ADDENDUM NO. 2

SHAWNEE OAKS SANITARY SEWER SYSTEM

ALLEN COUNTY, OHIO

Project No. C25073.4A

Index of Contents

Addendum No. 2, 3 Item, 32 pages total (including attachments)

Attachments
Section 11306 - Lift Station (Revised) – 30 pages

November 6, 2026

I hereby certify that this Addendum was prepared by me or under my direct supervision and that I am a duly registered Engineer under the Laws of the State of Ohio.

ACCESS ENGINEERING SOLUTIONS, LLC



11-6-2026

TO: ALL BIDDERS OF RECORD

ADDENDUM NO. 2 to Drawings and Specifications for the Shawnee Oaks Sanitary Sewer System Project, Allen County Ohio; as prepared by Access Engineering Solutions, Celina, Ohio.

This Addendum shall hereby be and become a part of the Contract Documents the same as if originally bound thereto.

The following clarifications, amendments, additions, revisions, changes, and modifications change the original Contract Documents only in the amount and to the extent hereinafter specified in this Addendum.

NOTE: Bidders are responsible for becoming familiar with every item of this Addendum and acknowledge the receipt of said addendum on the bid forms.

ITEM NO. 1 - Specification Section 00020 – Notice to Bidders

a. The Notice to Bidders was updated on 11/6/2026

Delete: Bid Date November 12, 2026 at 2:00 PM

Insert: Bid Date November 17, 2026 at 2:00 PM

ITEM NO. 2 - Specification Section 11306 – Lift Station

A. The Lift Station Specification was updated on 11/6/2026

Delete: **Section 11306 -** Lift Station

Insert: **Section 11306 -** Lift Station (Revised) – 30 pages

ITEM NO. 3 – Construction Drawings – Shawnee Oaks Sanitary Sewer System

Delete; Construction Drawing Sheets 28, 29 30 and 31

Delete: Residential Asphalt Drive Detail on Sheet 40

The Commercial Drive Pavement Detail shall be used for all driveway repairs.

SECTION 11306 - LIFT STATION (Revised)

1.01 SECTION INCLUDES

A. Work under this section includes, but is not limited to, furnishing and installing a factory built package submersible pump station as indicated on the project drawings, herein specified, as necessary for proper and complete performance.

1.02 REFERENCES

A. Publications listed below form part of this specification to extent referenced in the text by basic designation only. Consult latest edition of publication unless otherwise noted.

1. American National Std. Institute (ANSI) / American Water Works Assoc. (AWWA)

a. ANSI B16.1	Cast iron pipe flanges and flanged fittings.
b. ANSI/AWWA C115/A21.51	Cast/ductile iron pipe with threaded flanges.
c. ANSI 253.1	Safety Color Code for Marking Physical Hazards.
d. ANSI B40.1	Gauges, Pressure and Vacuum.
e. AWWA C508	Single Swing Check Valves.
f. AWWA C504	Plug Valves

2. American Society for Testing and Materials (ASTM)

a. ASTM A48	Gray Iron Castings.
b. ASTM A126	Valves, Flanges, and Pipe Fittings.
c. ASTM A307	Carbon Steel Bolts and Studs.
d. ASTM A36	Structural Steel.

3. Institute of Electrical and Electronics Engineers (IEEE)

a. ANSI/IEEE Std 100	Standard Dictionary of Electrical Terms.
b. ANSI/IEEE Std 112	Test Procedure for Polyphase Induction Motors.
c. IEEE Std 242	Protection of Industrial and Control Power Systems.

4. National Electric Code (NEC)/National Electrical Manufacturers Assoc. (NEMA)

a. NEC	National Electric Code.
b. NEC 701	National Electric Code article 701.
c. NEMA Std MG1	Motors and Generators.

5. Miscellaneous References

a. Ten-State Standards Recommended Standards for Sewage Works.
b. Hydraulic Institute Std for Centrifugal, Rotary and Reciprocating Pump
c. NMTBA and JIC Std National Machine Tool Builders Association and Joint Industrial Council Standards
d. ISO 9001 International Organization for Standardization.

1.03 SYSTEM DESCRIPTION

A. The contractor shall furnish and install one factory built automatically controlled above ground submersible pump valve package capable of handling raw unscreened sewage.

B. The pump and mechanical slide rail accessory shall be installed in the wet well as shown on the project plans. The pump control panel, liquid level control, valves and piping shall be installed within a factory built fiberglass enclosure.

C. Factory built pump station design, including materials of construction, pump features, valves and piping, and motor controls shall be in accordance with requirements listed under PART 2 - PRODUCTS of this section.

1.04 PERFORMANCE CRITERIA

A. Each pump must be designed to handle raw, unscreened, domestic sanitary sewage. Pumps shall be furnished with a discharge connection. The pump shall be selected to perform under the following operating conditions:

1. Shawnee Oaks

Capacity	200	GPM
Total Dynamic Head	63	FT

B. Site power furnished to pump station shall be single phase, 60 hertz, 240 volts, 4 wire, maintained within industry standards. The available fault current provided at the pump station control panel is 10,000 kA rms symmetrical. Voltage tolerance shall be plus or minus 10 percent. Phase-to-phase unbalance shall not exceed 1% average voltage as set forth in NEMA standard MG-1. Control voltage shall not exceed 132 volts

C. Inverters to be supplied as part of the pump controls to create 3/60/240 volt power to the pump motors.

1.05 SUBMITTALS

A. Product Data

1. Prior to fabrication, pump station manufacturer shall submit an electronic submittal data for each station, for review and approval.

2. Submittal shall include shop drawings, electrical ladder logic drawings, and support data as follows: Catalog cuts sheets reflecting characteristics for major items of equipment, materials of construction, major dimensions, motor data, pump characteristic curves showing the design duty point capacity (GPM), head (FT), and hydraulic brake horsepower (BHP). Electrical components used in the motor branch and liquid level control shall be fully described.

3. Shop drawings shall provide layout of mechanical equipment and anchor bolt locations for slide rail components. Pipe penetrations and station access clearances shall be dimensioned relative to the station centerline. The electrical ladder logic drawings shall illustrate motor branch and liquid level control circuits to extent necessary to validate function and integration of circuits to form a complete working system.

B. Operation & Maintenance Manuals

1. Installation shall be in accordance with written instructions provided by the pump station manufacturer. Comprehensive instructions supplied at time of shipment shall enable personnel to properly operate and maintain all equipment supplied. Content and instructions shall assume operating personnel are familiar with pump, motor, piping and valve, but lack experience on exact equipment supplied.

