ADDENDUM NUMBER ONE  
LAGOON INFUENT PUMP IMPROVEMENTS  
2020 COMMUNITY DEVELOPMENT BLOCK GRANT  
GREENFIELD, TENNESSEE  

1. SC-19.00 - Field Verification of Existing Force Main  
The above Special Condition shall be deleted and revised as follows:  
The flow rate and TDH (Total Dynamic Head) stated under “Operating Conditions” in pump specification 15043.18 is for bidding purposes only. The TDH will be more accurately determined by the Engineer after the size of the force main has been verified by the Contractor in the field. The shop drawings shall be revised accordingly. There will be no special payment for locating the force main and determining its size.  

2. Technical Specification 15043.18  
The above specification has been revised as shown on the attachment.  

3. Bid Date Change  
Bid opening is hereby revised to 2:00 PM CDT on September 30, 2022.  

[Signature]  
Kenneth R. King  
Registered Professional Engineer  
Tennessee License No. 12309  

[Date]  
09-01-22
SECTION 15043.18
FACTORY BUILT ABOVE GROUND
PUMPING STATION WITHOUT BELT DRIVES
GREENFIELD, TENNESSEE

PART 1 – GENERAL

1.1 SCOPE

The contractor shall furnish and install factory-built, automatic pumping stations as described herein and as manufactured by Smith & Loveless, Inc or equal. Each station shall be complete with all needed equipment factory installed on a welded steel baseplate with fiberglass cover.

The principal items of equipment in each station shall include two vertical, close-coupled, motor driven, vacuum primed, non-clog sewage pumps; valves; internal piping; central control panel with circuit breakers, motor starters and automatic pumping level controls; heater; ventilating blower; priming pumps and appurtenances; and all internal wiring.

1.2 OPERATING CONDITIONS

A. Each station shall be equipped with pumps capable of delivering the following flows of raw water or wastewater against the total dynamic heads indicated and at the efficiencies specified.

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>FLOW (GPM)</th>
<th>TDH (FT)</th>
<th>EFF</th>
<th>MOTOR SIZE (HP)</th>
<th>MAX. MOTOR SPEED (RPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagoon Influent Pump Station</td>
<td>950-1025</td>
<td>21-22</td>
<td>69%</td>
<td>10</td>
<td>875</td>
</tr>
</tbody>
</table>

B. All openings and passages shall be large enough to permit the passage of a sphere 3-inches in diameter.

1.3 MANUFACTURED EQUIPMENT EVALUATION

A. The specifications and drawings detail Smith & Loveless equipment or equal and represent the minimum standard of quality for both equipment and materials of construction. The contractor shall prepare his bid on the basis of this equipment for the purpose of determining the low bid without consideration of possible substitute.

B. Substitution of other makes may be considered if the equipment proposed for substitution is superior or equal in quality and efficiency to the standards of quality named in the specifications and is demonstrated to the satisfaction of the engineer.
C. Contractors wishing to offer a deduct for substitute equipment shall include the following submittal information with their proposal. This submittal shall include all necessary information for the proper determination of the acceptability of the proposed substitution and shall not necessarily be limited to the following:

1. Complete description of the equipment, system, process or function, including a list of system components and features, drawings, catalog information and cuts, manufacturer’s specifications, including materials descriptions.

2. Performance data and curves, and horsepower requirements.

3. Outside utility requirements, such as water, power, air, etc.

4. Functional description of any internal instrumentation and controls supplied including list of parameters monitored, controlled or alarmed.

5. Addresses and phone numbers of nearest service centers and a listing of the manufacturer’s or representative’s services available at these locations, including addresses and phone numbers of the nearest parts warehouses capable of providing full parts replacement and/or repair services.

6. A list of five installations in the states where similar equipment by the manufacturer is currently in similar service; include contact name, telephone number, mailing address of the municipality or installation; engineer, owner, and installing contractor. If five installations do not exist, the list shall include all that do exist, if any.

7. Detailed information on site, architectural, structural, mechanical, plumbing, electrical and control, and all other changes or modifications to the design and construction work necessary to adapt the equipment or systems to the arrangement shown and/or functions described on the drawings and in the technical specifications. This shall include plan view and section sketches illustrating any additional space requirements necessary to provide the minimum adequate clear space within and around the equipment for operation and maintenance, as shown on the drawings and specified.

