LRBOI

Manistee County, Michigan

WWTP Headworks Addition

PROJ #240157	ADDENDUM #1	DATE:11/05/2024

NOTICE: This Addendum No.1, issued in accordance with the Contract Documents, is incorporated into the Contract Documents and supersedes and updates all conflicting information and is hereby amended in certain particulars as follows:

Date: November 5, 2024

CHANGES TO THE CONTRACT DOCUMENTS:

1. **Advertisement for Bids**
   Pre-bid Conference
   ADD location of pre-bid conference.

2. **Section 40 70 00**
   REMOVE AND REPLACE section in its entirety.

3. **Section 43 20 00**
   REVISE specifications to properly incorporate pumping VFD and PLC information. Additional cleanup to add relevant items and language and removal of unnecessary equipment with addition of new controllers and starters.

4. **Section 43 22 00**
   ADD new Liquid Process Equipment specifications to address previously missing information.

CHANGES TO THE PLANS:

1. C-8: SEE ATTACHED SHEET
   a. **Adjusted scaling of sheet to 3/8" = 1'-0"**
   b. **Added clarity of effluent pump piping**

2. C-9: SEE ATTACHED SHEET
   a. **Adjusted scaling of sheet to 3/8" = 1'-0"**
   b. **Lowered bottom of wet well, high water level, and low water level by 6"**
   c. **Changed all underground pipe fittings to mechanical joints instead of flanged fittings.**
   d. **Set invert of 18" ductile iron wet well influent pipe to the same elevation as the high water level in the wet well.**
   e. **Changed wall sleeve of 18" ductile iron piping through headworks floor to be type 2.**

ADDENDUM ACKNOWLEDGMENT:

This Addendum No. 1 shall be attached to and shall become a part of the Contract Documents. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may result in the rejection of the Bid.

END SECTION

DISTRIBUTION: (via email)
All Plan Holders
Posted to website

ADVERTISEMENT FOR BIDS

LITTLE RIVER BAND OF OTTAWA INDIANS
MANISTEE, MICHIGAN
WWTP Headworks Addition

General Notice

Little River Band of Ottawa Indians (Owner), a federally recognized Indian Tribe, is soliciting bid proposals from qualified firms for professional services associated with the following Project:

WWTP Headworks Addition

Bids for the construction of the Project will be received at the Little River Band of Ottawa Indians, located at 2608 Government Center Dr., Manistee, MI 49660, Attn: Utility Department BID Enclosed Headworks Addition. Bids will open on November 26, 2024 at 2:00 PM local time. At that time bids received will be publicly open and read.

The Project includes the following Work:

Construction of a new Headworks building including mechanical screen and grit removal prior to the existing SBR/Lagoon treatment process.

Bids are requested for the following Contract: WWTP Headworks Addition

Obtaining the Bidding Documents

Information and Bidding Documents for the Project can be found at the following designated website:

https://www.goslingczubak.com

Bidding Documents may be downloaded from the designated website. Prospective Bidders are requested to register with Glenna L. Wood at glwood@goslingczubak.com as a plan holder. The designated website will be updated periodically with addenda, lists of registered plan holders, reports, and other information relevant to submitting a Bid for the Project. All official notifications, addenda, and other Bidding Documents will be offered only through the designated website. The Owner will not be responsible for Bidding Documents, including addenda, if any, obtained from sources other than the designated website.

Pre-bid Conference

A mandatory pre-bid conference for the Project will be held on November 13, 2024 at 1:00 pm at the LRBOI Wastewater Facility, 2539 Dontz Rd., Manistee, MI 49660. Bids will not be accepted from Bidders that do not attend the mandatory pre-bid conference.

Sovereign Immunity

This RFP does not commit the Tribe to accept any proposal submitted. The Tribe reserves the right to accept or reject any and all proposals, and to accept or reject any or all items in any proposal. The Tribe reserves the right to negotiate with any and all proposers and any and all parts of the proposals received, including, but not limited to, cost and other relevant details and to accept the proposal most advantageous to, and in the best interest of, the Tribe. The Tribe is not responsible for any costs incurred by the respondents in the preparation of responses to this RFP. The terms “vendor”, “bidder,” and “respondent” are used interchangeably throughout this RFP and are intended to refer to a person or entity submitting, or intending to submit, a proposal in response to this RFP.

This Advertisement is issued by:

Owner: Little River Band of Ottawa Indians
By: Gary Lewis
Title: Water and Wastewater Director
Date: October 29, 2024

SECTION 40 70 00

INSTRUMENTATION FOR PROCESS SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included:
1. Process Control System Integration. All Integration to be provided by Alpha-Tran Engineering/West Michigan Instrumentation Systems Inc., 12575 Cleveland Street, Nunica MI 49448, (888)575-3320. Contractor to contact directly for integration pricing.
2. Include all components necessary to achieve the functional intent indicated on the Drawings and in these Specifications.

B. Basic equipment and services:
1. Flow meters.
2. Instrumentation panels.
3. Alarm system.
4. Switches.
5. Timers.
6. Level control devices.
7. Process control devices
8. Control system integration.

C. Related Sections:

Section 01 33 00 - SUBMITTAL PROCEDURES
Section 28 31 10 – GAS DETECTION SYSTEM
Section 43 20 00 – PROCESS PUMPS AND ACCESORIES
Section 43 22 00 – LIQUID PROCESS EQUIPMENT
Section 46 21 00 - SCREEENING EQUIPMENT
All pertinent sections of Division 26 - Electrical.

1.02 SYSTEM DESCRIPTION

A. Gas Detection System:
1. The system shall include Alarm signal.

B. Mechanical Screen/Grit unit:
1. Control panel and accessories: as specified in 46 21 00 – SCREENING EQUIPMENT.
2. Control system to be furnished and installed by contractor per manufacturer's recommendation.
3. Control system integration with Owner SCADA to include HOA, Status, Running Time, Alarms, and parameters as provided by manufacturer's panel.

C. Process Pumps:
1. Control panel and accessories as specified in 43 20 00 – PROCESS PUMPS
2. Control system to be furnished and installed by contractor per manufacturer's recommendation.
3. Control system integration with Owner SCADA to include HOA, Status, Running Time, Alarms, and parameters as provided by manufacturer's panel.

1.03 QUALITY ASSURANCE

A. Field:
1. For installation of the work of this section, use only personnel completely trained and experienced in installation of the materials and equipment, and thoroughly familiar with the original design and approved Shop Drawings.

1. Manufacturer: All equipment called for under this section of the specifications shall be supplied by a single manufacturer. The equipment manufacturer shall, in addition to the Contractor, assume the responsibility for proper installation and functioning of the equipment.

1.04 SUBMITTALS

A. General:
1. Make all submittals in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.

B. Shop drawings:
1. Submit Shop Drawings showing dimensions and details of construction and installation.

C. O & M manuals:
1. Submit operation and maintenance manuals for the equipment.

D. Guarantee:
1. Submit written guarantee in accordance with the contract documents.

E. Manufacturer's literature:
1. Submit manufacturer's literature describing the operation of the system.

PART 2 - PRODUCTS

2.01 CONTROL PANELS

A. The following is a list of control panels:
1. Panels provided by the manufacturer with the equipment specified:
a. CP-1: Automatic Screen Panel
b. CP-2: Automatic Pump Panel
c. CP-3: Gas Monitor Panel
d. CP-4: Air Infusion Panel

2.02 FUNCTIONAL INTENT

The functional intent is provided as a general guideline to how the Client intents the system to be operated, but may be adjusted prior to programming based on manufacturer submittals and integration feedback.

