

SECTION 0 – GENERAL REQUIREMENTS

PART 1 – GENERAL OVERVIEW

1.01 Definitions

For the purposes of these Lift Station and Force Main Specifications ("Specifications"), the following definitions shall apply:

"HSEU" shall mean Hamilton Southeastern Utilities, Inc., the public utility that provides sanitary sewer service in the Project (as hereafter defined) area. HSEU's address is 11901 Lakeside Drive, Fishers, Indiana 46038, and HSEU's phone number is (317)577-2300.

"Engineer" shall mean the engineer for HSEU, which is Sanitary Management & Engineering Company, Inc. ("SAMCO") or SAMCO's engineers. SAMCO's inspector shall be Engineer's representative during construction of the Project. SAMCO's address is 11905 Lakeside Drive, Fishers, Indiana 46038, and SAMCO's phone number is (317)577-1150.

"Subscriber" shall mean those signatories identified as Subscribers under a Special Contract for extension of Sewer Mains and Facilities with HSEU through which the Project is being undertaken. Subscriber is generally the Owner under a construction contract. This definition is intended to include all employees and/or agents acting in the interest of Subscriber.

"Contractor" shall mean any construction contractor approved by HSEU to construct, install, maintain, repair, and remove public or private sanitary sewer facilities within the HSEU service area. This definition is intended to include all employees, sub-contractors and/or agents acting for or on behalf of Contractor's company. "Design Engineer" shall mean the engineer sealing the Construction Plans, as opposed to Engineer for HSEU who is also defined under these Specifications. This definition is intended to include all employees, sub-contractors and/or agents acting for or on behalf of Design Engineer's company.

"Project" shall mean any sanitary sewer facilities constructed under a distinct set of contract documents and shall include all work necessary for the Complete (as hereafter defined) and operable installation of all sanitary sewer infrastructure and appurtenances in conformity with the HSEU approved Construction Plans and the standards, specifications, and details of HSEU.

"Sanitary Sewer Facilities" shall mean any pipes, manholes, flow monitoring/metering manholes, clean-outs, grease traps, grit traps, oil/water separators, neutralization tanks, wyes, laterals, and any other appurtenances which convey or process sanitary sewage. "Conveyed" with regards to sanitary sewer facilities means Projects for which HSEU has received title.

"Private" with regards to Projects shall mean Projects from which sewage flows into HSEU's sanitary sewer facilities, but for which the title for sanitary sewer facilities is not to be Conveyed to HSEU. "Completed" with regards to Projects shall mean any Projects which are acceptably constructed, tested, and through which customer service has been authorized by HSEU, but for which HSEU has not received title. If applicable fees must be paid to HSEU prior to a Project being deemed Completed.

"Construction Plans" shall mean primary plats, secondary plats, sets of construction drawings, architectural plans, shop drawings, landscaping plans, record drawings, easements, deeds, covenants and restrictions, and any other documentation to be submitted under these Specifications and HSEU's "Design Specifications for Sanitary Sewer Facilities". Construction Plans must meet the applicable standards in effect at the time the documents are submitted. "Completion Documentation" shall mean record drawings and other documentation to be submitted under HSEU's "Sanitary Sewer Completion Specifications." Completion Documentation must meet the applicable standards in effect at the time the documents are submitted.

1.02 Purpose

The purpose of these Specifications is to define the standards for engineering design; construction specifications and construction practices related to the Project which will allow for the orderly and proper installation of sanitary sewer facilities constructed within HSEU's service area.

1.03 Applicability

These Specifications are applicable for all Public and Private sanitary sewer facilities which will be connected to HSEU's sanitary sewer system. This includes Private Projects which will not initially be connected to HSEU's sanitary sewer system but at some future date may be connected to the system.

1.04 Liability and Costs for Project

No direction, field directive or other instruction contemplated by these Specifications and/or conducted by others shall accrue any liability, charge, or cost to HSEU, Engineer or Engineer's inspectors.