8. All differences between the specifications and the proposed substitute equipment shall be clearly stated in writing under a heading of “differences”.

9. Other specific submittal requirements listed in the detailed equipment and material specifications.

D. Approval of the substitution to bid as an alternate shall in no way relieve the contractor from submitting the specified shop drawings for approval or complying
fully with all provisions of the specifications and drawings. If substituted equipment is accepted, the contractor shall, at his own expense, make any changes in the structures, piping, electrical, etc. necessary to accommodate the equipment. If engineering is required due to substitution of alternate equipment, the contractor shall pay for all engineering changes. To receive final consideration, copies of the manufacturer’s quotations for the equipment may be required to document the savings to the satisfaction of the engineer. It is the intent that the owner shall receive the full benefit of the savings in cost of the equipment and the contractor’s bid price shall be reduced by an amount equal to the savings. In all technical and other evaluations, the decision of the engineer is final.

1.4 GUARANTEE

A. The manufacturer of the pump station shall have a minimum of five years experience in the design and manufacture of vacuum priming type factory-built automatic pump stations and shall guarantee the structure and all equipment to be free from defects in materials and workmanship for a period up to one year from the date of start-up, not to exceed 18 months from the date of shipment.

B. Warranties and guarantees of suppliers of various components in lieu of a single source responsibility by the pump station manufacturer will not be accepted. The pump station manufacturer shall be solely responsible for the guarantee of the station and all components.

In the event a component fails to perform as specified or is proven defective in service during the guarantee period, the pump station manufacturer shall provide a replacement part without cost to the owner. He shall further provide, without cost, such labor as may be required to replace, repair or modify major components such as pumps, pump motors and sewage piping manifold.

C. It is not intended that the pump station manufacturer assume responsibility for contingent liabilities or consequential damages of any nature resulting from defects in design, material, workmanship or delays in delivery, replacement or otherwise.

1.5 PRODUCT LIABILITY INSURANCE

A. The pump station manufacturer shall have in effect at time of bid, contract award, contract performance, and warranty term, product and comprehensive liability insurance, including sudden and accidental pollution coverage in the amount of five million dollars ($5,000,000) through an insurance company with a minimum rating of A+ (Superior) XV according to the Best's insurance reports. All policies must be written on an occurrence basis. Policies written on a claims made basis are not acceptable. A typical certificate of insurance attesting to the specified coverage issued by the responsible carrier naming the engineer of record and the owner as additional insured, must be presented to the named additional insured prior to contract award, as directed by the Engineer. A failure to comply with this
requirement by the bidder will require disqualification of the bid and contract award.

PART 2 – PRODUCTS

2.1 PUMP STATION CONSTRUCTION

A. All openings and passages shall be large enough to permit the passage of a sphere 3-inches in diameter. Each station shall be constructed in one complete factory-built assembly. It shall be sized to rest on top of the wet well as detailed in the contract drawings. The supporting floor plate shall be a minimum 1-inch thick steel with reinforcing as required to prevent deflection and to insure an absolutely rigid support.

B. Pump station shall be enclosed by a two-piece hinged fiberglass cover made of molded reinforced orthophthalic polyester resins with a minimum of 30% glass fibers with a minimum average length of 1-¼-inch. The outside of the enclosure shall be coated with a polyester protective in-mold coating for superior resistance to weathering, ultraviolet radiation, yellowing and chalking. The completed fiberglass cover shall be resistant to mold, mildew, fungus and corrosive liquids and gasses normally found in pump station environments. The dimensions of the enclosure shown on the contract drawings shall be considered for internal component clearances and accessibility and nothing smaller will be acceptable. The cover shall have a suitable drip-lid around the edge and shall be provided with a hasp and staple connection to the floor plate to allow the pump chamber to be locked with padlocks. Each cover shall be attached with a multi segment stainless steel hinge, constructed of 7 gauge (minimum) type 304 stainless steel with a ¾-inch diameter stainless steel pin and supporting at least 75% of the width at one end. Stainless steel bolts with tamperproof heads and a full width ¾-inch thick anodized aluminum backing plate shall anchor the hinge to the fiberglass cover. Dual high-pressure gas struts shall be provided to counteract the dead weight of the cover assembly and limit the maximum lifting force required for opening to less than 20 pounds. The covers shall be self-latching upon opening, with a manually operated release for closing. Duplex heavy gauge safety chains shall be provided to prevent over-extension. All hardware and components of the cover assembly which are exposed to the weather shall be constructed of corrosion resistant materials.