2. Documentation shall be specific to the pump station supplied and collated in functional sections. Each section shall combine to form a complete system manual covering all aspects of equipment supplied by the station manufacturer. Support data for any equipment supplied by others, even if mounted or included in overall station design, shall be provided by those supplying the equipment. Instructions shall include the following as a minimum:

   a. Functional description of each major component, complete with operating instructions.

   b. Instructions for operating pump and pump controls in all modes of operation.

   c. Calibration and adjustment of equipment for initial start-up, replacement of level control components, or as required for routine maintenance.

d. Support data for commercially available components not produced by the station manufacturer, but supplied in accordance with the specifications, shall be supported by literature from the prime manufacturer and incorporated as appendices.

e. Electrical schematic diagram of the pump station circuits shall be in accordance with NFPA70. Schematics shall illustrate, to the extent of authorized repair, pump motor branch, control and alarm system circuits including interconnections. Wire numbers and legend symbols shall be shown. Schematic diagrams for individual components, not normally repairable by the station operator, need not be included. Details for such parts shall not be substituted for an overall system schematic. Partial schematics, block diagrams, and simplified schematics shall not be provided in lieu of an overall system diagram.

f. Mechanical layout drawing of the pump station and components, prepared in accordance with good commercial practice, shall provide installation dimensions and location of all pump, valve and piping.

3. Operation and maintenance instructions which rely on vendor cut-sheets and literature which include general configurations, or require operating personnel to selectively read portions of the manual shall not be acceptable. Operation and maintenance instructions must be specific to equipment supplied in accordance with these specifications.

1.06 QUALITY ASSURANCE

A. The pump and pump station manufacturer must be ISO 9001:2008 revision certified, with scope of registration including design control and service after sales activities.

B. The pump and pump station manufacturer must be registered to the ISO 14001 Environmental Management System standard and as such is committed to minimizing the impact of its activities on the environment and promoting environmental sustainability by the use of best management practices, technological advances, promoting environmental awareness and continual improvement.

C. Upon request from the engineer *(or owner)*, the pump station manufacturer shall prove financial stability and ability to produce the station within the specified delivery schedules. Evidence of facilities, equipment and expertise shall demonstrate the manufacturer's commitment to long term customer service and product support.

D. Manufacturer must show proof of original product design and testing. Products violating intellectual property regulations shall not be allowed, as they may violate international law and expose the user or engineer to unintended liabilities. "Reverse-engineered" products fabricated to substantially duplicate the design of original product shall not be allowed, as they may contain substantial differences in tolerances and material applications addressed in the original design, which may contribute to product failure.

E. The term "pump manufacturer" or "pump station manufacturer" shall be defined as the entity which designs, machines, assembles, hydraulically tests and warranties the final product. Any entity that does not meet this definition will not be considered a "pump manufacturer" or "pump station manufacturer" and is not an acceptable supplier. For quality control reasons and future pump and parts availability, all major castings of the pump shall be sourced and machined in North America.

F. The manufacturer's technical representative shall inspect the completed installation, correct or supervise the correction of any defect or malfunction, and instruct operating personnel in the proper operation and maintenance of the equipment as described in Part 3 of this section.

1.07 MANUFACTURER'S WARRANTY

A. The pump station manufacturer shall warrant all equipment to be of quality construction, free of defects in material and workmanship. A written warranty shall include specific details described below.

1. In addition to defects in material and workmanship, fiberglass reinforced polyester station enclosures are warranted for sixty (60) months to be resistant to rust, corrosion, corrosive soils, effects of airborne contamination or physical failures occurring in normal service for the period of the pump station warranty.

2. All other equipment, apparatus, and parts furnished shall be warranted for sixty (60) months, excepting only those items that are normally consumed in service, such as light bulbs, oils, grease, packing, gaskets, O-rings, etc. The pump station manufacturer shall be solely responsible for warranty of the station and all components.

B. Components failing to perform as specified by the engineer, or as represented by the manufacturer, or as proven defective in service during the warranty period, shall be replaced, repaired, or satisfactorily modified by the manufacturer.

C. It is not intended that the station manufacturer assume liability for consequential damages or contingent liabilities arising from failure of any vendor supplied product or part which fails to properly operate, however caused. Consequential damages resulting from defects in design, or delays in delivery are also beyond the manufacturer's scope of liability.

D. Equipment supplied by others and incorporated into a pump station or enclosure is not covered by this limited warranty. Any warranty applicable to equipment selected or supplied by others will be limited solely to the warranty, if any, provided by the manufacturer of the equipment.

E. This limited warranty shall be valid only when installation is made and use and maintenance is performed in accordance with manufacturer recommendations. A start-up report competed by an authorized manufacturer's representative must be received by manufacturer within thirty (30) days of the initial date the unit is placed into service. The warranty shall become effective on the date of acceptance by the purchaser or the purchaser's authorized agent, or sixty (60) days after installation, or ninety (90) days after shipment from the factory, whichever occurs first.

PART 2 - PRODUCTS

2.01 UNITARY RESPONSIBILITY

A. In order to unify responsibility for proper operation of the complete pumping station, it is the intent of these Specifications that all system components be furnished by a single supplier (unitary source). The pumping station must be of standard catalog design, totally warranted by the manufacturer. Under no circumstances will a system consisting of parts compiled and assembled by a manufacturer's representative or distributor be accepted.

2.02 MANUFACTURER

A. The specifications and project drawings depict equipment and materials manufactured by The Gorman-Rupp Company which are deemed most suitable for the service anticipated. The contractor shall prepare his bid based on the specified equipment for purposes of determining low bid. Award of a contract shall constitute an obligation to furnish the specified equipment and materials. The local authorized representative is The Craun-Liebing Company, Mr. Randy Keefe, Tel 216-228-7900, Ext. 104.

2.03 STATION ENCLOSURE

A. The station enclosure shall contain and enclose all valves, and associated controls and shall be constructed to enhance serviceability by incorporating the following design characteristics:

1. Two access panels per side of station shall be provided. Panels shall be sized and placed to permit routine maintenance operations through the panel openings of the enclosure. For these purposes, routine maintenance shall include frequently performed adjustments and inspections of the electrical components, controls and valves.

2. The access panels shall be provided with a hinge and latch. Hinge shall be the continuous type. Latch shall engage the enclosure at not less than three places, and shall be protected by a keyed lock.

3. One enclosure side shall contain a screened vent to maximize air flow for enclosure ventilation.

4. Station enclosure, less base, must be removable or able to be disassembled following the removal of reusable hardware.

5. Removal or disassembly of the enclosure shall be accomplished by not more than two maintenance personnel without the use of lifting equipment.

B. The station enclosure shall be manufactured of molded reinforced orthophthalic polyester resins with a minimum of 30% fiberglass, and a maximum of 70% resin. Resin fillers or extenders shall not be used.

C. Glass fibers shall have a minimum average length of 1 1/4 inches. Major design considerations shall be given to structural stability, corrosion resistance, and watertight properties. The polyester laminates shall provide a balance of mechanical, chemical, and electrical properties to insure long life. They must be impervious to micro-organisms, mildew, mold, fungus, corrosive liquids, and gases which can reasonably be expected to be present in the environment surrounding the wet well.

D. All interior surfaces of the housing shall be coated with a polyester resin-rich finish. It shall provide:

1. Maintenance-free service
2. Abrasion resistance
3. Protection from sewage, greases, oils, gasoline, and other common chemicals
4. The outside of the enclosure shall be coated with a suitable pigmented resin, compounded to insure long maintenance-free life.