1.05 Standards, Specifications and Details

HSEU's Gravity Sanitary Sewer Details sheet, Gravity Sanitary Sewer Specifications sheet, Lift Station and Force Main Details sheet, Lift Station and Force Main Specifications sheets, Standards for Design and Construction of Building Sewers, Rules and Regulations, Master Plan, and Design Specifications for Sanitary Sewer Facilities are integral parts of these Specifications. Contractor should become familiar with these documents prior to construction of any sanitary sewer facilities within HSEU's service area. These Specifications, Lift Station and Force Main Details sheet, and HSEU's Design Specifications for Sanitary Sewer Facilities are complementary in nature and should not be interpreted individually. These Specifications and HSEU's Lift Station and Force Main Details sheets, Master Plan, and other standards, specifications and details are subject to revision at any time prior to the start of construction of the Project. These documents are also subject to revision at any time during construction when, in Engineer's opinion, those revisions materially affect the maintenance, operation or life of the Project. All such revised documents must replace the corresponding documents in the Construction Plans at the time provided to Contractor. HSEU reserves the right to modify or waive any of these Specifications and/or its Master Plan and other standards, specifications, and details in its best interest. These Specifications are intended to define the construction requirements of sanitary sewer facilities which are constructed and operated under typical conditions in HSEU's service area. Depending on field conditions and the composition and characteristics of the sanitary sewer flow, different or unusual conditions may occur which cannot be anticipated in a document of this nature. Engineer may impose additional or special construction requirements under these circumstances.

1.06 Drawing Discrepancies and Omissions

Prior to starting construction, Contractor must notify Engineer of any conflicts between the Construction Plans, any supplemental

information supplied by HSEU, and/or these Specifications. Resolution of any such conflict will be at Engineer's sole discretion. Any items which are not covered in these Specifications, the Construction Plans or HSEU's other standards, specifications, and details, but are required for construction of the Project, must be approved by Engineer prior to installation and must be made part of the contract. If construction practices are not described but, in Engineer's opinion, will affect the quality of construction or long-term maintainability of sanitary sewer facilities, Engineer must approve any construction practices proposed by Contractor.

1.07 Governing Laws, Codes, and Regulations

Construction practices must meet all applicable laws, codes, or regulations and be in accordance with the requirements of all governmental agencies and public entities having jurisdiction. These Specifications shall not be considered as a substitute, nor shall supersede any state or federal law, code, or regulation related to the Project. In the event of a conflict between any state or federal law, code, or regulation governing the Project and these Specifications, the more stringent requirement will apply. All persons on site must abide by all Indiana Occupational Safety and Health Administration (IOSHA) standards including but not limited to "General Construction Practices" and "Trench Safety Standards".

1.08 Notices

All notices required by these Specifications must be given to both HSEU and Engineer at their respective business offices.

PART 2 – GENERAL CONSTRUCTION REQUIREMENTS

2.01 General

These Specifications cover all work necessary for the installation of lift station wet wells and valve vaults, backup electrical power generator, lift station piping, force mains, manholes, valves and valve boxes, submersible pumps and controls, control panel, alarm devices, level control systems, electrical wire in conduit from wet well to control panel, vents, slide rails, wet well and valve vault access doors with full protection and safety ladders, fittings, thrust blocks, odor control and ventilation, asphalt access drive, fencing, facility and site lighting and other miscellaneous items (Lift Station/Force Main Infrastructure) to convey sewage from the lift station pumps to the receiving sewer infrastructure in an acceptable and operable manner. Contractor must provide all necessary work to install Lift Station/Force Main Infrastructure in a Complete manner in accordance with the Construction Plans. All electrical work (conduit, wiring, panel installation, etc) shall be performed by a licensed electrician. All pipe, fittings, valves, and appurtenances must be the size, type, classification, and grade shown on the Construction Plans and must meet all requirements of these Specifications. All electrical work (conduit, wiring, panel installation, etc) shall be performed by a licensed electrician. All pipe, fittings, valves, and appurtenances must be the size, type, classification, and grade shown on the Construction Plans and must meet all requirements of these Specifications. If a material type is shown on the Construction Plans, the material type must describe a general category of materials meeting these Specifications.