A. SCDA SCREEN LAYOUT – POSSIBLE ADDS

1. Headworks – Overall Process

a. Gas Detection Alarm Status (YAH 100)

b. Screen HOA (HS 102)

c. Screen Time (KE 102)

d. Paddle Drive HOA (HS 103)

e. Paddle Drive Time (KE 103)

f. Grit Pump HOA (HS 104)

g. Grit Pump Time (KE 104)

h. Screw Conveyor (HS 105)

i. Screw Conveyor Time (KE 104)

j. Air Infusion HOA (HS 106)

k. Air Infusion Time (KE 106)

l. General Alarms (UA 102-106)

m. Fine Screen Level Transmitter (LI 102)

2. Headworks Lift Station

a. Level

1. Indicate (LIT 108)

2. Operator set point for high and low level alarm

3. Operator set point for “maintain level”

4. Level controls service pump speed (M-5, M-6)

ii. Headworks Pumps

1. Pumps Running (KIR 108 - 109)

a. Elapsed run time meter

2. HOA (HS 108 - 109)

3. Operator Speed set point

4. Speed indicate (SI 108 & 109)

iii. Valve position indicate (ZI 114 & 116)

1. Valve position determined by flow activity at Septage Unloading Station.

2. M6 to open and M7 to close when flow is indicated at Septage Unloading Station. Set point delay for open and close timing.

3. M7 to open and M6 to close when no flow is indicated at Septage unloading.

4. M6 to fail open, M7 to Fail closed

iii. Discharge Flow (FE 110 - 112)

1. Flow indicate (FI 110 & 112)

2. Totalized Flows (FQ 110 – 112)

2.03 PROGRAMMABLE LOGIC CONTROLLERS

1. Contractor to supply any additional components to the existing PLC necessary to achieve the functional intent of the project.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install all process control equipment in strict accordance with the manufacturer's recommendations as approved by the Engineer, as indicated on the Drawings, and as herein specified.

B. Electrical work: In accordance with Division 26 - ELECTRICAL.

C. Provide, fabricate and install any required mounting brackets and devices as required.

D. Instrumentation and control devices: Install, wire, calibrate and successfully test operate after installation.

3.02 FIELD TESTING

A. With the help of a representative of the manufacturer, the Contractor shall thoroughly field test the system prior to turning the system over to the Owner. Start up services shall include: training session for plant operator covering use, setting of alarm thresholds, calibration, and routine service and trouble shooting.

B. General:
   1. Control panels: Completely assembled and factory tested prior to shipment.
   2. Any defects detected at this time shall be corrected in the factory.
   3. Field installation:
      a. Set the panel in place
      b. Make the necessary electrical and piping connections
      c. Test all functions of the panels.

3.03 CHECK OUT

A. As soon as practical after installation, the instrumentation and controls supplier's engineer shall:
   1. Check out the work of this Section.
   2. Promptly make all changes and additions as required for the approval.

3.04 INSTRUCTIONS

When all required approvals of this portion of the work have been obtained, and at a time designated by the Owner, the supplier's engineer shall thoroughly demonstrate to the wastewater treatment plant

personnel the operation and maintenance of all items installed under the work of this Section and demonstrate the contents of the manual submitted under Article 1.02 of this Section.

3.05 CLEANING

Prior to acceptance of the work of this Section, thoroughly clean all installed materials, equipment and related areas.

3.03 ELECTRICAL WORK

A. All electrical work shall be performed as indicated on the drawings and as specified in Division 26, Electrical, and elsewhere in this section.

END OF SECTION

SECTION 43 20 00

PROCESS PUMPS AND ACCESSORIES

PART 1 - GENERAL

1.01 Section Includes

A. Work under this section includes, but is not limited to, furnishing and installing a factory built duplex 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 Gages, Pressure and Vacuum.
   e. AWWA C508 Single Swing Check 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 Pumps.
   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. Contractor shall furnish and install one factory built base mounted, automatic pump station. The station shall be complete with all equipment specified herein, factory assembled on a common steel base.

B. Principal items of equipment shall include two horizontal, self priming, centrifugal sewage pumps, V-belt drives, motors, piping, valves, motor control panel, automatic liquid level control system, and integral wiring.

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

B. The pump 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. Pumps must be designed to handle raw, unscreened, domestic sanitary sewage. Pumps shall have 6" suction connection, and 6" discharge connection. Each pump shall be selected to perform under following operating conditions:

1.	Pump Model	GR_T6A60S-B__
2.	Capacity (GPM)	____500_____
3.	Total Dynamic Head (FT)	____37.5_____
4.	Total Dynamic Suction Lift(FT)	____15.2_____
5.	Maximum Repriming Lift (FT)	_____18_____
6.	Minimum TDH (FT)	____26.4_____
7.	Maximum TDH (FT)	____37.5_____
8.	Maximum Static Suction Lift (FT)	_____21_____
9.	Total Discharge Static Head (FT)	____18.3_____
10.	Minimum Submergence Depth (FT)	_____2_____

D. Site power furnished to pump station shall be 3-phase, 60 hertz, 480 volts, 4 wire, maintained within industry standards. The available fault current provided at the pump station control panel is 60kA 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.

1.05 Submittals

A. Product Data

1. Prior to fabrication, pump station manufacturer shall submit 2 copies of submittal data 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 and v-belt drive data, pump characteristic curves showing the design duty point capacity (GPM), head (FT), net positive suction head required (NPSHr), and hydraulic brake horsepower (BHP). Electrical components used in the motor branch and liquid level control shall be fully described.

B. Shop drawings shall provide layout of mechanical equipment and anchor bolt locations for station. Contractor piping connections 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.

C. Operations 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 pumps, motors, piping and valves, 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 pumps 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 NMTBA and JIC standards. 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 pumps, motors, valves 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 pumps and pump station manufacturer must be ISO 9001 certified, with scope of registration including design control and service after sales activities.

B. The 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, 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. Pump Performance Certifications

1. Solids Handling Capability

a. All internal passages, impeller vanes, and recirculation ports shall pass a 3" spherical solid. Smaller internal passages that create a maintenance nuisance or interfere with priming and pump performance shall not be permitted. Upon request from the engineer, manufacturer’s certified drawings showing size and location of the recirculation port(s) shall be submitted for approval.

G. Reprime Performance

1. Consideration shall be given to the sanitary sewage service anticipated, in which debris is expected to lodge between the suction check valve and its seat, resulting in the loss of the pump suction leg, and siphoning of liquid from the pump casing to the approximate center line of the impeller. Such occurrence shall be considered normal, and the pump must be capable of automatic, unattended operation with an air release line installed.

2. During unattended operation, the pump shall retain adequate liquid in the casing to insure automatic repriming while operating at its rated speed in a completely open system. The need for a suction check valve or external priming device shall not be required.

3. Pump must reprime 10 vertical ft. at the specified speed and impeller diameter. Reprime lift is defined as the static height of the pump suction above the liquid, while operating with only one-half of the liquid remaining in the pump casing. The pump must reprime and deliver full capacity within five minutes after the pump is energized in the reprime condition. Reprime performance must be confirmed with the following test set-up:

a. A check valve to be installed down stream from the pump discharge flange. The check valve size shall be equal (or greater than) the pump discharge diameter.

b. A length of air release pipe shall be installed between pump and the discharge check valve. This line shall be open to atmosphere at all times duplicating the air displacement rate anticipated at a typical pump station fitted with an air release valve.

c. The pump suction check valve shall be removed. No restrictions in the pump or suction piping will prevent the siphon drop of the suction leg. Suction pipe configuration for reprime test shall incorporate a 2 feet minimum horizontal run, a 90 degree elbow and vertical run at the specified lift. Pipe size shall be equal to the pump suction diameter.

d. Impeller clearances shall be set as recommended in the pump service manual.

e. Repeatability of performance shall be demonstrated by testing five consecutive reprime cycles. Full pump capacity (flow) shall be achieved within five minutes during each cycle.

f. Liquid to be used for reprime test shall be water.

4. Upon request from the engineer, certified reprime performance test results, prepared by the manufacturer, and certified by a registered professional engineer, shall be submitted for approval prior to shipment.

H. Factory System Test

1. All components including the pumps, motors, valves, piping and controls will be tested as a complete working system at the manufacturer's facility. Tests shall be conducted in accordance with Hydraulic Institute Standards at the specified head, capacity, rated speed and horsepower. Factory operational test shall duplicate actual performance anticipated for the complete station.