E. A low enclosure temperature alarm shall be provided. The temperature sensing system will include an adjustable thermostat. Whenever the internal enclosure temperature

drops below the set point, an alarm signal shall be sent to the alarm system. Includes a set of dry contacts.

F. A spray foam installation with a rating of R-6 shall be applied to the roof, door and corner panels. A gasketed seal shall be provided around the doors.

G. A blower shall be mounted in the station enclosure. Blower capacity shall be sufficient to change station air a minimum of once every two minutes. Blower motor shall be operated automatically and shall be turned on at approximately 70-degrees F and shall be turn off at 55-degrees F. Blower motor and control circuit shall be protected by a thermal-magnetic air circuit breaker to provide over current and overload protection. Blower inlet shall be designed to prevent the entrance of rain, snow, rocks, and foreign material. H. Station Heater: Pump station shall be provided with a 1300/1500-watt, 115-volt electric heater with cord and grounding plug. Ungrounded heaters shall not be acceptable.

2.04 STATION BASE

A. Station base shall be constructed of pre-cast, reinforced concrete bonded inside a fiberglass form covering top and sides, and shall be designed to insure adequate strength to resist deformation of the structure during shipping, lifting, or handling. A separate precast concrete slab shall support the packaged station base and function as the wet well top. It shall incorporate a duplex access lid, sized for the installation and removal of the specified pump, and shall be of sufficient size to permit access to the wet well. A safety grate shall be supplied with the access hatch assembly. Color used shall de-emphasize the presence of dirt, grease, etc., and shall be provided with a non-skid surface.

B. A static wet well vent shall be mounted in the station base, and be housed in the station enclosure. The station enclosure shall provide a transition area between the wet well and the vent outlet. The vent shall terminate through the station wall with a screened opening which shall be designed to prevent the entrance of rain, snow, rocks and foreign material.

C. The station base shall incorporate a cable transition adapter for the pump cables, level controls, and associated wiring. The adapter shall provide for a vapor tight transition between the wet well and the lift station enclosure. The adapter shall incorporate cable grips for each cable and be provided with a gasket between the adapter and the station for a positive seal. Junction boxes shall not be considered for cable transition.

D. The station base shall be furnished with elastomeric compression sealing devices for all piping penetrations to provide for a vapor tight transition between the wet well and lift station enclosure.

E. Station Heater

1. Pump station shall be provided with a 1500 watt, 115 volt electric heater with cord, thermostat and grounding plug. Ungrounded heaters shall not be acceptable.

F. Insulation Package

1. The pump station shall be furnished with 1" thick spray foam insulation, which shall be applied to the roof, doors, and corner panels.

G. Discharge Gauge Kit

1. The pump station shall be equipped with a glycerin-filled pressure gauge to monitor discharge pressures. Gauge shall be a minimum of 4 inches in diameter, and shall be graduated in feet water column. Rated accuracy shall be 1 percent of full scale reading. Pressure gauge shall be graduated 0 to 140 feet water column minimum. Gauge kit shall be mounted and complete with all hoses and stainless steel fittings and shall include a shutoff valve installed in each connection to discharge piping and a three way valve to monitor either pump.

H. Guide Rail Splice Kit

1. Each pump shall be equipped with a welded 304 stainless steel assembly to provide guide rail splicing and support. This applies to all wet wells that are deeper than 20 ft.

2.05 PUMP DESIGN

A. The manufacturer of the pumps must be certified to ISO 9001 by an accredited certification agency.

B. Hydraulic Components and Solids Handling:

1. The pump casing shall be of gray iron, ASTM A-48, Class 30, or ductile iron, Class 65-45-12, with a 125# Flange. Casing shall be easily removable from the motor for full inspection of impeller.

2. All pump openings and passages shall be of adequate size to pass 3" diameter spheres (minimum) and any trash or stringy material which can pass through an average house collection system.

3. ERADICATOR PLUS™ – Solids reduction system designed for sanitary wipes, plastic bags, feathers, hair, sludge, organic solids and all other types of stringy solids.

4. Channel Impeller Design. The impeller shall be enclosed non-clog channel design, incorporating multiple vanes with wide flow channels. It shall be ductile iron, Class

65-45-12, with designed counter weight mass for dynamic balancing to eliminate vibration. Balancing shall not deform or weaken the impeller. The impeller shall be driven by means of a key slotted into the shaft. Impeller fasteners shall be non-corroding. The axial suction clearance between the impeller and pump casing shall be fully adjustable to maintain peak operating efficiency of the pump. The adjustment shall be easily accomplished using four external adjusting screws.

5. A hoisting bail shall provide for proper balance of pump while it is being lifted.

6. All other major pump components such as motor housing, seal housing, and bearing brackets shall be of gray iron, ASTM A-48, Class 30. All external surfaces coming into contact with pumped media shall be protected by water-based epoxy primer and a waterborne enamel top coat with a minimum 8 mil thickness. All exposed fasteners and lock washers shall be of 300 series stainless steel.

C. Shaft Seal

1. Two separate mechanical seals shall be provided, arranged in tandem. The upper seal shall have a carbon rotating face and ni-resist stationary face. The lower seal shall incorporate silicon carbide on both the rotating and stationary faces. Cage and springs shall be of stainless steel and elastomers of Viton or Buna-N.

2. The rotating seal faces shall be lubricated from an oil filled reservoir between pump and motor; the oil serving as both lubricating and a cooling media. The reservoir shall have two oil fill and drain plugs to insure accuracy when measuring lubricant level and for ease of maintenance.

3. Seal shall require no special maintenance or routine adjustment; however, shall be easily inspected or replaced. No seal damage shall result from operating the pump for short periods of time without liquid.

4. A seal failure electric probe sensor shall be installed in the seal chamber. The sensor shall be capable of sensing leakage into the seal chamber and the sensitivity level shall be set in the control panel.

D. Pump Motor

1. Motor Description

a. The motor and pump must be connected to form an integral unit. Motor shall be a squirrel-cage, induction type in an air-filled water tight enclosure, oil-filled motors shall not be acceptable. The motor shall conform to NEMA design standards, and incorporate Class H insulation materials to withstand a continuous operating temperature of 180^0C (356^0F). The pump and motor shall be capable of handling liquids with a maximum temperature of 40^0C (104^0F).

b. Motor shall be capable of sustaining a minimum of 10 starts per hour and shall be inverter duty rated in accordance with NEMA MG1. The motor shall not require a cooling jacket or any other means of auxiliary cooling during normal continuous operation.

c. Motor housing shall be of cast iron. The stator shall consist of copper windings with copper connectors applied to high grade electrical steel laminations. The stator shall be held securely in place by a heat-shrink fit into the motor housing. Any other means of securing the stator which would require penetration of the motor housing shall not be considered acceptable.

d. Combined rotor and shaft assembly shall be dynamically balanced for vibration-free operation. Rotor end bars and short circuit rings shall be of aluminum. The pump shaft shall be of 17-4 PH series stainless steel. The shaft shall be machined with shoulders or snap ring grooves for positive placement of bearings.

e. The upper and lower bearing shall be of heavy duty design, capable of supporting the shaft and rotor while under maximum radial and thrust loads. The bearings shall be permanently grease lubricated and sealed at the time of installation. The minimum B-10 bearing life shall be 50,000 hours over the normal operating range of the curve.

f. Motors to be 10 HP, 1750 RPM, 3/60/240 volt.