2.02 Submittals

Contractor must submit only one model number or type per item for approval. Multiple submittals of model number or type for a single item will be cause for rejection of the shop drawing. Before delivery of products to the site (for standard yard stocked items) or before fabrication (for items which are not standard yard stocked items), Contractor must provide submittals and obtain acceptance from Engineer. Submittals must be thoroughly reviewed by Contractor and certified to meet these Specifications (with all exceptions explicitly indicated) prior to submission to Engineer. Acceptance by Engineer does not exempt Contractor from compliance of these specifications. Manufacturer's certificate of compliance, signed by an authorized agent of the manufacturer or seller, certifying that the pumps and control panels meet these Specifications. Certified copies of test reports on factory tests. 1. Factory test each submersible pump according to Hydraulic Institute standards. During factory operational hydraulic pressure tests, test pump power and control circuits under load. Verify operation of all monitoring circuits and alarms. Refer to Testing Punch Lists and Cleaning within these Specifications for further information. 2. Where required by applicable manufacturing standards, provide a copy of the manufacturer's inspection or test report and a certified statement by manufacturer that the material has been sampled, tested, and inspected in accordance with applicable standards. 3. All factory inspections, tests, and record keeping identified as mandatory or required under applicable standards for each product are required under these Specifications. Factory inspections and tests, which are identified as optional under applicable manufacturing standards, are not required unless otherwise specifically indicated in the Construction Plans or these Specifications. 4. An authorized agent of the manufacturer or distributor must sign each certification and report. Shop drawings with performance data, field measurements, details of fabrication, details of installation, and physical characteristics for mechanical products, including valves, controls, pumps, etc. Shop drawings for control and other electrical wiring must comply with component manufacturer and electrical code requirements stated in these specifications. System head curve plotted with the proposed curve. 1. Plot must indicate pump efficiency; solids handling capacity and reflect the motor service factor. 2. Efficiency and other performance data must be based on performance with an uncoated impeller. Attempts to improve reported efficiency by coating impeller will not be accepted. Catalog cuts with product data, including details of manufacture, for all manufactured items. Manufacturer's recommendations on all materials and methods of installation. Forms of warranty. 1. Warrant equipment free from manufacture and installation defects for a period of three (3) years from date of successful operation. Successful operation date will be the first day of the initial thirty (30) day period the pump station functions without failure due to defects in workmanship or materials. 2. Warrant fence and appurtenances free from manufacturing and installation defects for a period of three (3) years from the date HSEU deems the fence and appurtenances complete. Operation and maintenance instructions for all mechanical and electrical equipment. Contractor must provide to HSEU copies of all contracts, invoices, statements, material lists, payment requests and all other related documents pertaining to construction of the Project. The above documents must be provided monthly, unless otherwise determined by HSEU.

If requested by Engineer, mill reports on steel. Submit any other items required by Engineer.

2.03 Initiation of Construction

Plan approval will be authorization to proceed with construction of the Project, however, it shall not be construed as authority to violate, cancel, or set aside any of HSEU's requirements or the laws, codes, regulations, and permit processes of governmental agencies or public entities. Approval will be evidenced by an "Approved Hamilton Southeastern Utilities, Inc." stamp on the Construction Plans.

Plan approvals will be valid for a period of six (6) months from the date of approval stamp. Extensions of this time limit may be requested from Engineer if extenuating circumstances exist. Engineer's decision regarding time extensions will be final. Prior to starting construction, Design Engineer must receive formal written approval from Engineer. At this time, Design Engineer must supply Engineer with a PDF and an AutoCAD file of complete set of Construction Plans.

Contractor will not be permitted to initiate construction until the Construction Plans are formally approved, and Subscriber has entered into all necessary agreements and authorizations with, and all required fees have been paid to HSEU. Contractor will not be permitted to initiate construction until all applicable permits have been approved by and obtained from all affected governmental agencies and public entities. Copies of the permits must be submitted to Engineer for review. Contractor will not be permitted to initiate construction until all off-site easements have been reviewed, approved, and recorded by Engineer.

Pipe layers and foreman (superintendent) assigned to the Project must be approved by HSEU prior to starting construction. Notice must be provided to Engineer twenty-one (21) days prior to the initiation of construction. A pre-construction meeting is required between Engineer and Contractor prior to starting construction. The pre-construction meeting must be completed no more than fourteen (14) days prior to starting construction. All rough grading (on and off site) must be finished to within one (1) foot of final grade and verified by Engineer prior to starting construction on Sanitary Sewer Facilities.

Once construction has commenced, the Project must be Completed promptly as directed by Engineer. Contractor must not discontinue work on the Project, except for weather delays, without written approval from Engineer. No sanitary sewer structures including wet wells, valve vaults, or manholes can be left open and incomplete. If wet well excavation requires dewatering well installation, it shall be a minimum of 10-inch diameter with stainless steel wire wound well screen appropriately sized for formation retention. The well is to be available for future supply of non-potable lift station wash and test/flush water.