2. Upon request from the engineer, the operational test may be witnessed by the engineer, and/or representatives of his choice, at the manufacturer’s facility.

I. 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 (where applicable) 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 represented by the manufacturer or as proven defective in material or workmanship during the warranty period, shall be repaired, replaced, or 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 - PRODUCT

A. Unitary Responsibility

B. 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 pump station system integrator must be ISO 9001 certified, with scope of registration including design control and service after sales activities.

B. The specifications and project drawings depict equipment and materials manufactured by The Gorman-Rupp Company which are deemed most suitable for the service anticipated. It is not intended, however, to eliminate other products of equal quality and performance. 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.

C. After execution of the contract, the contractor may offer substitutions to the specified equipment for consideration. The equipment proposed for substitution must be superior in construction and performance to that specified in the contract, and the higher quality must be demonstrated by a list of current users of the proposed equipment in similar installations.

D. In event the contractor obtains engineer's approval for equipment substitution, the contractor shall, at his own expense, make all resulting changes to the enclosures, buildings, piping or electrical systems as required to accommodate the proposed equipment. Revised detail drawings illustrating the substituted equipment shall be submitted to the engineer prior to acceptance.

E. It will be assumed that if the cost to the contractor is less for the proposed substitution, then the contract price shall be reduced by an amount equal to the savings.

2.03 Unit Base

A. The unit base shall comprise a base plate, perimeter flange, and reinforcements. Base plate shall be fabricated of steel not less than 1/4" thick. Perimeter flange and reinforcements shall be designed to prevent flexing or warping under operating conditions. Base plate and/or flange shall be drilled for hardware used to secure unit base to concrete pad as shown on the contract drawings. Unit base shall contain provisions for lifting the complete pump unit during shipping and installation.

2.04 Pump Design

A. Pumps shall be horizontal, self-priming centrifugal type, designed specifically for handling raw, unscreened, domestic sanitary sewage. Pump solids handling capability and performance criteria shall be in accordance with requirements listed under PART 1 - GENERAL of this section.

B. The pump manufacturer must be ISO 9001 certified, with scope of registration including design control and service after sales activities.

C. Materials and Construction Features

1. Pump casing shall be cast iron Class 30 with integral volute scroll. Casing shall incorporate following features:

a. Mounting feet sized to prevent tipping or binding when pump is completely disassembled for maintenance.

b. Fill port coverplate, 3 1/2" diameter, shall be opened after loosening a hand nut/clamp bar assembly. In consideration for safety, hand nut threads must provide slow release of pressure, and the clamp bar shall be retained by detente lugs. A Teflon gasket shall prevent adhesion of the fill port cover to the casing.

c. Casing drain plug shall be at least 1 1/4" NPT to insure complete and rapid draining.

d. Liquid volume and recirculation port design shall be consistent with performance criteria listed under PART 1 - GENERAL of this section.

2. Coverplate assembly shall be cast iron Class 30. Design must incorporate following maintenance features:

a. A lightweight inspection coverplate, retained by acorn nuts, for access to pump interior for removal of stoppages. Designs that require removal of complete coverplate assembly for access to the impeller will not be accepted.

b. Retained by acorn nuts for complete access to pump interior. Back coverplate removal must allow service to the impeller, seal, wear plate or check valve without removing suction or discharge piping. Back coverplate shall incorporate an obstruction free flow path by combining four support posts into a two-point “webbed” plate design for increased durability, reduced clogging, and increased operational efficiency.

1) A replaceable wear plate secured to the back cover plate by studs and nuts. Wear plate shall be self-cleaning design ensuring that debris is cleared away and does not collect on the impeller vanes.

2) The nature of the conveyed medium poses significant challenges to the continuous operation of the pump. Of particular concern is the clogging of the impeller by debris in the pumped medium including but not limited to long rags, fibers, and like debris which are able to wrap around the impeller vanes, stick to the center of the vanes or hub, or lodge within the spaces between the impeller and the housing.

c. In consideration for safety, a pressure relief valve shall be supplied in the inspection coverplate. Relief valve shall open at 75-200 PSI.

d. One O-ring of Buna-N material shall seal inspection coverplate to back coverplate.

e. Two O-rings of Buna-N material shall seal back coverplate to pump casing.

f. Pusher bolt capability to assist in removal of inspection coverplate or back coverplate. Pusher bolt threaded holes shall be sized to accept same retaining capscrews as used in rotating assembly.

g. Easy-grip handle shall be mounted to face of inspection coverplate.

3. Rotating assembly, which includes impeller, shaft, mechanical shaft seal, lip seals, bearings, seal plate and bearing housing, must be removable as a single unit without disturbing the pump casing or piping. Design shall incorporate following features:

a. Seal plate and bearing housing shall be cast iron Class 30. Separate oil filled cavities, vented to atmosphere, shall be provided for shaft seal and bearings. Cavities must be cooled by the liquid pumped. Three lip seals will prevent leakage of oil.

1) The bearing cavity shall have an oil level sight gauge and fill plug check valve. The clear sight gauge shall provide easy monitoring of the bearing cavity oil level and condition of oil without removal of the fill plug check valve. The check valve shall vent the cavity but prevent introduction of moist air to the bearings.

2) The seal cavity shall have an oil level sight gauge and fill/vent plug. The clear sight gauge shall provide easy monitoring of the seal cavity oil level and condition of oil without removal of the fill/vent plug.

3) Double lip seal shall provide an atmospheric path providing positive protection of bearings, with capability for external drainage monitoring.

b. Impeller shall be ductile iron, two-vane, semi-open, non-clog, with integral pump out vanes on the back shroud. Impeller shall thread onto the pump shaft and be secured with a lockscrew and conical washer.

c. Shaft shall be AISI 4140 alloy steel unless otherwise specified by the engineer, in which case AISI 17-4 pH stainless steel shall be supplied.

d. Bearings shall be anti-friction ball type of proper size and design to withstand all radial and thrust loads expected during normal operation. Bearings shall be oil lubricated from a dedicated reservoir. Pump designs which use the same oil to lubricate the bearings and shaft seal shall not be acceptable.

e. Shaft seal shall be cartridge oil lubricated mechanical type. The stationary and rotating seal faces shall be tungsten titanium carbide alloy. Each mating surface shall be lapped to within three light bands flatness (35 millionths of an inch), as measured by an optical flat under monochromatic light. The stationary seal seat shall be double floating by virtue of a dual O-ring design; an external O-ring secures the stationary seat to the seal plate, and an internal O-ring holds the faces in alignment during periods of mechanical or hydraulic shock (loads which cause shaft deflection, vibration, and axial/radial movement). Elastomers shall be viton; cage and spring to be stainless steel. Seal shall be oil lubricated from a dedicated reservoir. The same oil shall not lubricate both shaft seal and shaft bearings. Seal shall be warranted in accordance with requirements listed under PART 1 - GENERAL of this section.

f. Pusher bolt capability to assist in removal of rotating assembly. Pusher bolt threaded holes shall be sized to accept same capscrews as used for retaining rotating assembly.

4. Adjustment of the impeller face clearance (distance between impeller and wearplate) shall be accomplished by external means.

a. Clearances shall be maintained by a four-point external shimless coverplate adjustment system, utilizing a four collar and four adjusting screw design allowing for incremental adjustment of clearances by hand as required. Each of the four points shall be lockable to prevent inadvertent clearance increases or decreases due to equipment vibration or accidental operator contact. The four point system also allows for equal clearance gaps at all points between the impeller and wear plate. Requirement of realignment of belts, couplings, etc., shall not be acceptable. Coverplate shall be capable of being removed without disturbing clearance settings. Clearance adjustment systems that utilize less than four points will not be considered.

b. There shall be provisions for additional clearance adjustment in the event that adjustment tolerances have been depleted from the coverplate side of the pump. The removal of stainless steel shims from the rotating assembly side of the pump shall allow for further adjustment as described above

c. Clearance adjustment which requires movement of the shaft only, thereby adversely affecting seal working length or impeller back clearance, shall not be acceptable.