2. Watertight Integrity

a. All static seals at watertight mating surfaces shall be of Buna-N or Viton rubber O-ring type. Use of auxiliary sealing compounds shall not be required.

b. The power and control cables shall enter the motor through a terminal housing. The entrance shall be sealed with a rubber grommet and clamp set which when compressed longitudinally causes a radial watertight seal. The individual leads of the power and control cables shall be separated by a compressible grommet, which shall provide protection from wicking through the cable. Any other cable entrance design requiring use of epoxies, silicones, or similar caulking materials shall be considered unacceptable.

c. The motor and sensor leads shall be mated to the cable leads through a group of quick-connect, color-coded cable connectors.

d. The pump and electrical cables shall be capable of continuous submergence without loss of waterproof integrity to a depth of 65 feet.

e. The watertight integrity of the motor housing and shaft seal shall be tested during manufacture by vacuum testing the completed pump assembly.

3. Motor Protection

a. The motor shall be protected from thermal damage by a group of three separate thermostatic switches embedded into the stator windings, one per stator phase. Each switch shall open independently and terminate motor operation if temperature of the protected winding reaches the high temperature set point of 160^{o}C (320^{o}F) and shall automatically reset upon cooling of the winding. The

thermal sensing device shall be connected to the pump control panel by the contractor.

b. The pump shall utilize a single probe to monitor both the motor and seal chambers for moisture intrusion. The detection of moisture in either chamber shall send a signal to the control panel which shall be used to notify the user of the need for an inspection.

2.06 AUTOMATIC DISCHARGE CONNECTION

A. Each pump shall be furnished with a submersible discharge connection system to permit removal and installation of the pump without the necessity of an operator entering the wet well. The design must insure an automatic and firm connection of the pump to the discharge piping when lowered into place.

A. A gray iron or fabricated steel base plate with integral guide rail pilots shall be provided along with all hardware and anchor bolts required for permanent installation to the wet well floor. The base plate shall be designed with an integral 90^0 elbow, or adapt to a commercially available elbow for connection to the vertical discharge piping utilizing standard ANSI 125 lbs. flanges. The base plate shall be coated with an epoxy coating for corrosion resistance. The manufacturer shall provide all necessary drawings to insure proper installation and alignment of baseplate within the sump.

B. Each pump shall be provided with a replaceable ductile iron slide rail guide shoe attached to pump discharge flange. A replaceable neoprene seal shall be provided as an integral part of the guide shoe to form a seal with the base plate connection and eliminate the possibility of leakage and erosive wear during operation. The seal shall contact mating faces in a static position and shall have adequate flexibility to flex under pumping pressure to increase seal efficiency. Metal-to-metal contact at the discharge connection shall not be acceptable.

C. The contractor shall provide two lengths of 2", schedule 40 stainless steel guide rail pipe for each pump.

D. Upper guide rail pilots, and a lifting cable shall be furnished for each pump. Bottom pilots shall be an integral part of the baseplate for ease of installation and proper alignment.

E. The guide shoe shall direct the pump down two vertical guide rails and onto the discharge connection in a simple lineal movement. The buildup of sludge and grease on guide rails shall not present problems during the lifting operation. The guide shoe shall be designed with integral hooks at the top to transmit full weight of the pump to the base plate flange. No portion of the pump shall be supported directly on the bottom of the wet well, guide rails, or lifting cable.

F. Lifting cable shall consist of a stainless steel braided wire cable attached to the pump lifting bail. A crimped ball end shall be provided at the upper end of this cable for attaching to the wet well access frame.

G. All bolts, machine screws, nuts, washers, and lockwashers for complete assembly of access cover, guide rails, and discharge elbow shall be stainless steel.

2.07 WET WELL ACCESS

A. The wet well access shall be fabricated from welded aluminum sections. A hinged aluminum door shall be provided for each pump. The hinged door shall be fabricated from 1/4" thick aluminum with non-skid diamond tread on upper surface. All hardware on access assembly shall be stainless steel with a flush upper surface without protrusions. For safety, the door shall have a 300 lbs/sq.ft. rating and be fitted with a recessed staple for padlock. Door shall be furnished with a flush aluminum drop handle and automatic hold open arm.

B. A fall protection safety grate shall be provided. An aluminum grate provided and installed allowing access to pump cables, lifting cables and guide rail brackets without removal. The grate is latchable in the open position, includes 316 SST hardware and is load rated consistent with the access cover.

2.08 VALVES AND PIPING

A. Check Valve: Each pump shall be equipped with a full flow type check valve capable of passing a 3" spherical solid. Valve shall be constructed with flanged ends and fitted with an external lever and torsional spring. Valve seat shall be constructed of stainless steel, secured to the body to ensure concentricity, sealed by an O-ring, and shall be replaceable. The valve body shall be cast iron incorporating a clean-out port large enough to allow removal and/or replacement of the valve clapper without removing valve or piping from the line. Valve clapper shall have a molded neoprene seating surface incorporating low pressure sealing rings. Valve hinge pin and internal hinge arm shall be stainless steel supported on each end in brass bushings. Shaft nut shall have double O-rings which shall be shall be easily replaceable without requiring access to interior of valve body. All internal hardware shall be stainless steel. Valve shall be rated at 175 PSI water working pressure, 350 PSI hydrostatic test pressure. Valves other than full flow type or valves mounted in such a manner that prevents the passage of a 3" spherical solid shall not be acceptable.

B. The discharge line shall be equipped with a 2-way plug valve to permit isolation of the pump from the common discharge header. The plug valve shall be non-lubricated type. Valve body shall be cast iron with flanged end connections

drilled to 125 pound standard. Valve shall be furnished with a drip-tight shutoff plug mounted in stainless steel or teflon over phenolic bearings, and shall have a resilient facing bonded to the sealing surface. Valves shall have ports designed to pass 3" spherical solids.

C. Piping

1. Flanged header pipe shall be centrifugally cast, ductile iron, complying with ANSI/AWWA A21.51/C115 and class 53 thickness.

2. Flanges shall be cast iron class 125 and Comply with ANSI B16.1.

3. Pipe and flanges shall be threaded and suitable thread sealant applied before assembling flange to pipe.

4. Bolt holes shall be in angular alignment within $1/2^0$ between flanges. Flanges shall be faced and a gasket finish applied.

5. All pipes connected to the pump station shall be supported according to good commercial practice.

D. Discharge Bypass Connection

1. The station header pipe shall incorporate a 2-way plug valve to permit emergency access to the pump station force main after isolation of the pump. The plug valve shall be non-lubricated, tapered type. Valve body shall be cast iron with flanged end connections drilled to 125 pound standard. Valve shall be furnished with a drip-tight shutoff plug mounted in stainless steel or Teflon over phenolic bearings, and shall have a resilient facing bonded to the sealing surface.