2.04 Continuity of Construction

Once construction has commenced, the Project must be Completed promptly as directed by Engineer. Contractor must not discontinue work on the Project, except for weather delays, without written approval from Engineer. No sanitary sewer structures including wet wells, valve vaults, or manholes can be left open and incomplete. If wet well excavation requires dewatering well installation, it shall be a minimum of 10-inch diameter with stainless steel wire wound well screen appropriately sized for formation retention. The well is to be available for future supply of non-potable lift station wash and test/flush water.

2.05 Confined Space Entry

All persons, including but not limited to Subscribers, Contractors, sub-contractors, Design Engineers, and surveyors must abide by the most recent IOSHA confined space entry standards.

2.06 Cleanliness

The Project site must at all-time be kept free of trash, rubbish, unsightly materials, and other nuisances.

2.07 Product Delivery, Handling, and Storage

Contractor is responsible for the delivery, handling, and storage of products. Deliver products with manufacturer's tags and labels intact. Handle products in accordance with manufacturer's recommendations and with extreme care not to damage or shock. Load and unload all products by hoists or skidding. Do not drop products. Do not skid or roll products on or against other products. Slings, hooks, and pipe tongs must be padded. Keep stored products safe from damage or deterioration in accordance with manufacturer's recommendations. Keep the interior of products free from dirt or foreign matter. Drain and store products in a manner that will protect them from freezing. Store electronics and electrical products in a manner that will protect them from freezing and weather. Do not stack products unless allowed by the manufacturer's requirements. Store gaskets and other products affected by sunlight in a cool location out of direct sunlight. Gaskets must not come in contact with petroleum products. Use gaskets on a first-in/first-out basis. Promptly remove damaged or defective products from the Project site. Replace damaged or defective products with acceptable products. Contractor is responsible for verifying materials are free of defects and are the proper type, classification, grade, etc. complying with the Construction Plans and/or HSEU's standards, specifications, and details.

2.08 Quality Assurance

Contractor must test and perform quality assurance requirements on all Lift Station/Force Main Infrastructure in accordance with these Specifications. Execute work in conformance with applicable sections of the latest published editions of American National Standards Institute (ANSI), American Society of Mechanical Engineers (ASME), American Society for Testing and Materials (ASTM), American Water Works Association (AWWA), American Welding Society (AWS), and National Electrical Manufacturers Association (NEMA) standards or as indicated in these Specifications and/or the Construction Plans, whichever is more stringent. All electrical materials and products installed by Contractor must be approved by the National Electrical Code (NEC), Uniform Building Code, and Underwriters Laboratories Inc. (UL). All Lift Station/Force Main Infrastructure must be new and unused. Line and grade requirements

Contractor must provide assurance to Engineer the force main is laid to the required line and grade as shown on the Construction Plans. Contractor must constantly check horizontal alignment of the force main.

Contractor must coordinate verification of the force main with Engineer to provide an as-built record set as described later in these Specifications. Verification is defined as certification by an appropriately registered Indiana professional as to actual elevation and horizontal location of the force main. Variations from line and/or grade as shown on the Construction Plans are cause for the force main to be rejected and re-laid in compliance with the Construction Plans.

Contractor's survey equipment (level, transit, GPS, etc) shall bear calibration certification documentation by the manufacturer's approved service facility within six (6) months of it being in use. Initial Performance Tests – A hydrostatic pressure test may be required on the first six hundred (600) feet of force main material installed. This test will be required when, in Engineer's opinion, materials or techniques unproven with HSEU are proposed, when Contractor cannot show adequate experience with the materials or techniques to be used, or when field conditions warrant. No additional force main can be installed until the first section of force main of each size and type of material has satisfactorily passed the initial performance tests or a waiver is received.

Subsequent Performance Testing – As work progresses, Engineer may designate additional sections for subsequent performance testing, as conditions in his opinion warrant. Engineer will notify Contractor of the location(s) where subsequent performance test(s) are to be required not later than fifteen (15) days after the force main has been installed. Unless otherwise authorized, Contractor must arrange to commence the subsequent performance test(s) within fifteen (15) days after the force main has been installed or fifteen (15) days after receiving notification by Engineer, whichever date is later.