5. Suction check valve shall be molded Neoprene with integral steel and nylon reinforcement. A blow-out center shall protect pump casing from hydraulic shock or excessive pressure. Removal or installation of the check valve must be accomplished through the coverplate opening, without disturbing the suction piping. Sole function of check valve shall be to save energy by eliminating need to reprime after each pumping cycle. Pumps requiring a suction check valve to assist reprime will not be acceptable.

6. Spool flanges shall be one-piece cast iron, class 30 fitted to suction and/or discharge ports. Each spool shall have one 1-1/4" NPT and one 1/4" NPT tapped hole with pipe plugs for mounting gauges or other equipment.

D. Serviceability

1. The pump manufacturer shall demonstrate to the engineer's satisfaction that consideration has been given to reducing maintenance costs.

2. No special tools shall be required for replacement of any components within the pump.

2.06 Drain Kit

A. Pumps to be supplied with a drain kit for ease of maintenance. The kit to contain 10' length of reinforced plastic hose with a female quick connect fitting at one end, and factory installed drain fittings in each pump. Fittings include a stainless steel pipe nipple, stainless steel bushing, stainless steel gate valve and aluminum male quick connect fitting.

2.07 Spare Parts Kit

A. The following minimum spare parts shall be furnished with the pump station:

1. One spare pump mechanical seal (complete with shaft sleeve).
2. One cover plate O-Ring.
3. One rotating assembly O-Ring.
4. One set of impeller clearance adjustment shims.

2.08 Valves & Piping

A. 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. A 3-way plug valve must allow either or all pumps to be isolated from the force main. Valve shall pass 3" spherical solids. The plug valve shall be non-lubricated, tapered type. Valve body shall be semi-steel with flanged end connections drilled to 125 pound standard. The drip-tight shutoff plug shall be mounted in stainless steel bearings, and shall have a resilient facing bonded to the sealing surface.

Valve shall be operated with a single lever actuator providing lift, turn, and reseat action. The lever shall have a locking device to hold the plug in the desired position.

C. Automatic air release valves:

1. An automatic air release valve shall be furnished for each pump designed to permit the escape of air to the atmosphere during initial priming or unattended repriming cycles. Upon completion of the priming cycle or repriming cycle, the valve shall close to prevent recirculation. Valves shall provide visual indication of valve closure, and shall operate solely on discharge pressure. Valves which require connection to the suction line shall not be acceptable.

2. All valve parts exposed to sewage shall be constructed of cast iron, stainless steel, or similar corrosion resistant materials. Diaphragms, if used, shall be of fabric reinforced neoprene or similar inert material.

3. A cleanout port, three inches in diameter, shall be provided for ease of inspection, cleanout, and service.

4. Valves shall be field adjustable for varying discharge heads.

5. Connection of the air release valves to the station piping shall include stainless steel fittings.

D. Gauge Kit

1. A gauge kit shall be supplied for each pump. Suction pressure must be monitored by a glycerin-filled compound gauge, and discharge pressure by a glycerin-filled pressure gauge. Gauges to be at least 4 inches in diameter, graduated in feet water column. Rated accuracy shall be 1% of full scale reading. Compound gauge shall be graduated -34 to +34 feet water column minimum. Pressure gauge to be graduated 0 to 140 feet water column minimum.

2. Gauges to be factory mounted on a resilient panel with frame assembly secured to pumps or piping. Gauge installations shall be complete with all hoses and stainless steel fittings, including a shutoff valve for each gauge line at the point of connection to suction and discharge pipes.

E. 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 degrees between flanges. Flanges shall be faced with a gasket finish having concentric grooves a minimum of 0.01 inch deep by approximately 0.03 inch wide, with a minimum of three grooves on any given surface spaced a maximum of 1/4 inch apart.

F. Supports and Thrust Blocks

1. Contractor must insure all pipes connected to the pump station are supported to prevent piping loads from being transmitted to pumps or station piping. Pump station discharge force main piping shall be anchored with thrust blocks where shown on the contract drawings.

2.09 FINISH

A. Pumps, piping, and exposed steel framework shall be cleaned prior to coating using an approved solvent wipe or phosphatizing cleaner. The part must thoroughly dry before paint application. Open joints shall be caulked with an approved polyurethane sealant. Exposed surfaces shall be applied with one coat of Tnemec Series 69 Polymide Epoxy Primer and one finish coat of Series 73 Aliphatic Acrylic Polyurethane for a total dry film thickness of 4-6 mils. Finish coat shall be semi-gloss white for optimum illumination and enhancement. The coating shall be corrosion, moisture, oil, and solvent resistant when completely dry. The factory finish shall allow for over-coating and touch-up for 6 months after coating. Thereafter, it will generally require sanding to accept a topcoat or touch-up coating. See Product Data Sheet for additional information.

2.10 Electrical Components

A. The pump station control panel will be tested as an integral unit by the pump station manufacturer. The control panel shall also be tested with the pump station as a complete working system at the pump station manufacturer's facility.

2.11 Panel Enclosure

A. Electrical control equipment shall be mounted within a NEMA 3R 304SS, dead front type, control enclosure. Door shall be hinged and sealed with a neoprene gasket and equipped with captive closing hardware. Control components shall be mounted on a removable steel back panel secured to enclosure with collar studs.

B. All control devices and instruments shall be secured to the sub-plate with machine screws and lockwashers. Mounting holes shall be drilled and tapped; self-tapping screws shall not be used to mount and component. All control devices shall be clearly labeled to indicate function.

2.12 UL Label Requirement

A. Pump station controls shall conform to third party safety certification. The panel shall bear a serialized UL label listed for "Enclosed Industrial Control Panels". The enclosure, and all components mounted on the sub-panel or control cover shall conform to UL descriptions and procedures.

2.13 Line Reactors

A. Line reactors shall be provided on the incoming power to the pump station control panel. Line reactors shall be 3% Low Z line type reactors and shall be factory-mounted in the control panel.

2.13 Branch Components

A. All motor branch and power circuit components shall be of highest industrial quality. The short circuit current rating of all power circuit devices shall be a tested combination or evaluated per the National Electrical Code Article 409. the lowest rated power circuit component shall be the overall control panel short circuit rating and shall not be less than the fault current available. The minimum control panel rating shall not be less than 10 kA, rms symmetrical. Control assemblies operating at 120 volts nominal or less may be provided with transformers which limit the fault current and may be rated less than the minimum required short circuit rating.

B. Circuit Breakers and Operating Mechanisms

1. A properly sized heavy duty circuit breaker shall be furnished for each pump motor. The circuit breakers must be sealed by the manufacturer after calibration to prevent tampering.

2. An operating mechanism installed on each motor circuit breaker shall penetrate the control panel door. A padlockable operator handle shall be secured on the exterior surface. Interlocks must prevent opening the door until circuit breakers are in "OFF" position. An

additional mechanism(s) shall be provided on the circuit breaker permitting the breaker to be operated and/or locked with the control panel door in the open position.

C. Programmable Logic Controller

1. The PLC shall be an Allen-Bradley CompactLogix L306 Control System. The PLC shall be equipped with a CPU with 750KB [1769-L16ER] or 1MB [1769-L18ERM] of user memory, determined by the factory during equipment construction. Two EtherNet/IP communication ports supporting ring topologies and 1 USB port for firmware download and programming shall also be included. The Controller shall utilize the small applications 1769 I/O modules. The Controller shall be designed to implement consumed tag, event instruction, embedded inputs, remote I/O, axis, and motion event triggers. The controller shall be equipped to handle up to 32 Controller Tasks and 100 programs/task.

2. The PLC shall operate on 24VDC power and be equipped with a 24VDC embedded power supply. A 1784-SD1 (1GB) Memory Module shall be shipped with the controller. The controller will contain, at least but not limited to, embedded digital I/O [16DC Inputs, 16DC Outputs]. The controller shall accept all digital and analog I/O necessary to accomplish the specified operation. A minimum of 10% spare of the I/O used shall be supplied.