2. The header pipe shall penetrate the station side wall and terminate with a male OPW type quick connect fitting.

3. Suction bypass line to be independent of the discharge piping.

E. Suction Bypass Connection

1. The station incorporate piping to permit emergency access to the pump station wet well.

2. The pipe shall penetrate the station side wall and terminate with a male OPW type quick connect fitting.

F. Alarm Light

1. Station manufacturer will supply one 115 volt AC, LED alarm light fixture with vapor-tight red globe, guard, conduit box, and mounting base. The design must prevent rain water from collecting in the gasketed area of the fixture, between the base and globe. The alarm light will be shipped loose for installation by the contractor.

F. Alarm Flasher

1. The alarm light circuit shall be equipped with a repeat cycle timer causing the alarm light to flash. Flash rate shall be approximately 1 second. (1/2 second on and off).

2.09 ELECTRICAL CONTROL COMPONENTS

A. The pump station control panel will be tested as an integral unit by the pump station manufacturer.

B. Panel Enclosure

1 The electrical control equipment shall be mounted within a NEMA 1 stainless-steel control enclosure (60" W x 36" H x 14" D). The enclosure door shall be hinged and sealed with a neoprene gasket. It shall include a removable steel back panel on which control components shall be mounted. Back panel shall be secured to enclosure with collar studs. Operator controls shall be mounted on the outer swing panel door. The enclosure shall be mounted on the electrical service rack at the site. The control panel shall be equipped with vapor emission type corrosion inhibitors.

2 All motor branch circuits shall be of the highest industrial quality, securely fastened to a removable sub plate with screws and lock washers. The sub plate shall be tapped to accept all mounting screws. Self-tapping screws shall not be used to mount any component. All operating controls and instruments shall be securely mounted and shall be clearly labeled to indicate function.

C. UL Label Requirement

1. The pump control panel shall be manufactured by a UL panel builder and the assembly shall bear a serialized UL label for "Enclosed Industrial Control Panels". Listing for open style industrial control panels or an assembly of listed or recognized components shall not be acceptable.

D. Drive Assembly

1. All motor branch components shall be of the highest industrial quality. Operating coils of all AC control devices shall be rated for 120 volts, and shall be suitable for use in a voltage range of 108 to 132 volts, 60 hertz.

E. Drive Control

1. Each drive assembly shall be equipped with a control power transformer with primary and secondary fuses and all relays and components necessary to perform the specified functions.

2. Operator controls shall be mounted through the drive assembly enclosure door and consist of the following:

    a. Mode selector switch (Hand-off-auto)
    b. Manual speed potentiometer
    c. Digital display
    d. Drive fault reset/stop pushbutton
    e. Elapsed time meter

F. Circuit Breakers and Operating Mechanisms

1. A properly sized heavy-duty air circuit breaker shall be furnished for each pump motor, and shall have a symmetrical RMS interrupting rating of 10,000 amperes at 240-volts. All circuit breakers shall be sealed by the manufacturer after calibration to prevent tampering. A padlocking operating mechanism shall be installed on each motor circuit breaker. Operator handles for the mechanisms shall be located on the exterior of the control compartment door, with interlocks which permit the door to be opened only when circuit breakers are in the "off" position.

G. Inverters

1. The inverter shall be suitable for operation of standard Nema Design B, 4 pole motors. The inverter will have a diode bridge rectifier on the input to minimize the generation of electrical noise back into the line and provide near unity power factor. Output devices shall be transistors.

2. Environment Conditions

    a. The inverter shall be capable of operation under any combination of the following conditions without mechanical or electrical damage.

        1) Ambient Temperature: -10 + 40 degrees C
        2) Relative Humidity: Less than 90% non-condensing
        3) Altitude: Less than 1,000M (3300 ft) above sea level
        4) Vibration: .006 inches displacement, 1G peak
        5) Shock: 15G peak for 11mS (+/-1.0mS)

3. Control Specification

        1) Control System: Sinusoidal pulse width modulated voltage waveform

2) Frequency Accuracy: +/- 1% of max. frequency
3) Volts/Hertz Ratio: 1 to 14.3 V/HZ user programmable
4) Operation Frequency: 0 to 250 Hz
5) Overload Capacity: 115 for 60 seconds

H. Digital Readout and Monitor

1. A five digit panel meter will display standby status, output frequency, set-up parameters and fault. With pushbutton, user can monitor current, voltage, frequency, acceleration and deceleration time, minimum frequency and maximum frequency. Readout also provides inverter status and protective circuit status.

I. Protection

1. The variable speed drive system shall include a diode bridge rectifier, capacitor filter, and transistorized inverter section. Base driver signals to control firing of the power transistors will be designed with optically coupled isolators for maximum protection of the control circuits from high voltage and noise. The output will be a sinusoidal, pulse width modulated, voltage waveform for reduced harmonic heating in the motor.

2. The system protection will provide the following:

   a. Intermittent overload - 50 to 115%
   b. Current limit - 50 to 150%
   c. Overcurrent - 180% of rated output current
   d. Inverse time overload - 50 to 100%
   e. Short circuit - Phase to phase or phase to ground
   f. Overvoltage - 10% above input line or DC bus voltage
   g. Undervoltage - 10% below line voltage
   h. Component burnout - DC bus fuse protection and/or phase input fusing
   i. Power loss ride-through - 500mS

3. When the inverter trips out on a fault, the fault relay shall activate and the display shall indicate the reason for the trip as follows:

   a. Overcurrent
   b. Short circuit
   c. Overload
   d. Overvoltage
   e. Undervoltage
   f. Overheat
   g. Ground fault
   h. Motor stalled
   i. Power supply fault

4. Auto restart shall occur when the inverter trips on undervoltage. Auto restart will not be attempted for any other type of fault and the inverter will trip out immediately, activate the fault relay and make the appropriate indication on the display.

    a. Save the status of the inverter at the time of the fault and make that information available on the LED display until the inverter is reset or the control power is removed.

5. Operational Functions

    a. Acceleration and deceleration time independently adjustable from 1 to 600 seconds (selectable ranges).
    b. Signal follower 0-10VDC or 4-20MA user selectable. An increasing input signal can command increasing or decreasing frequency as required by the application.
    c. Volts/Hertz patterns user selectable.
    d. Maximum and minimum frequency limit adjustments.

6. EMI Protection

    a. Each inverter input shall be equipped with a solid state, soft clamping transient voltage protector. The protector shall be capable of dissipating 16,000 joules or greater and a response time of 6 nanoseconds.

    b. All contactor coils shall be equipped with MOV or RC surge arresters.

