mounted with connection to the radio telemetry system. Required modifications to the Lift Station monitoring software at the Wastewater Treatment Plant will be performed by the HCRSD.
- F. The automatic pump operation, automatic pump lead-lag alternation, and all control logic commands shall be carried out by the PLC. The PLC shall be (Allen Bradley Micrologix 1000 / Modicon TSX Momentum) series meeting the following requirements:
- Minimum 10 Discrete Inputs
 - Minimum 6 Discrete Outputs
 - Minimum 4 Analog Inputs (Where required for CSO monitoring)
- G. Provide the following front of panel mounted devices to be labeled as indicated:
- "Hand-Off-Automatic" switch for each pump, with the hand mode wired for manual operation.
 - "Normal/Bypass" switch (both labeled as such) shall be provided for each pump.
 - The "Normal/Bypass" switch is to bypass the operation of a pump. This will allow the (PLC) to ignore this pump for alarm and alternating purposes.
 - "Lead Pump 1 / Lead Pump 2 / Lead Pump Alternate" selector switch.
 - "Pump Run" indicating light for each pump (labeled as Pump "x" Run), lit when the pump is ON.
 - "Seal/Failure" indicating light for each pump (labeled as such).
 - "Motor High Temperature" indicating light for each pump (labeled as such).
 - Accumulative type elapsed "Run Time" meter for each pump. The meters shall be a non-resettable type in one-tenth (1/10th)-hour increments.
 - A "Test-Auto" test switch shall be mounted on the control enclosure dead panel for testing all alarm lights (labeled as such).

H. System programming guidelines:

- PLC shall be configured to monitor the following input signals:
 - Pump 1 running
 - Pump 2 running
 - Pump 1 lead (from hand switch)
 - Pump alternate (from hand switch)
 - Wet Well level (analog)
 - High Wet Well level
 - Low Wet Well level
 - Low temperature (outdoor systems only)
 - Control power (120 VAC) available
 - CSO flow (where present - analog)
- Automatic pump control shall start and stop pumps in a lead and lag fashion based on Wet Well level input.
- Provide pump fault logic to sense discrepancy between pump-required output being turned on and no pump run signal being received. Configure system to generate fault on any condition including motor overload, motor over temperature, seal failure or power disconnect.
- Provide time delay on pump required outputs, initially set at 10 seconds and 20 seconds, to prevent simultaneous pump restart on restoration of control power.
- All alarms shall automatically reset when the alarm condition has cleared. An adjustable 0-15 minute time delay relay shall be activated and timed-out prior to transmitting the high wet well level condition.
- All switches, indicating lights, and push buttons mounted on the pump control panel shall have engraved plastic legend nameplates (black with white letters) - secured with screws - indicating its function.

1.8 Mechanical Building (if required)

- A. All lift stations shall have erected a block building with brick veneer on the outside. This building will serve as the lift station site for mechanical storage, and to house the electrical equipment. The building must have a minimum ceiling height of 8'0", and have 8'0" by 8'0" minimum **INSIDE** dimensions. The interior of the building shall be painted with light colored masonry paint. The truss roof of the mechanical building shall be constructed with asphalt shingles with a pitch sufficient to allow water to run off the roof. The building must be securely anchored to a minimum 6-inch thick poured-in-place concrete reinforced slab. The surface of the slab shall be slightly above surrounding area.
- The building shall be designed so that it will not detract from the appearance of the surrounding vicinity. Match brick and roof of nearest house.
 - A 42" wide (minimum) x 7' hollow metal door in a steel frame with 2 finish coats of paint must be installed with a 2' x 2' louver for ventilation, and an aluminum threshold. The door must have a hasp for padlocking provisions.

1.9 Site Requirements

- A. The CONTRACTOR shall be responsible for developing a lawn around the lift station by sodding or by seeding with Kentucky 31 variety clear tag grass seed. All banks shall be no steeper than 3 to 1 slope.
- B. A bituminous or concrete paved road (minimum 12'0" width) shall be built to the station, which will accommodate maintenance truck traffic. If the station is located on a dead-end street, a paved turn area shall be provided. Road construction shall meet current Harrison County street specifications. Pavement shall be one (1) inch INDOT HMA surface over two (2) inches INDOT HMA binder over nine (9) inches INDOT 73 DGA. All thickness refers to compacted thickness.
- C. A four (4)-foot by four (4)-foot concrete slab, sloping away from the building, shall be provided at the entrance to the building.
- D. All above ground structures, hatch openings, valve vaults, wet wells and driveways shall be designed so that they are inherently protected from a 100-year flood event.

1.10 Miscellaneous

- A. A minimum three (3)-inch ductile iron pipe wet well vent shall be installed, with a 180-degree bend with a stainless steel screen.
- B. All hardware and fastener items located either inside or directly connected to the wet well and valve vault shall be of stainless steel construction.
- C. Pumps shall have a five (5) year warranty provided by the manufacturer. The warranty shall be as follows. 18 months full coverage of pump, 19-36 months 75% coverage, 37-48 months 50% coverage and 49-60 months 25% coverage. The CONTRACTOR or the pump manufacturer can provide this warranty. A certificate of warranty shall be supplied with the pumps. The CONTRACTOR shall warrant all equipment, materials, and workmanship in the installation against defects or failures of any kind for a period of one (1) year from the date the HCRSD accepts the lift station for operation and maintenance.
- D. **Two sets of as-built drawings (24" x 36") on mylar (4 mil) shall be provided** to the HCRSD prior to acceptance of the station. Four (4) copies of the operation and maintenance manuals shall be provided at this time along with the certificate of warranty, and two copies of all submittal plans and documents. Digital files containing the approved plans shall be submitted in electronic format in the most current version of AutoCad.
- E. All panel enclosures (except NEMA 4X) shall be painted with an epoxy-based enamel coating.

- F. A manhole shall be located within ten (10) feet of the wet well on the influent line. This manhole shall provide provisions for bypass pumping. A plug valve shall be placed in the influent line to the lift station. This valve will be used to isolate the wet well.

- G. An area light shall be installed to illuminate the area. Light shall be installed with a dusk-dawn sensor, and an on/off switch, with a weatherproof cover, to override the dusk-dawn sensor. The light shall be installed a minimum of 10 feet above the ground or high enough to illuminate the entire lift station area. The light shall be a 800-watt metal Halide type. **Light shall be mounted on a standard 12" diameter power pole.**

- H. Two sets of preliminary plans for the lift station layout and structures shall be submitted for approval to the HCRSD 30 days prior to construction.

- I. Certified pump curves shall be supplied for each installed pump. All pumps shall have stainless steel nameplates securely attached. Pump motors shall be non-overloading at all points on the pump curve. The CONTRACTOR, pump supplier and CONTRACTOR's electrical subcontractor shall perform field operation tests, when all construction is complete, to show that all items are working properly and meeting design specifications. A complete written report, containing the above, shall be submitted to the HCRSD.