3. The program logic shall be stored on the processor as well as on a programmable, read only 1 GB SD card [shipped with controller]. The memory module shall auto load and run when installed in the programmable control processor and is included to facilitate field repair or replacement of the programmable control hardware without the use of programming terminals or personal computers.

4. The PLC shall communicate with the variable frequency drives (VFDs) using an EtherNet/IP, but can also support other communication protocols such as ControlNet, or DeviceNet networks. The PLC shall issue drive start/stop and speed commands. VFD status shall also be communicated to the PLC using EtherNet/IP. The VFD shall be configured to operate manually without the use of the PLC.

5. An Allen-Bradley PanelView Plus 7 electronic operator interface shall be provided for data entry and display. The Operator Interface Display size will be at least 6.5 inches with Color active matrix, thin film transistor (TFT), liquid crystal display (LCD). The operator interface shall have an 18-Bit color graphic resolution with backlight CCFL of 50,000 hours minimum. The operator interface shall be mounted on the front of the control panel with other operator controls and shall be compatible with the PLC communication protocol. The operator interface shall be a backlit, touch-screen terminal. The operator interface program shall be stored externally on a Secure Digital (SD) card.

D. Motor Starters: Variable Frequency Drives

1. The pump station controls shall include Allen-Bradley PowerFlex 753 Variable Frequency Drives (VFDs) with HIMs and overload protection on all phases for each pump / motor. The VFD HIM shall be factory mounted in the door of the pump station control panel.

2. The VFDs and level/logic control shall be an integrated system, factory tested. The pump station control system shall be mounted in a NEMA 3R 304 stainless steel enclosure.

3. The variable frequency drive shall be capable of operation under any combination of the following conditions without mechanical or electrical damage:

a) Ambient Temperature: 0 to + 40 degrees C
b) Relative Humidity: Less than 95% non-condensing
c) Altitude: Less than 1,000M (3300 ft) above sea level
d) Vibration: .006 inches displacement, 1G peak

e) Shock: 15G peak for 11mS (+/- 1.0mS)
f) Control Specification
g) Control System: Sinusoidal pulse width modulated voltage waveform
h) Frequency Accuracy: +/- 0.4% of max. frequency
i) Volts/Hertz Ratio: V/Hz user programmable
j) Operation Frequency: 0 to 400 Hz
k) Overload Capacity: 110% Overload capability for up to 1 minute, 150% Overload capability for up to 3 seconds

4. Digital Readout and Monitor. Interface to the drive is provided via a module with integral LCD display. Unit is a 7 line by 21 character backlit LCD display with graphics capability. It is used to display drive operating conditions, fault / alarm indications and programming information with full text support in multiple languages, including but not limited to English, German, French, Italian, Spanish, Portuguese and Dutch. The unit will display standby status (power on, not running), output frequency (drive run), set-up parameters and fault. With keypad, user can monitor current, voltage, frequency, acceleration and deceleration time, minimum frequency and maximum frequency. Readout also provides inverter status and protective circuit status.

5. The variable speed drive system shall include a diode or fully gated 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.

6. The system protection will provide the following:
   a) Intermittent overload - 50 to 150%
   b) Current limit - 50 to 115%
   c) Overcurrent - 220-300% 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) Power loss ride-through - 500mS

7. 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

8. Auto restart shall occur when the inverter faults. Auto restart shall be adjustable up to 9 attempts with a 0.5 to 30 second interval. Auto restart will not be attempted for ground fault, output shorted, transistor shorted or internal microprocessor fault but will trip out immediately, activate the fault relay and make the appropriate indication on the display.

9. In the event of a fault trip, the microprocessor shall save the status of the inverter at the time of the fault and make that information available on the digital display. Information regarding the last 4 faults is maintained in event of a power loss.

10. Operational Functions:

a) Acceleration and deceleration time independently adjustable from 0.1 to 3600.0 seconds (selectable ranges).
b) Volts/Hertz patterns user selectable.
c) Maximum and minimum frequency limit adjustments.

2.14 Phase Monitor

A. The control panel shall be equipped to monitor the incoming power and shut down the pump motors when required to protect the motor(s) from damage caused by phase reversal, phase loss, low voltage, and voltage unbalance. An integral time delay shall be provided to minimize nuisance trips. The motor(s) shall automatically restart when power conditions return to normal.

2.15 Transient Voltage Surge Suppressor (SPD)

A. The control panel shall be equipped with a modular surge arrestor to minimize damage to the pump motors and control from transient voltage surges. The suppressor shall utilize thermally protected by heavy duty zinc-oxide varistors encapsulated in a non-conductive housing. Mechanical indicators shall be provided on each phase to indicate protection has been lost. The suppressor shall have a short circuit current rating of 200,000 Amps and a Maximum Discharge current rating [I_{max}] of 40,000 Amperes. Nominal discharge current [I_n] is 20,000 Amperes. Surge arrester according to UL 1449 3rd Edition, Type 2 component assembly.

2.16 Pump Start Delay

A. The control circuit for pump #2 shall be equipped with a time delay to prevent simultaneous motor starts.

2.17 Control Circuit

A. A normal duty thermal-magnetic circuit breaker shall protect all control circuits by interrupting control power.

B. Pump mode selector switches shall permit manual start or stop of each pump individually, or permit automatic operation under control of the liquid level control system. Manual operation shall override all shutdown systems, except the motor overload relays. Selector switches to be oil-tight design with contacts rated NEMA A300 minimum.

C. Control logic shall be accomplished using a programmable controller.

D. Electromechanical relays and timers shall be equipped with 120VAC coils and contacts rated Nema A-300 minimum. Timers shall be pneumatic or synchronous motor driven.

E. Programmable controls shall operate on 120VAC power and be equipped with 120VAC inputs and hard contact outputs. Outputs shall have an inductive load rating equivalent to a size 4 contactor. Inputs shall incorporate a filter time delay and the overall controller noise immunity shall meet Nema standard ICS 2-230. The power supply to the programmable control shall include an active tracking filter protection system to minimize the effects of electrical noise.

F. Operator interface equipment shall be provided to permit field adjustment of the programmable control timers and counters and shall be mounted on the control panel with other operator controls and displays.

G. The program logic shall be stored in battery backed random access memory, as well as on a programmable, read only memory module. The memory module shall be included to facilitate field repair or replacement of the programmable control hardware.

H. The O&M manual shall be provided with complete ladder logic program documentation including English names, rung comments, and coil/contact cross-references.

I. The control shall be pre-programmed or wired to provide the following routines:

1. Pump alternation at lead stop
2. Excessive pump run time alternation (1-9999 minutes)
3. Jump to idle pump/drive on lead failure
4. Pump start delays after power restoration
5. Flashing alarm/steady acknowledge on all alarm pilot lights
6. Station trouble alarm (115vac and normally open dry contact)
7. High and low level alarms
8. Pump high temperature shutdown
9. Motor high temperature

J. The control system shall be equipped with the following dry contacts wired to the terminal blocks at minimum:

1. Pump run - (1) N.O. each pump
2. Drive fault - (1) N.O. each pump
3. High pump temperature shutdown - (1) N.O. each pump
4. High motor temperature - (1) N.O. each pump
5. Three phase voltage monitor - (1) N.C.
6. High water alarm - (1) N.O.
7. Low water alarm *(optional)*- (1) N.O.

K. A 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. A thermostat shall be mounted on each pump casing and connected to the PLC. If casing temperature rises to a level sufficient to cause damage, the thermostat N.O. contact shall close indicating a high pump temperature condition to the PLC. The PLC will then interrupt power to the pump motor. The operator interface terminal will display an alarm banner indicating the motor stopped due to high pump temperature. The motor shall remain locked out until the pump has cooled and circuit has been manually reset. Automatic reset of this circuit is not acceptable.