C. A wet well access cover shall be fabricated of ¼-inch thick aluminum treadplate located exterior to the fiberglass pump chamber shall be provided, complete with padlocking provisions. The manway shall be an integral part of the pump station floor and shall provide access to the wet well. The minimum open area of the manway access into the wet well shall be at least 4.2 square feet. The manway cover shall have a three color 7" x 10" corrosion-resistant sign permanently affixed to it, reading “DANGER – Before Entering, Test for Explosive Gases. Test for Oxygen Deficiency. Supply Fresh Air to Work Area.”
D. Enclosures utilized to house the valve train and/or controls, which are defined under OSHA Article 29CFR, Parts 1910 as a Confined Space shall not be acceptable.

E. To allow on-site maintenance of the pumps, a stanchion with lifting or pulling arm shall be provided to lift or pull each pump. This requirement will apply to both vertical and horizontal pumps, whichever is supplied by the installing contractor. The arm shall have a hook over the center of the motor to support a hoist for removal of the motors, impellers and pumps from the station. (Hoist shall be supplied by the Owner.)

F. The pump volutes and discharge piping shall be mounted in relation to the floor plate as detailed in the contract drawings. The suction and discharge connections shall be mounted in relation to the floor plate as detailed on the contract drawings.

2.2 WELDING

All steel structural members shall be joined by electric arc welding with welds of adequate section for the joint involved.

2.3 PROTECTION AGAINST CORROSION

A. All structural steel surfaces shall be factory blasted after welding with steel grit to remove rust, mill scale, weld slag etc. All weld spatter and surface roughness shall be removed by grinding. Surface preparation shall comply with SSPC-SP6 specifications. Immediately following the cleaning, a single 6-8 mil dry film thickness coating of VERSAPOX® or equal a self-priming Cycloaliphatic Amine epoxy or equal shall be factory applied to the base. After curing, a 2-3 mil DFT top coating of XTRATHANE™ or equal, a moisture-cured Aliphatic Polyurethane or equal protective finish for abrasion resistance and weather protection shall be applied to the top of the base and as a finish coating for all other structural, pump and piping assemblies. The bottom of the station, exposed to the wet well, shall further coated with an additional 6-8 mil coating of XTRAGUARD™ epoxy or equal for chemical and abrasion resistance. These coatings shall be as formulated by Smith & Loveless or equal specifically for this type of application and service.

B. Stainless steel, aluminum and other corrosion resistant shall not be coated. Carbon steel surfaces not otherwise protected shall be coated with a suitable non-hardening rust preventative compound. Auxiliary components, such as the electrical enclosure, ventilating blower and vacuum pumps, shall be furnished with the original manufacturer’s coating.

C. Finish coating shall be accomplished prior to shipment of the station from the factory and shall comply fully with the intent of these specifications. A touch-up kit shall be provided by the pump station manufacturer for repair of any mars or...
scratches occurring during shipping and installation. The kits shall contain
detailed instructions for use and shall be the same material as the original coating.

2.4 MAIN PUMPS

A. The pumps shall be 8-inch vertical, non-clog type of heavy cast iron construction,
especially designed for the use of mechanical seals and vacuum priming. In order
to minimize seal wear caused by linear movement of the shaft, the shaft bearing
nearest the pump impeller shall be locked in place so that end play is limited to the
clearance within the bearing. To minimize seal wear resulting from shaft
deflection caused by the radial thrust of the pump, the shaft from the top of the
impeller to the lower bearing supporting the impeller shall have a minimum
diameter of 1-7/8-inch for motor sizes 1.5 H.P. through 15 H.P. (motor frame sizes
213 through 286); 2-1/8-inch for motor sizes 20 H.P. through 30 H.P. (motor frame
sizes 324 and 326); and 3-inch for motor sizes 40 H.P. and larger (motor frame
sizes 364 and larger). The dimension from the lowest bearing to the top of the
impeller shall not exceed 6-inches. The oversized shaft incorporating oversized
bearings and heavier bearing frame construction provides for extended mechanical
seal, bearing and overall pump/motor life. Since the larger shaft with the specified
minimum overhang is the key to heavier, more rigid construction throughout, no
deviation from the specified shaft diameter or tolerances will be allowed.