Final Performance Testing for Completion – All Lift Station/Force Main Infrastructure must pass all applicable test requirements of these Specifications. Inspection and Rejection of Materials The quality of all materials, process of manufacture, and finished product are subject to inspection and acceptance by Engineer. Inspection may be made at the place of manufacture and/or on the work site after delivery. Products are subject to rejection at any time for failure to meet any of the manufacturers' specifications even though samples may have otherwise been accepted as satisfactory. Immediately prior to being incorporated into the Project, each product must be carefully inspected, and those not meeting these Specifications and HSEU's Lift Station/Force Main Details sheets must be rejected, immediately removed from the site, and replaced at Contractor's sole expense. Contractor must not repair, or permit manufacturer to repair, any pre-cast concrete structures with exposed steel or welded wire fabric reinforcement.

2.09 Inspection and Rejection of Materials

The quality of all materials, process of manufacture, and finished product are subject to inspection and acceptance by Engineer. Inspection may be made at the place of manufacture and/or on the work site after delivery. Products are subject to rejection at any time for failure to meet any of the manufacturers' specifications even though samples may have otherwise been accepted as satisfactory. Immediately prior to being incorporated into the Project, each product must be carefully inspected, and those not meeting these Specifications and HSEU's Lift Station/Force Main Details sheets must be rejected, immediately removed from the site, and replaced at Contractor's sole expense. Contractor must not repair, or permit manufacturer to repair, any pre-cast concrete structures with exposed steel or welded wire fabric reinforcement.

2.10 Relation to Wells and Water Supplies

Force mains must be laid at least ten (10) feet horizontally from any existing or proposed water main, distance is to be measured edge to edge. Should specific conditions prevent this separation, Contractor must notify Engineer for specific instructions. When the force main crosses a water main, the force main should be laid at least eighteen (18) inches below the water main. Sewer/water supply separations and pipe classifications must conform with the latest edition of the Ten States Standards, Indiana State Board of Health's (ISBH) "On-site Water Supply and Wastewater Disposal for Public and Commercial Establishments – Bulletin S.E. 13" and Indiana Department of Environmental Management (IDEM).

2.11 Utilities

All existing utility systems which conflict with the construction of the Project, which can be temporarily removed and replaced, must be accomplished at the expense of Subscriber. Work must be done by the respective utility, unless the utility approved in writing Contractor may perform the work. Permanent relocation of Utilities 1. Except as otherwise noted on the Construction Plans, it is the responsibility of Subscriber to move or pay for moving all utility appurtenances, including but not limited to, water mains, storm sewer inlets, gas lines, electrical lines, service connections, water and gas meter boxes, and gas valve boxes, light and traffic standards, cable ways, signals, etc. located in the public right-of-way or private easement which would permanently interfere with the Project. 2. It is understood and agreed Contractor has considered, in his bid, all the permanent and temporary utility appurtenances shown or otherwise indicated on the Construction Plans. It is also understood and agreed that when contracted by HSEU, no additional compensation will be allowed for any delays, inconvenience, or damage sustained by Contractor due to any interference from said utility appurtenances or the operation of moving them. Costs incurred due to the respective utility company moving the utilities shall be that of Subscriber. Contractor must provide, at Contractor's expense, all electrical and gas energy, water service (including water for flushing and testing) and telephone service required for the Project until it is Complete.

Installation Service Provide services of a factory-trained representative(s), if requested by Engineer, for a minimum period of eight (8) hours each on two (2) separate occasions, one (1) month apart, to perform inspection of the pump station, perform the dry test and wet test of the pumping and control system, perform initial start-up, instruct Engineer's personnel in pump station operation and maintenance, and certify installation. The service of an experienced installation representative of the manufacturer must be provided for a minimum of ten (10) days at no additional cost to Subscriber if requested by Engineer.

Representative must be on site during initial installation and testing of the Lift Station/Force Main Infrastructure, when installation problems arise, or when requested by Engineer to resolve installation problems.

Manufacturer of the Lift Station/Force Main Infrastructure may be required to provide installation advice on bedding, haunching, and backfill to Contractor's workforce. Engineer will determine the need for these services based on field conditions encountered during construction.

2.13 Product Installation

Install all products in strict accordance with manufacturer's recommendations and these Specifications in a neat and workmanlike manner. Bring all conflicts between the manufacturer's recommendations and these Specifications to the attention of Engineer and obtain direction from Engineer as to the resolution of any conflict in installation directives.