L. A duplex ground fault receptacle providing 115 VAC, 60 Hz, single phase current, will be mounted on the side of the control enclosure. Receptacle circuit shall be protected by a 15 ampere thermal-magnetic circuit breaker.

M. Auxiliary Power Transformer

1. The lift station shall be equipped with a 5 KVA step-down transformer to supply 115 volt, AC, single phase for the control and auxiliary equipment. The primary and secondary side of the transformer to be protected by a thermal magnetic circuit breaker, sized to meet the power requirements of the transformer. An operating mechanism shall penetrate the control panel door. and a padlockable operator handle shall be secured on the exterior surface. Interlocks must prevent opening the door until circuit breakers are in "OFF" position. An additional mechanism(s) shall be provided on the circuit breaker permitting the breaker to be operated and/or locked with the control panel door in the open position.

N. Wiring

1. The pump station, as furnished by the manufacturer, shall be completely wired, except for power feed lines to the branch circuit breakers and final connections to remote alarm devices.

2. All wiring, workmanship, and schematic wiring diagrams shall comply with applicable standards and specifications of the National Electric Code (NEC).\

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

a) Line and Load Circuits, AC or DC power ..... Black
b) AC Control Circuit Less Than Line Voltage ..... Red
c) DC Control Circuit ..... Blue
d) Interlock Control Circuit from external source ..... Yellow
e) Equipment Grounding Conductor..... Green
f) Current CarryingGround..... White
g) Hot with circuit breaker open..... Orange

4. Control circuit wiring inside the panel, with exception of internal wiring of individual components, shall be 16 gauge minimum, type MTW or THW, 600 volts. Power wiring to be 14 gauge minimum. Motor branch wiring shall be 10 gauge minimum.\

5. Motor branch and other power conductors shall not be loaded above the temperature rating of the connected termination. Wires must be clearly numbered at each end in conformance with applicable standards. All wire connectors in the control panel shall be ring tongue type with nylon insulated shanks. All wires on the sub-plate shall be bundled and tied. All wires extending from components mounted on door shall terminate at a terminal block mounted on the back panel. All wiring outside the panel shall be routed through conduit.

6. Control wires connected to door mounted components must be tied and bundled in accordance with good commercial practice. Bundles shall be made flexible at the hinged side of the enclosure. Adequate length and flex shall allow the door to swing full open without undue stress or abrasion. Bundles shall be held on each side of hinge by mechanical fastening devices.

O. Conduit

1. Factory installed conduit shall conform to following requirements:

a) All conduit and fittings to be UL listed.

b) Liquid tight flexible metal conduit to be constructed of smooth, flexible galvanized steel core with smooth abrasion resistant, liquid tight polyvinyl chloride cover.

c) Conduit to 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.

P. Grounding

1. Station manufacturer shall ground all electrical equipment inside the pump station to the control panel back plate. All paint must be removed from the grounding mounting surface before making final connection.

2. The contractor shall provide an earth driven ground connection to the pump station at the main grounding lug in accordance with the National Electric Code (NEC).

Q. Equipment Marking

1. Permanent corrosion resistant name plate(s) shall be attached to the control and include following information:

a) Equipment serial number
b) Control panel short circuit rating
c) Supply voltage, phase and frequency
d) Current rating of the minimum main conductor
e) Electrical wiring diagram number

f) Motor horsepower and full load current
g) Motor overload heater element
h) Motor circuit breaker trip current rating
i) Name and location of equipment manufacturer

2. Control components shall be permanently marked using the same identification keys shown on the electrical diagram. Labels shall be mounted adjacent to device being identified.

3. Switches, indicators, and instruments mounted through the control panel door shall be labeled to indicate function, position, etc. Labels shall be mounted adjacent to, or above the device.

2.18 Primary Liquid Level Control System

A. The manufacturer of the liquid level control system must be ISO 9001 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 a submersible transducer type system, non-contact radar transmitter type system or ultrasonic 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. 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.

F. Submersible Transducer Level Sensor

1. The level control system shall utilize a submersible transducer. It shall be a strain gauge transducer with a pressure sensor housed in a 316 SST or Titanium case designed to extend into the wet well. The pressure transducer shall provide a proportional signal for distribution to the display and electronic comparators of the electronic pressure switch, and remainder of the level control system. Sensor range shall be 0-12 ft. W.C. minimum with an over-pressure rating 3 times full scale. The transducer shall have output capability of 0-5Vdc or 4-20mA. The transducer's polyurethane jacketed shielded cable shall be of suitable length for proper installation into the wet well without splicing.

2. An intrinsically safe repeater shall be supplied in the control enclosure. Repeater must be recognized and listed as intrinsically safe by a nationally recognized testing laboratory. Station manufacturer shall make all connections from repeater to feeder lines and motor controls. Installing contractor shall make connections from repeater to transducer.

3. Submersible transducer will be furnished with surge protection to protect related equipment from an induced voltage spike from lighting.

2.17 Alarm Light (External)

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 will be shipped loose for installation by the contractor.

2.18 Alarm Horn (External)

1. Station manufacturer will supply one 115 volt AC weatherproof alarm horn with projector, conduit box, and mounting base. The design must prevent rain water from collecting in any part of the horn. The alarm horn will be shipped loose for installation by the contractor

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. Suction pipe connections are vacuum tight. Fasteners at all pipe connections must be tight. Install pipe with supports and thrust blocks to prevent strain and vibration on pump station piping. Install and secure all service lines (level control, air release valve or pump drain lines) as required in wet well.

C. 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.

D. 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 all pumps, drives, 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 pumps, 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. Co-ordinate station start-up with manufacturer's technical representative. The representative or factory service technician will inspect the completed installation. He will 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, drain water from pumps and piping. Open motor circuit breakers and protect station controls and interior equipment from cold and moisture.

END OF SECTION

SECTION 43 22 00

LIQUID PROCESS EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide materials, labor, and services necessary for furnishing and installing two new magnetic meters for the purpose of measuring discharge volume and flow of wastewater.
1. Install on each discharge line as shown on plans and per manufacturer recommendations.

B. Provide materials, labor, and services necessary for furnishing and installing two new electrically actuated valves for the purpose of directing the Raw wastewater to different treatment processes.
1. Install on each discharge line as shown on plans and per manufacturer recommendations.

1.02 SUBMITTALS

A. Make all submittals in accordance with Section 01 33 00 – Submittal Procedures

B. Submit shop drawings showing dimensions and details of construction and installation.

C. Submit written guarantee in accordance with the Contract Documents

D. Submit manufacturer's literature describing the operation and maintenance of the composite samplers.

1.03 DELIVER, STORAGE, AND HANDLING

A. Manufacture shall issue written instructions to the contractor on special handling and installation requirements.

PART 2 - PRODUCTS

2.01 MAGNETIC FLOW METER

A. Application:
1. Flow meters shall be designed for metering wastewater with solid content of 0.5% to 8%.
2. Flow meters for the following applications:
a. RAW Wastewater

B. General:
1. Low frequency electromagnetic induction type, producing a low voltage signal linearly proportional to flow.
2. Accurate within +/-0.25% of meter scale for a velocity range of 1.0 fps to 33.0 fps.
3. Operate on 120 Vac +/-10%, 60 Hz +/-5%.
4. Signal converters:
a. Ability to be integrally or remotely mounted, as specified.
b. If not specified, the converter shall be remotely mounted.
5. Flanged or flangeless type as specified.
6. Length to diameter ratio: Minimum of 1.5 in order to minimize inaccuracies generated by the affects of inner wall conductivity of adjacent piping.
7. Calibrated traceable to NIST standards:
8. Supply a calibration curve to the engineer.

9. Manufacturer must comply with ISO 9000 Standards.
10. Magnetic flow meters measuring thickened sludge: Capacitance type with electrodes that are not in contact with the process.
11. Provide factory calibration and document with calibration curves and methodology submitted to the Engineer.