7. Auxiliary Power Transformer

    a. The liquid level control shall be equipped with a 5 kVA stepdown transformer to supply 115 volts. The primary side of the transformer shall be protected by a thermal-magnetic air circuit breaker, specifically sized to meet the power requirements of the transformer. A mechanical operating mechanism shall be installed on the circuit breaker to provide a means of disconnecting power to the transformer. The operator handle for the operating mechanism hall be located on the exterior of the control panel with interlocks which permit the door to be opened only when the circuit breaker is in the "off" position.

8. Transient Voltage Surge Suppression

    a. Pump control panel will be furnished to minimize equipment damage from induced lightning/power surges and transients (20,000 AMPS).

9. Three Phase Voltage Monitor

a. Voltage monitor will be wired to stop pump motors in the event of any of the following: Low voltage, voltage unbalance, phase loss, phase reversal. Power to the pump will automatically be restored upon return to normal power conditions. Includes integral pick-up and drop-out delay.

10. Receptacle

a. Two (2) duplex ground fault interrupter utility receptacles providing 115 VAC, 60 hertz, single phase current shall be provided. Receptacle circuit shall be protected by a 15 ampere thermal-magnetic circuit breaker.

11. Fault Monitoring Contacts

a. External Source Contacts Wired to Terminal Blocks:

1) Low Water Alarm (Primary Radar)
2) High Water Alarm (Primary Radar)
3) Three Phase Voltage Monitor/Phase Failure
4) Pump #1 Fault
5) Pump #2 Fault
6) VFD Fault - Pump #1
7) VFD Fault - Pump #2
8) Station Enclosure Low Temperature Alarm
9) Backup Float Switch Control Activated
10) Pump Run #1
11) Pump Run #2
12) Station intrusion (door open)
13) Wet Well Level Sensed by Analog Signal
14) Flow Meter Analog Signal

12. Pump Motor Protection

a. The pump control panel shall be equipped to terminate pump operation due to high motor winding temperature or moisture in the motor housing and shall utilize the contacts in the pump motor.

13. Other Control Components

a. The pump control panel shall be equipped to terminate pump operation due to high motor winding temperature or moisture in the motor housing, utilizing contacts in the pump motor housing. If either event should occur, the motor starter will drop out and a mechanical indicator visible on the door shall indicate that the pump motor has been shut down. The pump motor and the mechanical indicator shall require manual reset. Dry

contacts, wired to terminal blocks, shall be furnished for each pump for thermal/moisture shutdown.

b. The control circuit shall be protected by a normal duty thermal magnetic air circuit breaker which shall be connected in such a manner as to allow control power to be disconnected from all control circuits.

c. Pump mode selector switches shall be connected to permit manual start and manual stop for each pump individually, and to select automatic operation of each pump under control of the liquid level control system. Manual operation shall override the liquid level control system. Selector switches shall be heavy duty, oil tight design, with contacts rated NEMA A300 minimum.

d. Pump alternation shall be integral to the liquid level controller. Provisions for automatic alternation or manual selection shall also be integral to the liquid level controller.

e. Control panel shall be equipped with one oil tight pilot light for each pump motor. Light shall be wired in parallel with the related pump motor starter to indicate that the motor is on or should be running.

f. The control panel shall be equipped with a panel heater to minimize the effects of humidity and condensation. The heater shall include a thermostat.

14. Wiring

a. The control panel, as furnished by the manufacturer, shall be completely wired. The contractor shall field connect the power feeder lines to the main terminal block, final connections to the remote alarm devices, and the connections between the pump and the pump motor control. All wiring, workmanship, and schematic wiring diagrams shall be in compliance with applicable standards and specifications set forth by the National Electric Code (NEC).

b. All user serviceable wiring shall be type MTW or THW, 600 volts, and shall be color coded as follows:

1) Line and load circuits, AC or DC power.....Black
2) AC control circuit less than line voltage.....Red
3) DC control circuit.....Blue
4) Interlock control circuit, from external source.....Yellow
5) Equipment grounding conductor.....Green
6) Current carrying ground.....White
7) Hot with circuit breaker open.....Orange

c. Control circuit wiring inside the panel, with the exception of internal wiring of individual components, shall be of 16 gauge minimum, type MTW or THW, 600 volts. Power wiring shall be 14 gauge minimum.

d. The ampacity of motor branch conductors and other power conductors shall not exceed the temperature rating of the connecting terminals. Wires shall be clearly numbered at each end in accordance with the electrical diagrams. All wires on the sub plate shall be bundled and tied.

e. Wires connected to components mounted on the enclosure door shall be bundled and tied in accordance with good commercial practice. Bundles shall be made flexible at the hinged side of the enclosure. Adequate length and flex shall be provided to allow the door to swing to its full open position without undue stress or abrasion on the wire or insulation. Bundles shall be held in place on each side of the hinge by mechanical fastening devices.

15. Conduit requirements are as follows:

a. All conduit and fittings shall be UL listed.
b. Liquid tight flexible metal conduit shall be constructed of smooth, flexible galvanized steel core with smooth abrasion resistant, liquid tight, polyvinyl chloride cover.
c. Conduit shall be supported in accordance with articles 346, 347, and 350 of the National Electric Code.
d. Conduit shall be sized according to the National Electric Code.

16. Grounding

a. The pump control manufacturer shall provide a common ground bar mounted on the enclosure back plate. The mounting surface of the ground bar shall have any paint removed before making final connections.

b. The contractor shall make the field connections to the main ground lug and each pump motor in accordance with the National Electric Code.

17. Identification

a. A permanent corrosion resistant name plate(s) shall be attached to the control and include the following information:

1) Equipment serial number
2) Supply voltage, phase and frequency
3) Current rating of the minimum main conductor
4) Electrical wiring diagram number

5) Motor horsepower and full load current
6) Motor overload heater element
7) Motor circuit breaker trip current rating
8) Name and location of equipment manufacturer

b. Control components shall be permanently marked using the same identification shown on the electrical diagram. Identification label shall be mounted adjacent to the device.

c. Switches, indicators, and instruments shall be plainly marked to indicate function, position, etc. Marking shall be mounted adjacent to and above the device.

2.10 LIQUID LEVEL CONTROL

A. The manufacturer of the liquid level control system must be ISO 9001:2000 revision certified, with scope of registration including design control and service after sales activities.

B. The level control system shall start and stop the pump motors in response to changes in wet well level, as set forth herein.

C. The level control system shall be capable of operating as either an air bubbler type level control system, submersible transducer type system, or ultrasonic (radar) transmitter type system.

D. The level control system shall utilize alternation to select first one pump, then the second pump, then the third pump (if required), to run as lead pump for a pumping cycle. Alternation shall occur at the end of a pumping cycle, or in the event of excessive run time.

E. The level control system shall utilize an electronic pressure switch which shall continuously monitor the wet well level, permitting the operator to read wet well level at any time. Upon operator selection of automatic operation, the electronic pressure switch shall start the motor for one pump when the liquid level in the wet well rises to the "lead pump start level". When the liquid is lowered to the "lead pump stop level", the electronic pressure switch shall stop this pump. These actions shall constitute one pumping cycle. Should the wet well level continue to rise, the electronic pressure switch shall start the second and/or third pump (if required) when the liquid reaches the "lag pump start level", or "standby pump start level" so that all pumps are operating. These levels shall be adjustable as described below.