B. The bearing nearest the impeller shall be designed for the combined thrust and
radial load. The upper bearing shall be free to move linearly with the thermal
expansion of the shaft and shall carry only radial loads. The shaft shall be solid
stainless steel through the mechanical seal to eliminate corrosion and abrasive rust
particles. Removable shaft sleeves will not be acceptable if the shaft under the
sleeve does not meet the specified minimum diameter.

C. Per TDEC 2.5.4.1, pumps with less than a standard 4-inch suction or 4-inch
discharge connection, or with less than a 3-inch spherical solids handling capacity
will be rejected for this application.

D. The pump impellers shall be of the enclosed two-port type made of close-grained
cast iron and shall be balanced. The eye of the impeller as well as the ports shall
be large enough to permit the passage of a sphere 3-inch in diameter in
accordance with nationally recognized codes. The impeller shall be keyed with a
stainless steel key and secured to the motor shaft by a stainless steel cap screw
equipped with a Nylock or other suitable self locking device.

E. The impeller shall not be screwed or pinned to the motor pump shaft, and shall be
readily removable without the use of special tools. To prevent the buildup of
stringy materials, grit and other foreign particles around the pump shaft, all
impellers less that full diameter shall be trimmed inside the impeller shrouds. The
shrouds shall remain full diameter so that close minimum clearance from shrouds
to volute is maintained. Both the end of the shaft and the bore of the impeller shall be tapered to permit easy removal of the impeller from the shaft.

F. The pump shall have an adapter providing a large water reservoir above the impeller to provide for positive exclusion of air from the impeller. The seal shall be inside this area to assure lubrication. Pumps which do not use hollow priming adapters for positive lubrication of the seal will not be acceptable.

G. The pump shall be constructed so as to permit priming from the low pressure area behind the impeller. Priming from high pressure connections tending to cause solids to enter and clog the priming system will not be acceptable. The priming bowl shall be transparent to enable the operator to monitor the priming level. The pump shall be arranged so that the rotating element can easily be removed from the volute without disconnecting the electrical wiring or disassembling the motor, impeller, backhead or seal so that any foreign object may be removed from the pump or suction line.

H. The pump shaft shall be sealed against leakage by a mechanical seal. The seal shall be of carbon and ceramic materials with the mating surfaces lapped to a flatness tolerance of one light band. The rotating ceramic shall be held in mating position with the stationary carbon by a stainless steel spring. The entire seal assembly shall be held in place by a bronze seal housing to prevent excessive heat build-up. Use of cast iron or other ferrous materials for the seal housing which will rust and damage the seal, shortening seal life, will not be acceptable.

2.5 MOTORS

A. The pump motors shall be vertical, solid shaft, NEMA P-base, squirrel-cage induction type, suitable for 3 Phase, 60 Cycle, 208-230/240 Volt electric current. They shall have Class F insulation. Insulation temperature shall be limited to Class B. The motors shall have normal starting torque and low-starting current, as specified by NEMA Design B characteristics. They shall be open drip-proof design with forced air circulation by integral fan. Openings for ventilation shall be uniformly spaced around the motor frame. Leads shall be terminated in a cast connection box and shall be clearly identified.

B. The motors shall have a 1.15 service factor. The service factor shall be reserved for the Owner’s protection. The motors shall not be overloaded beyond their nameplate rating, at the design conditions, nor at any head in the operating range specified under Operating Conditions.

C. The motor pump shaft shall be centered, in relation to motor base, within 0.005-inch. The shaft runout shall not exceed 0.003-inch. The motor shaft shall equal or exceed the diameter specified under “Main Pumps”, at all points from immediately below the top bearing to the top of the impeller hub. A bearing cap shall be provided to hold the bottom motor bearing in a fixed position. Bearing
housings shall be provided with fittings for lubrication as well as purging old lubricant.

D. The motor shall be fitted with heavy lifting eyes, each capable of supporting the entire weight of the pump and motor rotating assembly.