2.14 As-Built Record Set

Contractor must maintain, during the Project, an up-to-date digital plan set which accurately reflects the as-built dimensions (horizontal location and vertical elevation), materials of construction, and other relevant information, necessary to develop a set of as-built record drawing. As-built horizontal locations and vertical elevations are required on all fittings (including elbows, tees, valves, and adapters), the force main (at a maximum interval of 500 feet), the top and bottom of the wet well and valve vault, and inverts into the wet well and air/vacuum release manholes. Failure to provide as-built information may require excavation by Contractor to obtain this information.

2.15 Completion Documentation

Contractor must provide HSEU and Engineer, in Subscriber's name, the necessary Completion Documentation for the Project. Costs associated with the final as-built documentation review by Engineer and its inclusion to update HSEU's GIS infrastructure database shall be at Subscriber's expense. Any Field Changes made which, in Engineer's opinion, materially affect the infrastructure are to be made by Design Engineer and amended digital plan sheets provided prior to completion of sanitary sewer infrastructure installation and operation. On a daily basis, Utility Inspector and Contractor must digitally submit a HSEU Lift Station Progress Log. Contractor must complete all outstanding items detailed in Engineer's correspondence and supply all necessary information (including construction cost documentation, with all applicable change orders). Sanitary Sewer Inventory form, Lift Station Progress Logs, video logs, etc. are the responsibility of Inspector who shall provide them to Engineer. If a Lift Station/Force Main Air-Release manhole top of casting is adjusted after as-builtting, Contractor must supply Engineer with a new measure down from the top of casting to flow line. If new measure down is not provided to Engineer, Contractor must pay Engineer, at their current rate, for all time required obtaining this information.

Contractor must provide HSEU copies of all contracts, invoices, statements, material lists, payment requests, and all other related documents pertaining to the construction cost of Project. The above documents must be provided monthly, unless otherwise determined by HSEU. Submit any other items required by Engineer.

2.16 Inspection and Reimbursement

Full time inspection by Engineer is required for all repairs, maintenance, or construction to Lift Station/Force Main Infrastructure. Engineer must approve, in writing, all methods of repair to Lift Station/Force Main Infrastructure as recommended by Contractor and manufacturer. Failure to comply will be grounds for removal from the HSEU Approved Contractor List. If, for any reason, construction work is delayed or canceled, Contractor shall notify Engineer's inspector assigned to the Project and Engineer's chief inspector at least one hour (1) prior to the normal scheduled start time on the day the work is delayed or canceled. Contractor will be charged the prevailing rate for failure to notify Engineer's inspector and/or inspector's supervisor per occurrence. Contractor must pay Engineer for all Inspector's overtime cost. Contractors will be charged overtime costs at the prevailing rate per hour outside of Engineer's normal business hours on weekdays and all day on Saturdays. The rate for Sundays and holidays will be twice the hourly rate. Rates are subject to change without notice, contact Engineer prior to starting construction for current rates. If, at the sole discretion of Engineer, construction volume is less than what is deemed acceptable, Contractor may be required to pay for additional inspection services. Engineer's decision on field changes or construction practices is final. Failure to comply is grounds for removal from the HSEU Approved Contractor List.

PART 3 – TESTING, PUNCH LISTS, AND CLEANING

3.01 General Testing Requirements (Except Pump Factory Test)

All testing must be conducted at Contractor's expense in presence of Engineer. Notification must be provided at least three (3) days prior to any testing. All lines must be clean and free of any debris. At HSEU's option, all testing of Lift Station/Force Main Infrastructure within HSEU's service area may be performed by either Contractor, HSEU or their agent. Contractor shall reimburse HSEU or its agent at HSEU's current rate for all testing related services performed by either HSEU or its agent. All testing (except air release manhole vacuum testing) must be conducted after all other in-ground utilities have been installed. All concrete thrust blocks must have been in place for a period of at least ten (10) days prior to testing. At Engineer's discretion, testing may be delayed, or additional testing may be required, based upon weather conditions (inadequate precipitation to allow for adequate settlement, etc.).

Testing may also be delayed, or additional testing may be required, due to installation of site improvements (including but not limited to fencing, signage, landscaping, site lighting, and other sub-surface improvements).

If Subscriber requires sanitary sewer service prior to testing, a preliminary test may be performed, however, Subscriber must provide, in writing, a guarantee that all cleaning and testing will be performed per the Construction Plans and HSEU's then current standards, specifications, and details.