1. The electronic pressure switch shall include integral components to perform all pressure sensing, signal conditioning, EMI and RFI suppression, DC

power supply and 120 volt outputs. Comparators shall be solid state, and shall be integrated with other components to perform as described below.

2. The electronic pressure switch shall be capable of operating on a supply voltage of 12-24Vdc in an ambient temperature range of -10 degrees C (14 degrees F) through 55 degrees C (131 degrees F). Ingress Protection of IP56 for indoor use with closed cell neoprene blend gasket material. Evaluated by Underwriters Laboratories for Pollution Degree 2 device for U.L. and cU.L. Control range shall be 0 to 33.3 feet of water with an overall repeat accuracy of (plus/minus) 0.1 feet of water. Memory shall be non-volatile. A Battery backed real time clock shall be standard.

3. Eleven optically isolated, user defined digital inputs for pump and alarm status. Rated at 10mA at 24Vdc. Eight digital output relays (mechanical contacts), configurable for pump start/stop or alarms. Three relays rated at 12 Amp @ 28Vdc and 120Vac, five relays rated at 3 Amp @ 30Vdc and 120Vac. The electronic pressure switch shall consist of the following integral components: pressure sensor, display, electronic comparators, digital inputs and digital output relays.

    a. The electronic pressure switch shall incorporate a digital back lighted LCD panel display which, upon operator selection, shall indicate liquid level in the wet well, and pump status indication for up to 3 pumps. The display shall include a 128 x 64 bit resolution LCD to read out directly in feet of water, accurate to within one-tenth foot (0.1 foot), with a full scale indication of not less than 12 feet. The display shall be easily convertible to indicate English or metric units.

    b. Level adjustments shall be electronic comparator set-points to control the levels at which the lead, lag and standby pumps start and stop. Each of the level settings shall be easily adjustable with the use of membrane type switches, and accessible to the operator without opening any cover panel on the electronic pressure switch. Controls shall be provided to permit the operator to read the selected levels on the display. Such adjustments shall not require hard wiring, the use of electronic test equipment, artificial level simulation or introduction of pressure to the electronic pressure switch.

    c. Each digital input can be programmed as pump run, pump HOA, pump high temp, pump moisture/thermal, starter failure (FVNR, RVSS, VFD), and phase failure. Inputs are used for status and alarm indication.

    d. Each output relay in the electronic pressure switch shall be hard contact mechanical style. Each relay input shall be optically isolated from its output and shall incorporate zero crossover switching to provide high immunity to electrical noise. Each output relay shall have an inductive

load rating equivalent to one NEMA size 3 contactor. A pilot relay shall be incorporated for loads greater than a size 3 contactor.

4. The electronic pressure switch shall be equipped with alarm banners with time and date history for displaying alarm input notification. Alarm history will retain a 16 of the most recent alarm events.

5. The electronic pressure switch shall be equipped with pump start/stop and alarm input delay(s) that have an adjustable delay set points.

6. An Antiseptic function with a built in timer shall be incorporated in the electronic pressure switch to prevent the well from becoming septic.

7. The electronic pressure switch shall be capable of jumping to next available pump if current pump is out of service due to pump failure or manual selection. Circuit design in which application of power to the lag pump motor starter is contingent upon completion of the lead pump circuit shall not be acceptable.

8. The electronic pressure switch shall be equipped with a simulator system capable of performing system cycle testing functions.

9. The electronic pressure switch shall be capable of calculating and displaying pump elapse run time. The elapse run time is resettable and adjustable.

10. The electronic pressure switch shall have internal capability of providing automatic simplex, duplex, and triplex alternation, manual selection of pump sequence operation, and alternation in the event of 1-24 hours of excessive run time.

11. The electronic pressure switch shall be equipped with a security access code to prevent accidental set-up changes and provide liquid level set-point lock-out. The supervisor access code is adjustable.

12. The electronic pressure switch shall be equipped with one (1) 0-33 ft. W.C. input, one (1) scalable analog input of either 0-5Vdc, or 4-20mA, and one (1) scalable analog output of either 0-5Vdc, 0-10Vdc or 4-20mA. Output is powered by 10-24Vdc supply. Load resistance for 4-20mA output shall be 100-1000 ohms.

13. The electronic pressure switch shall include a DC power supply to convert 120Vac control power to 12 or 24Vdc power. The power supply shall be 500 mA (6W) minimum and be UL listed Class II power limited power supply.

14. The electronic pressure switch shall be equipped with an electronic comparator and mechanical output relay to alert maintenance personnel to a

high liquid level in the wet well. An alarm banner, visible on the front of the controller, shall indicate that a high wet well level exists. The alarm signal shall be maintained until the wet well level has been lowered and the circuit has been manually reset. High water alarm shall be furnished with a dry contact wired to terminal blocks.

15. The electronic pressure switch shall be equipped with an electronic comparator and mechanical output relay to alert maintenance personnel to a low liquid level in the wet well. An alarm banner, visible on the front of the controller, shall indicate that a low wet well level exists. The alarm signal shall be maintained until the cause for the low wet well level has been corrected and the circuit has been manually reset. A low liquid level condition shall disable all pump motors. When the wet well rises above the low level point, all pump motors shall be automatically enabled. Low water alarm shall be furnished with a dry contact wired to terminal blocks.

16. Integrinex Standard Analog Output circuit will be furnished with transient voltage surge suppression to protect related equipment from induced voltage spike from lighting.

F. An alarm silence pushbutton and relay shall be provided to permit maintenance personnel to de-energize the audible alarm device while corrective actions are under way. After silencing the alarm device, manual reset of the alarm condition shall clear the alarm silence relay automatically. The pushbutton shall be a membrane style button integral to the Integrinex Standard level controller.

G. Integrinex Standard Elapsed Time Meter: Six digit elapsed time meter shall be shall be displayed on the Integrinex™ Standard operator interface to indicate total running time of each pump in "hours" and "tenths of hours". Pump runtime shall be adjustable and password protected.

H. Integrinex Standard High Pump Temperature: A moisture/thermal and high pump temperature protection circuit shall override the level control and shut down the pump motor(s) when required to protect the pump from excessive temperature. The Integrinex™ Standard will display an alarm banner indicating the motor stopped due to this fault condition. The motor shall remain locked out until the pump can be manually reset. Automatic reset of this circuit is not acceptable.

I. Alarm Light

1. Station manufacturer will supply one 115 volt AC alarm light fixture with vapor-tight red globe, guard, conduit box, and mounting base. The design must prevent rain water from collecting in the gasketed area of the fixture, between the base and globe. The alarm light shall ship loose for field installation by the Contractor.

J. Alarm Flasher

1. The alarm light circuit shall be equipped with a repeat cycle timer causing the alarm light to flash. Flash rate shall be approximately 1 second. (1/2 second on and off).