E. The pump motors shall be Premium Efficiency type, per NEMA MG-1 Table 12-12, Inverter Ready per NEMA Part 31.4.4.2, with cast iron frames, and UL Recognized and CSA Approved. The motor windings shall be 200 C Inverter Spike-Resistant magnet wire and the rotors shall have an epoxy coating for corrosion protection.

2.6 CONTROLS

A. The control equipment shall be mounted in a NEMA Type 1 steel enclosure with two hinged access doors. The circuit breakers, starter reset buttons, and control switches shall be operable without opening the access cover.

B. A GFI protected duplex convenience outlet shall be provided in the above grade control cabinet for operation of 120-volt AC devices.

C. Thermal magnetic air circuit breakers shall be provided for branch disconnect service and short circuit protection of all motor control and auxiliary circuits.

D. Magnetic across-the-line starters with under-voltage release and overload coils for each phase shall be provided for each pump motor to give positive protection. All starters shall be NEMA rated – IEC type starters shall not be acceptable. Each single phase auxiliary motor shall be equipped with an over-current protection device in addition to the branch circuit breaker, or shall be impedance protected. All wiring shall be labeled and a coded wiring diagram shall be provided.

E. To control the operation of the pumps with variation of liquid level in the wet well, a minimum of five (5) float displacement switches shall be provided. A minimum of 30-feet of cord shall be provided with each switch. The cord shall have a corrosion resistant vinyl jacket and shall be multi-stranded in order to prevent fatigue.

F. An automatic alternator with manual switch shall be provided to change the sequence of operation of the pumps after every cycle. The manual switch shall allow either pump to be selected as a base pump or for automatic operation.

G. Provisions shall also be made for the pumps to operate in parallel should the level in the wet well continue to rise above the starting level for the low level “Lead” pump.
2.7 PUMP FAILURE ALARM

To sense failure to deliver normal flow, each pump set shall be provided with a sealed sensor switch and red LED "On" indicating light, mounted in a protective ABS enclosure. The enclosure shall be mounted with an adjustable universal mounting bracket to the external arm of each discharge check valve. The mounting bracket shall allow the adjustment of the sensor switch with a single locking pivot adjustment. The LED indicating light shall facilitate accurate setting of the switch, as well as indicate operation. The sensor switch shall monitor the movement of the check valve arm and thereby detect failure of the pump to deliver normal operating flow when called on to run. An auxiliary time delay relay shall be provided to prevent an alarm signal during pump startup period.

2.8 VACUUM PRIMING SYSTEM

A. A separate and independent priming system shall be furnished for each pump set, providing complete standby operation. Each priming system shall include a separate vacuum pump. Vacuum pumps shall have corrosion resistant internal components. The vacuum priming system shall be complete with large port vacuum control solenoid valves, WaveStart™ or equal prime level sensor, float operated check valves to protect the vacuum pumps, and all necessary shut-off valves. The float operated check valves shall have a transparent body for visual inspection of the liquid level. All hoses and tubing used in the priming system shall be at least ¾-inch nominal diameter.

B. The solenoid valves used in the vacuum priming system shall be of the high flow, direct acting brass body type, with threaded ports, NBR seals and 300 Series stainless steel plunger, rod, plate and springs. The minimum orifice diameter shall be 5/16-inch. The solenoid valves shall be UL Listed, with Class F coil rating and suitable voltage and thermal capacity for the application.

C. Liquid level in the pump priming chamber shall be monitored by a WaveStart™ or equal resonant frequency liquid level sensing probe incorporating frequency spectrum technology to evaluate the media with which it is in contact at several measurement points. At each measurement point, the sensor shall take readings. Using a multi-variable sensing technology, collected over a spectrum sweep, the sensor shall create an outline of the medium, its residue and absence of medium. From these reference points, the sensor shall be able to accurately determine the presence or absence of liquid, unaffected by foam, residue or deposits. The liquid level sensor algorithm shall provide prime status in less than 100 milliseconds. Systems utilizing an electrode, mechanical means such as a float or protrusions into the pump, which may become fouled due to bridging or wrapping, or that require any type of electrical or moving parts inside the priming chamber, which may accumulate debris, short out, bind or fail will not be acceptable. Single or double sensing probes will not be acceptable. The WaveStart™ probe or equal shall be provided with light emitting diodes. This diagnostic tool shall indicate
connectivity, prime status or a fault condition. The probe shall be completely sealed and have a 316L stainless steel housing for corrosion resistance. It shall be provided with a wiring connector of molded thermoplastic for impact and chemical resistance. The probe shall have a threaded electrical connector to facilitate easy removal.