C. Meter:
1. Stainless steel or carbon steel schedule 20 minimum.
2. Meter:
   a. ANSI 150# flanges.
   b. Teflon or approved equal suitable for wastewater applications
   c. Hastalloy electrodes.
   d. Capable of permanent submergence in up to 30 feet of water
3. Furnish with two orifice type grounding rings.
4. Grounding electrodes which penetrate the liner will not be acceptable.

D. Signal Converter:
1. Microprocessor based capable of displaying flow rate and totalization simultaneously.
2. Remote converters: Equipped with 50 feet of cable.
3. Accuracy of meter: +/-0.25% of flow rate.
4. Repeatability: +/- 0.1% of span.
5. Rangeability: 75:1 or greater.
6. Housed in a NEMA 4X enclosure.
7. Current output: 4-20 mA into a 0 to 750 Ohms load and capable of accommodating bidirectional flow.
8. Interchangeable without affecting meter accuracy or the need for recalibration for all meter sizes.
9. Sensing of meter failure shall activate a user configurable zero or 100% output signal and a failure alarm contact closure.
10. Provide automatic empty pipe detection.
11. Include non-volatile memory so that flow totals and calibration are not lost during a power outage.

E. Manufacturers:
1. Siemens FM MAG 5100W or Endress + Hauser Promag W 400 or approved equal.
2. Influent Meter
   a. Size: 6-inch.
   b. Power Requirements: 120 Vac 50/60 Hz.
   c. Indicator/Totalizer: 2 x 16 Character LCD lighted display.
   d. 316 SS Grounding Rings Provided.
   e. Low Flow 250 GPM /Max Flow 1200 GPM.

2.02 AUTOMATIC VALVES

A. Application:
1. Automatic valve operation for directing flow to different treatment processes.
2. Electrically actuated valves for the following applications:
   b. RAW Wastewater

B. General:
1. Flanged connections unless otherwise noted.
2. Valve type as noted on plans.
3. Operate on 120 Vac +/-10%, 60 Hz +/-5%.
4. Shall be single phase with a direct torque output range from 50-2,000 N/m.
5. Emergency handwheel, ability to fail open or close based on operator selection.
6. Visual position indicator, user interface display
7. Maufacturer provided cable and/or interface compatible with owner’s control system.

C. Manufacturers:
1. Rotork IQT Part-turn Electric Actuator, Hayward HRS or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install all equipment in strict accordance with the manufacturer's recommendations and shop drawings as approved by the Engineer. Locate per Engineer.

3.02 ELECTRICAL WORK

A. All electrical work shall be performed as specified in Division 26 – ELECTRICAL

3.03 PIPING AND VALVING

All external piping and valving shall be furnished and installed as specified in Section 40 23 00 – WATER AND WASTEWATER PROCESS PIPING.

3.04 FIELD SERVICES

The equipment manufacturer shall provide field services as specified under Section 01 75 16. Minimum instruction time shall be four (4) hours.

END OF SECTION

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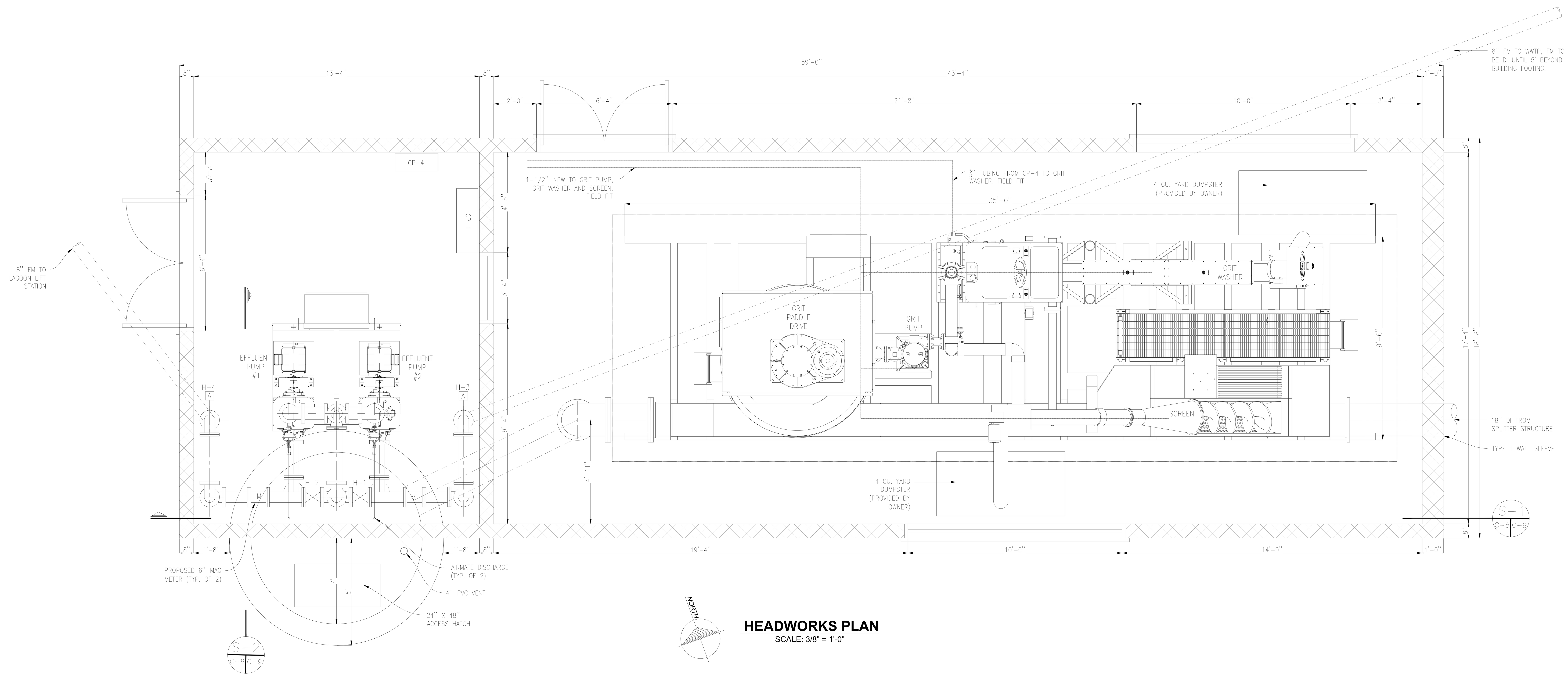
ENVIRONMENTAL SERVICES
GEOTECHNICAL
CONSTRUCTION SERVICES
DRILLING
LANDSCAPE ARCHITECTURE

No.	Date	Revision	By
1	11/5/2024	ADDENDUM 1	

HEADWORKS EQUIPMENT PLAN
HEADWORKS ADDITION
LITTLE RIVER BAND OF OTTAWA INDIANS



HEADWORKS PLAN
SCALE: 3/8" = 1'-0"

NOTES:
1. SCREEN/GRIT IS A PREPACKAGED UNIT ARRIVING ON A SKID. CONTRACTOR SHALL MAKE ALL REQUIRED MECHANICAL AND ELECTRICAL CONNECTIONS AS REQUIRED BY MANUFACTURER AND AS SHOWN ON THE PLANS AND SPECIFICATIONS.
2. FINAL EQUIPMENT LAYOUT AND DIMENSIONS MAY VARY FROM WHAT IS SHOWN. ANY DISCREPANCIES BETWEEN THE PLANS AND SHOP DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND OWNER.
3. ALL EQUIPMENT LOCATED IN THE SCREENING ROOM MUST MEET CLASS 1 DIVISION 1 REQUIREMENTS.
4. PUMPING EQUIPMENT SHALL COME PREPACKAGED ON A SKID. CONTRACTOR SHALL MAKE ALL REQUIRED MECHANICAL AND ELECTRICAL CONNECTIONS REQUIRED BY MANUFACTURER AND AS SHOWN ON THE PLANS AND SPECIFICATIONS.