3.02 Pump Factory Test

Factory testing of the pump/motor systems is required. Pump must be visually inspected to confirm that it is built in accordance with manufacturer's specifications as to horsepower, voltage, phase, frequency, and impeller size. Motor seal and housing chambers must be metered for infinity to test for moisture content or insulation defects and equipped with seal failure and motor over temperature sensor outputs. Pump must be allowed to run dry to check for proper rotation. Discharge piping must be attached, pump submerged in water and ampere readings shall be taken in each leg to check for an imbalanced stator winding. If there is a significant difference in readings, stator windings must be checked with a bridge to determine if an imbalance exists. If so, stator must be replaced and warrantee remains effective. Pump must be removed from the water and metered again. In addition to the above factory test, a special meger test must be performed and include the following: 1. Pump must be submerged in water and allowed to run at maximum load for fifteen (15) minutes. 2. A written report must be prepared by test engineer, certified, and submitted to Engineer. A non-witnessed Hydraulic Institute performance test may be required to be performed by Engineer. This must include the following: 1. Pump must be tested at the design point as well as four (4) other points to develop a pump curve. Data must be collected to plot the performance (head-capacity) curve as well as kilowatt input and amperage curves. 2. In making this test, no points on the curve shall be less than the specified design condition with respect to capacity, total head, or efficiency. Pump must be held within a tolerance of ten (10) percent of the rated capacity or at rated capacity with five (5) percent of rated head. Pump must be tested at shut off, but not be plotted, and only used as a reference point when plotting the performance curve. 3. Through records must be kept of all information relevant to the test, including pump manufacturer's serial number, type, and size of pump, as well as impeller modifications made to meet the design conditions. 4. A written test report must be prepared, signed, certified, and dated by test engineer incorporating three (3) curves (head capacity, kilowatt input, and amperage) along with the pump serial number, test number, date, speed, volts, phase, impeller diameter, and certification number. This report must be submitted to Engineer.

3.03 Force Main Testing

Perform hydrostatic pressure and leakage tests on all force mains, including piping within the lift station. The following requirements are applicable to both tests. 1. Lift station piping must be tested to the discharge elbow (with a blind flange on the discharge). 2. System will not be considered Complete until all leaks have been repaired and all tests have been passed to the satisfaction of Engineer. 3. During filling of the pipe, and before application of the specified test pressure, all air must be expelled from the force main by means of the air/vacuum release valves, and if necessary, by additional taps at points of highest elevation. After the test is finished, the taps must be tightly plugged, unless otherwise specified. 4. Limit fill rate of force main to available venting capacity. Fill rate must be regulated to limit velocity in force main when flowing full to not more than one (1) foot per second. 5. Test separately in segments between isolation valves, between an isolation valve and a test plug, or between test plugs. 6. Contractor must furnish and install test plugs, including all anchors, braces, and other temporary or permanent devices to withstand hydrostatic pressure on plugs. 7. Contractor is responsible for any damage caused by failure of the Lift Station/Force Main Infrastructure during testing of the Project. 8. Refit and replace pipe not meeting leakage or pressure requirements. 9. Repair all visible leaks regardless of the amount of leakage. Hydrostatic Pressure Test 1. Hydrostatic pressure test must conform to ANSI/AWWA C600 and C605 procedures except as modified by these Specifications. 2. Conduct test at a pressure of at least one hundred (100) psi or one and a half (1.5) times the operating pressure, whichever is greater. 3. Maintain pressure for a minimum of eight (8) consecutive hours. 4. Test Pressure must not vary by more than five (5) +/- psi. Leakage Test 1. Close all inlet valves of air/vacuum release valves before performing the leakage test. 2. Maintain pressure for a minimum of eight (8) consecutive hours. 3. Leakage test will be acceptable when leakage does not exceed that value (L) determined by the following formula:
$$L = (N \times D \times \sqrt{P}) / 7400$$
 where, L = Maximum permissible leakage in gallons per hour, N = Number of pipe joints in segment being tested, D = Nominal internal diameter of pipe being tested in inches, P = Average test pressure, psig. 4. Repeat hydrostatic pressure and leakage tests, as necessary. a. After location of leaks and repair or replacement of defective joints, pipe, or fittings.

Until satisfactory test results are obtained. Open all air/vacuum release valves and verify proper operation. Test locator wire for continuity. For force mains installed by boring, test both wires for continuity.