D. The priming system shall automatically provide positive lubrication of the mechanical seal each time a main pump is primed. To prevent excessive stoppage due to grease accumulation, no passageway in the priming system through which the pumped liquid must pass shall be smaller than the equivalent of a 2-\(\frac{1}{2}\)-inch opening.

E. The vacuum priming system shall have two field selectable modes of operation. In the “On-Demand” mode, the priming system will operate only after a pump is called on to run, and if it is not primed. Once primed, the pump will be allowed to run. In the “Constant Prime” mode, both pumps are kept primed continuously, and ready to start immediately when called for.

2.9 ENVIRONMENTAL EQUIPMENT

A ventilating blower shall be provided, capable of delivering 650 CFM at 0.1-inch static water pressure in order to remove the heat generated by continuous motor operation. The ventilating blower shall be turned on and off automatically by a preset thermostat. A louvered opening shall cover the discharge. An electric heater controlled by a present thermostat shall be furnished. The heater shall be rigidly mounted in the station to prevent removal.

2.10 MAIN PIPING

A. The pump suction shall be drilled and tapped for a 125 pound American Standard flange for easy connection of the suction riser. The discharge line from each pump shall be fitted with a clapper-type check valve and 3-way plug valve. Size, location and quantity of check valves and plug valves shall be as shown on the contract drawings. The check valve shall be of the spring-loaded type with external lever arm and replaceable resilient seat for added assurance against vacuum leaks. Check valves shall have stainless steel shaft with replaceable bronze shaft bushings and shall be sealed with an adjustable Teflon or equal seal. To facilitate back flushing of either pump, only check valves with outside lever arms will be acceptable. Ball type check valves will not be acceptable. Only plug valves capable of passing 3-inch spherical solids will be acceptable – 4-inch 3-way plug valves will not be acceptable. The three-way plug valve shall be furnished with a gear actuator with handwheel operator.

B. Protrusions through the floor plate shall be gas-tight where necessary to effect sealing between the equipment chamber and the wet well. Bolted and sealed joints shall be provided at the pump volutes or suction pipes in order to prevent corrosive, noxious fumes from entering the station. The pump station
manufacturer shall extend the suction and discharge connections below the floor plate at the factory so that field connections can be made without disturbing the gas-tight seals.

C. The manufacturer of the pump station shall provide a compression type sleeve coupling for installation in the common discharge pipe. Provisions shall be made for securing the coupling to the station floor plate.

2.11 FACTORY TESTS

All components of the pump station shall be given an operational test at the pump station manufacturer’s facility to check for excessive vibration or leaks in the piping or seals, and for correct operation of the automatic control and vacuum priming systems and all auxiliary equipment. Installed pumps shall take suction from a deep wet well, simulating actual service conditions. The control panel shall undergo both a dry logic test and full operational tests with all systems operating. Factory test instrumentation must include flow measuring with indicator; compound suction gauge; bourdon tube type discharge pressure gauge; electrical meters to measure amperes, volts, kilowatts and power factor; speed indicator; and a vibrometer capable of measuring both amplitude and frequency.

2.12 SPARE PARTS

A complete replacement pump shaft seal assembly shall be furnished with each pump station. The spare seal shall be packed in a suitable container and shall include complete installation instructions. A spare volute gasket and seal gasket shall be provided.

2.13 PUMP STATION ACCESSORIES

A. HIGH AND LOW WATER ALARM

An adjustable displacement switch shall be provided to sense a high water level and low water level condition. The switch shall hang into the wet well and shall activate a contact to indicate the high water condition. Also have another switch to activate a contact to indicate the low water condition. The low water contact shall also be a second level to turn off all pumps in case the all pumps off switch fails.

B. HIGH WATER AND LOW WATER ALARM LIGHT

A vapor-proof light fixture with a 120 VAC 50 watt lamp, red globe and guard shall be furnished for outdoor mounting to signal the “High Wet Well Level” alarm condition. Contractor shall coordinate with the Owner for exact location.