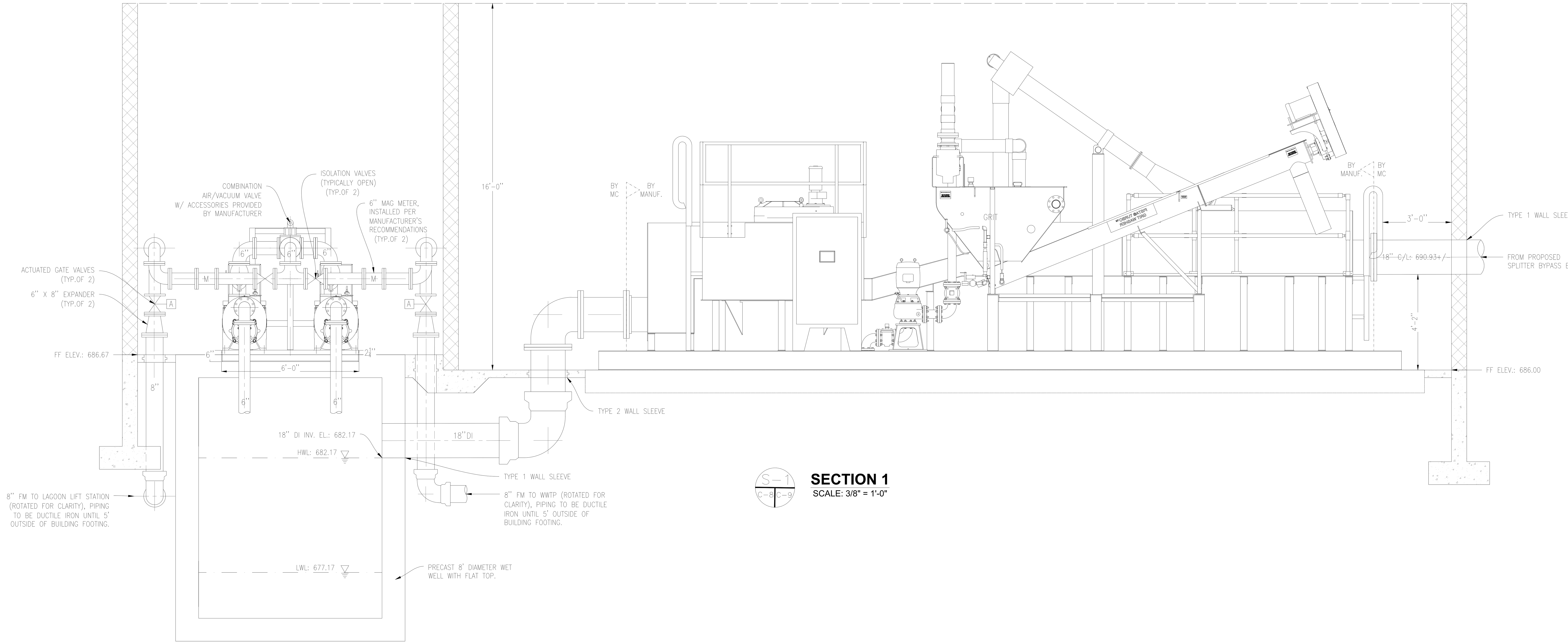
Date Issued:	3/10/2022
Date Surveyed:	8/10/2021
Designed By:	ALT
Drawn By:	ALT
Checked By:	
Scale:	AS NOTED

Original sheet size is 22x34

Location:
PARTS OF SECTIONS 21 & 28, T 22 N, R 16 W, MANISTEE TOWNSHIP, MANISTEE COUNTY, MICHIGAN

Project Number:
2021096001.00

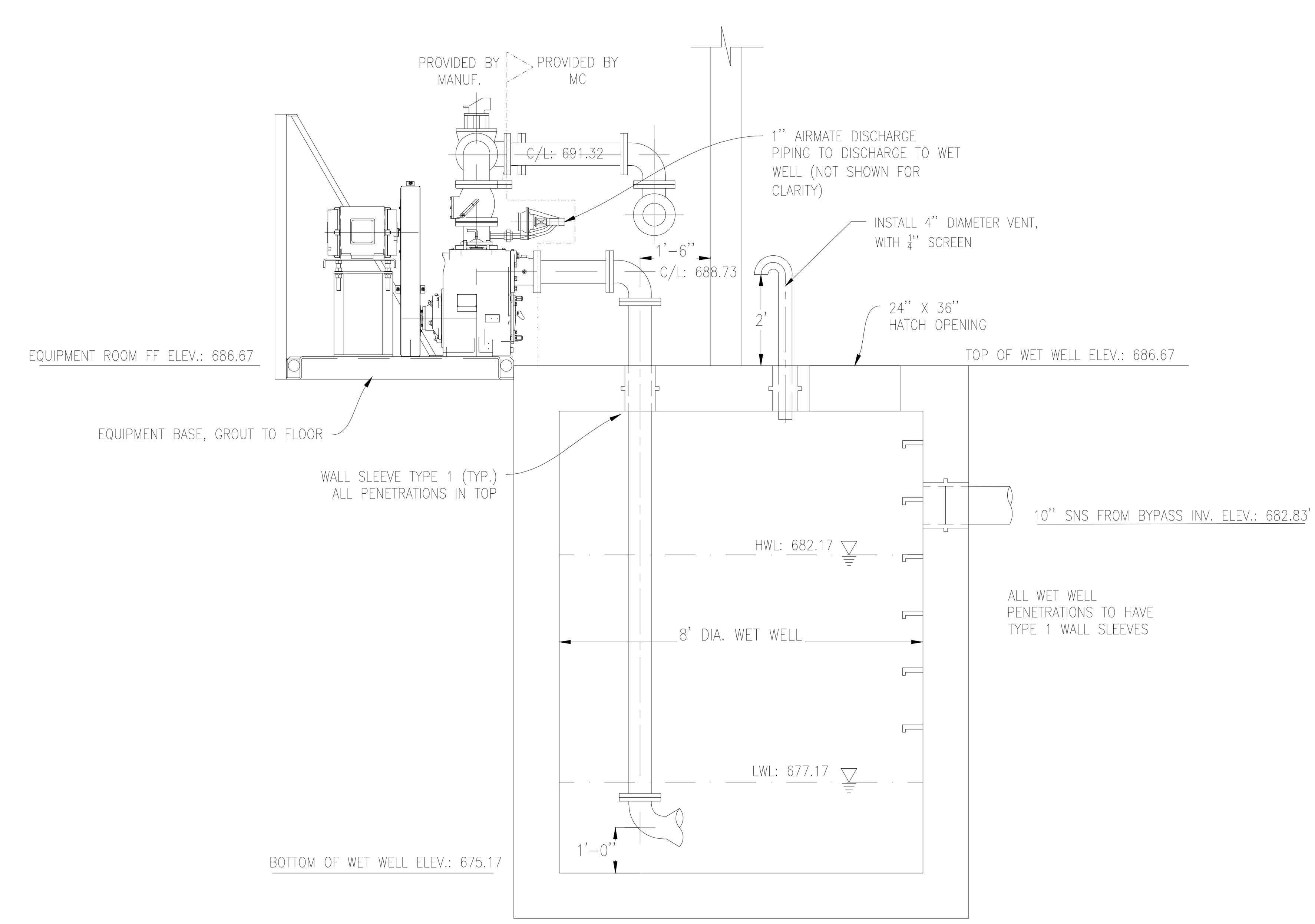
Sheet:
C-8



S-1 C-8 C-9

SECTION 1

SCALE: 3/8" = 1'-0"



S-2 C-8 C-9

SECTION 2

SCALE: 3/8" = 1'-0"

NOTES:
1. SEE ARCHITECTURAL PLANS FOR BUILDING AND FOOTING DETAILS.
2. ALL EQUIPMENT IS TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
3. FINAL DIMENSIONS AND ELEVATIONS TO BE DETERMINED BASED ON SHOP DRAWING SUBMITTALS.
4. ALL PROCESS PIPING TO BE DUCTILE IRON UNLESS OTHERWISE NOTED ON PLANS.

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