K. VEGA Radar System

1. Non-Contact Radar Sensor

2. The transducer shall be FMCW radar type, emitting W-Band energy. The frequency change is proportional to distance and is converted into filling height. Variations in the filling height are converted into a linear 4-20mAdc signal. Signal processing shall filter out false reflections and other background noises.

3. Range

    a. Up to 15 meters (49.21 feet)

4. Performance Requirements

    a. Accuracy: ±2 mm
    b. Process pressure: -14.5 to 43.5 psig
    c. Process temperature: -40 to +176 deg F
    d. Ambient temperature: -40 to +176 deg F
    e. Sinusoidal Vibrations resistance Class 4M8 according to IEC 60271-3-4
    f. Shock resistance 50 g, 2.3 ms; according to EN 60068-2-27
    g. Impact resistance IK07 according to IEC 62262

5. Characteristics

    a. Protection rating IP 66/68 (3 bar) NEMA 6P submersible
    b. Measuring cycle time ≤ 250 ms
    c. Boot strap time ≤ 10 s
    d. Step response time <3 s
    e. Beam angle 8 deg
    f. Output signal 4-20mA with HART
    g. 32-point linearization curve
    h. Integrated open channel flow algorithms
    i. Flumes – Parshall, Palmer-Bowlus, Venturi
    j. Weirs – Trapezoidal, Rectangular, V-Notch

6. Communications

    a. Encrypted Bluetooth communication with PIN and authentication process

7. Certifications

    a. CE approved
    b. FCC 15.256 approved
    c. CSA certified to Ordinary Location for use in Canada and USA
    d. CSA certified Intrinsically Safe to Class I, Division 1, Groups A, B, C, and D; Class II, Division 1 Groups E, F, and G; Class III for use in Canada and USA
    e. CSA certified Non-Incendive to Class I, Division 2, Groups A, B, C, and D; Class II, Division 2 Groups F and G for use in Canada and USA

8. Memory

    a. The radar shall include a counter for tracking the number of parameter changes to the sensor
    b. The radar shall track the minimum and maximum distance measured, measurement reliability, measurement rate and electronics temperature.

9. Diagnosis

    a. The radar sensor shall include self-monitoring and diagnostics according to NE 107 and VDI/VDE 2650.
    b. Status messages categories shall be failure, function check, out of specification and maintenance requirement.
    c. The radar sensor shall be able to perform a function test and produce a test report verifying that the sensor is functioning properly.

10. Mounting

    a. The radar sensor shall have mounting options of a straining clamp or a mounting bracket.

11. Maintenance

    a. No maintenance required in normal operation.

12. Manufacturer

a. VEGA Americas/ VEGA Grieshaber KG.
b. VEGAPULS C21 radar sensor (Intrinsically-safe).

2.12 BACKUP LIQUID LEVEL CONTROL

A. A backup level control system shall be provided to operate the pump, in the event of a failure of the primary solid state level control system. This backup level control will allow for a redundant pump off switch to turn the pump motors off in the event of a primary level control failure.

B. The backup level control system shall start and stop pump motors in response to changes in wet well level. It shall be the mercury float switch type, incorporating intrinsically safe relays. Rising and falling liquid level in the wet well causes switches within the floats to open and close, providing start and stop signals to the remainder of the level control system.

C. The backup level control system shall start and stop the pump in accordance to the wet well level. The pump start and stop float switches shall be set above and below the normal pump start and stop level settings utilized for the primary level control. Upon operator selection of automatic operation, a float switch shall start one pump motor when water rises to the "pump start level". When the water is lowered to the "pump stop level", the system shall stop the pump. These actions shall constitute one pumping cycle.

D. The backup level control system shall work in conjunction with an alternator relay to select first one pump, then the second pump, to run as "Lead" pump. Alternation will occur at the end of each pumping cycle.

G. Two (2) float switches shall be supplied for installation by the contractor. Each float shall contain a mercury switch sealed in a polypropylene housing, with 50 feet of power cord, and polypropylene mounting hardware. A PVC chain with weight shall be furnished to secure the switches in the wet well.

H. Two intrinsically safe relays shall be supplied in a separate level control enclosure. Relays must be recognized and listed as intrinsically safe by a nationally recognized testing laboratory. Installing contractor shall make connections from relays to motor controls.

I. Backup Level Controller: Smart Relay [Eaton Easy4].

1. Backup Level Controller: Smart Relay [Eaton Easy4].
2. Backup Level Sensor: Float Controls (Intrinsically Safe).
3. Backup Floats:
   a. #1 – Low Level Float/Pumps Stop
   b. #2 – High Level Float/Pump Start

4. Float Chain Included: 30 feet of stainless-steel chain with cast iron weight.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Contractor shall off-load equipment at installation site using equipment of sufficient size and design to prevent injury or damage. Station manufacturer shall provide written instruction for proper handling. Immediately after off-loading, contractor shall inspect complete pump station and appurtenances for shipping damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to accepting delivery. Validate all station serial numbers and parts lists with shipping documentation. Notify the manufacturer's representative of any unacceptable conditions noted with shipper.

3.02 INSTALLATION

A. Install, level, align, and lubricate pump station as indicated on project drawings. Installation must be in accordance with written instructions supplied by the manufacturer at time of delivery.

B. Check motor and control data plates for compatibility to site voltage. Install and test the station ground prior to connecting line voltage to station control panel.

C. Prior to applying electrical power to any motors or control equipment, check all wiring for tight connection. Verify that protective devices (fuses and circuit breakers) conform to project design documents. Manually operate circuit breakers and switches to ensure operation without binding. Open all circuit breakers and disconnects before connecting utility power. Verify line voltage, phase sequence and ground before actual start-up.

3.03 FIELD QUALITY CONTROL

A. Operational Test

1. Prior to acceptance by owner, an operational test of the pump, and control systems shall be conducted to determine if the installed equipment meets the purpose and intent of the specifications. Tests shall demonstrate that all equipment is electrically, mechanically, structurally, and otherwise acceptable; it is safe and in optimum working condition; and conforms to the specified operating characteristics.

2. After construction debris and foreign material has been removed form the wet well, contractor shall supply clear water volume adequate to operate station through several pumping cycles. Observe and record operation of pump, suction and discharge gage readings, ampere draw, pump controls, and liquid level controls. Check calibration of all instrumentation equipment, test manual control devices, and automatic control systems. Be alert to any undue noise, vibration or other operational problems.

B. Manufacturer's Start-up Services

1. Coordinate station start-up with manufacturer's technical representative. The representative or factory service technician will inspect the completed installation. Calibrate and adjust instrumentation, correct or supervise correction of defects or malfunctions, and instruct operating personnel in proper operation and maintenance procedures.

3.04 CLEANING

A. Prior to acceptance, inspect interior and exterior of pump station for dirt, splashed material or damaged paint. Clean or repair accordingly. Remove from the job site all tools, surplus materials, scrap and debris.

3.05 PROTECTION

A. The pump station should be placed into service immediately. If operation is delayed, station is to be stored and maintained per manufacturer's written instructions.

END OF SECTION