C. ALARM HORN

Station manufacturer shall supply one 115 VAC weatherproof alarm horn with projector, conduit box, and mounting base for high and low water level alarm. The
horn shall have a silencer. Contractor shall coordinate with the Owner for exact
location.

D. PROTECTED LIQUID FILLED COMPOUND PRESSURE GAUGES

A four-inch (4") Bourdon tube-type compound vacuum/pressure gauge with
3-½-inch dial, fitted with a brass stop valve and a manual air relief valve shall be
provided for each pump. The gauges shall be mounted apart from the pumps, on
a bracket attached to the control panel support structure, and connected to the
pump discharge taps by flexible tubing to minimize vibration. The range of each
gauge shall be selected to place the normal operating discharge pressure reading
in the middle one-third of the scale and the gauge shall also be capable of
measuring up to 30-inch HG of vacuum. The dial shall be white with black
markings and the gauge itself shall have an accuracy of 1% of scale. The gauge
shall be American made, with a Zytel Nylon or equal case with ½-inch blow-out
plug, stainless steel bezel, acrylic lens and phosphorus bronze tube with brass
socket. Each compound gauge shall be filled with a viscous fluid to dampen
vibration and pulsation effects on the needle reading. Temperature compensation
shall be provided by an internal compensating diaphragm. Gauges shall be
protected from the service fluid by a Buna-N elastomer or equal “boot”
diaphragm within the stem, and the Bourdon tube and the space between the
Bourdon tube and the internal isolating diaphragm shall be filled with low
temperature instrument oil, completely isolating the gauge components from the
fluid being measured.

E. PUMP START DELAY

The control circuit for Pump No. 2 shall be equipped with a time delay to prevent
simultaneous motor starts.

F. RUNNING TIME METERS

A running time meter shall be supplied for each pump set to show the number of
hours of operation. The meter shall be enclosed in a dust and moisture-proof
molded plastic case. The flush mounted dial shall register in hours and tenths of
hours up to 99999.9 hours before repeating. The meter shall be suitable for
operation on 120 VAC supply.

G. TRANSFORMER

An insulating type transformer shall be provided to supply power lights, controls
and auxiliary devices. The transformer shall have 240/460 volt primary, 120/240
volt secondary, Class F insulation, with temperature rise not to exceed 115
degrees C above a 40 degree C ambient. The core and coil shall be protected by a
metal housing to prevent damage.
H. PHASE FAILURE PROTECTION

A relay with double pole double throw contacts to monitor and protect against phase loss (single phase), under voltage (brown outs) and phase reversal (improper sequence) shall be provided in the control system. The relay shall activate the high water alarm light in the event of a failure. The relay shall automatically reset whenever three phase service returns to normal.

I. PUMP FAILURE TO PRIME OR FAILURE TO PUMP ALARM

To sense failure to deliver normal flow for any reason, including failure to prime, each pump set shall be provided with a sealed sensor switch mounted in a protective ABS enclosure. The enclosure shall be mounted with an adjustable universal mounting bracket to the external arm of each discharge check valve. The mounting bracket shall allow the adjustment of the sensor switch with a single locking pivot adjustment. A red LED indicating light shall be provided on each switch unit to facilitate accurate setting of the switch for proper operation. The sensor switch shall monitor the movement of the check valve arm and thereby detect failure of the pump to deliver normal operating flow when called on to run. An auxiliary time delay relay shall be provided to prevent an alarm signal during the pump priming and start-up period.

J. PANEL MOUNTED ALARM LIGHTS

Provide a panel mounted alarm lights to signal – 1) High Water Alarm, 2) Fail to Prime and 3) Pump Fail. Total of 5 alarm lights to be provided.

PART 3 – EXECUTION

3.1 INSTALLATION AND OPERATING INSTRUCTIONS

A. Installation of the pump station shall be done in accordance with the written instructions provided by the manufacturer.

B. Four (4) operation and maintenance manuals shall be furnished with each pump station which will include parts lists of components and complete service procedures, and a troubleshooting guide.

C. The pump station manufacturer shall provide complete start-up services. The pump station manufacturer representative or factory service technician will inspect the completed installation 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; the station installation is safe and in optimum working condition; and conforms to the specified operating conditions. The start-up technician shall instruct the Owner’s personnel in the proper operation and maintenance procedures.

END OF SECTION