3.04 Manhole Testing

All air/vacuum release and flow monitoring/metering manholes must be vacuum tested per ASTM C1244 after installation, repair, or modification. Test to be performed by Contractor or HSEU appointed agent and witnessed by Engineer's Inspector prior to adjustment ring(s) and casting placement. Manhole boots must be secured to prevent movement while vacuum is drawn. Installation and operation of vacuum equipment and indicating devices must be in accordance with ASTM C1244. With the vacuum tester in place, draw a vacuum of ten (10) inches of mercury and close the valve. Acceptance standards for leakage will be established from the elapsed time for a negative pressure change from ten (10) inches to nine (9) inches of mercury. The maximum allowable leakage rate for a four (4) foot diameter manhole must be in accordance with the following: Minimum Elapsed time for a Pressure Change of 1-inch Mercury Manhole Depth 10ft or less 60 sec >10ft but <15ft 75 sec >15ft but <25ft 90 sec >25ft but <30ft 105 sec >30ft but <35ft 120 sec

For manholes five (5) feet in diameter, add an additional fifteen (15) seconds and for manholes six (6) feet in diameter, add an additional thirty (30) seconds to the time requirements for four (4) foot diameter manholes. If manhole fails the test, necessary repairs must be made and the vacuum test and repairs must be repeated until manhole passes the test. Manholes will be subject to visual inspection with all visible leaks being repaired.

3.05 Electrical Testing (must be performed by licensed electrician)

A. Test resistance to ground of ground system or grounding network at a point where equipment, raceways, and conductors are to be connected. Measurement must be made with a vibro-ground instrument manufactured by Associated Research or equal. Value of this resistance to ground cannot exceed five (5) ohms and must be measured from ground being tested to system neutral. B. Contractor equipped to certify tests must perform ground system tests. Test one hundred-twenty (120) volt to six hundred (600) volt circuits. Test cables with megger voltage to be determined by Engineer between phases and between each phase and ground, with test maintained until readings are steady for three (3) minutes. Readings to be equivalent to manufacturer's specifications and similar readings not to deviate by more than five (5) percent.

3.06 Punch Lists

A. After all testing has been successfully completed, Engineer will perform an inspection of the Lift Station/Force Main Infrastructure and provide Contractor a written summary of items, or punch list, which require corrective action. B. Contractor must complete all punch list items within twenty-one (21) days of issuance. If, in opinion of Engineer, the punch list has not been completed, Contractor must pay HSEU additional inspection fees per re-inspection (inclusive of associated management costs) until Engineer deems punch list complete.

3.07 Cleaning

A. Flush internals of Lift Station/Force Main Infrastructure with water of sufficient velocity and quantity that will dislodge sediment or dirt that has accidentally entered the system. B. Remove surplus/waste materials, including but not limited to, earth, trash, rubbish, unsightly materials, and other such nuisances from the Project Site.

PART 4 – OPERATION, CLEANING, AND FINAL INSPECTION PRIOR TO CONVEYANCE

4.01 Operation

No person, including but not limited to, Subscribers, maintenance workers, Contractors, sub-contractors, and engineers shall, directly or indirectly, allow flow to occur from any Project which is not a Completed Project. HSEU shall be responsible for operation and maintenance of these facilities once sanitary flow is permitted to enter the system and continue through conveyance.

4.02 Cleaning

A. Wet well must be cleaned by high pressure washer and vector truck at Subscriber's expense prior to any testing and at least once prior to conveyance.

4.03 Final Inspection

A. Within six (6) months prior to conveyance, Engineer will conduct an inspection (Final Inspection) at Subscriber's expense. Final Inspection will consist of a walk-through of the Project to identify any defects. Final Inspection may also consist of pumping tests, various motor analyses and force main hydrostatic pressure tests as determined by Engineer. B. After Final Inspection has been performed, Engineer will provide a written summary, or punch list, of items which require corrective action. Subscriber must complete all punch list items within sixty (60) days from date of issuance of the punch list. If, after the sixty (60) day period, and in sole opinion of Engineer, punch list items have not been corrected, Contractor and/or Subscriber may be required to pay HSEU additional inspection fees until the items are corrected.

PROJECT	JOB NO.	DRAWN	REVISIONS				CERTIFIED
			BY	DATE	CHECK	DATE	
			1	11/01/2022	MM	11/01/2022	
PREPARED FOR		HAMILTON SOUTHEASTERN UTILITIES, INC.		SCALE:		SHEET 1 OF 4	
TITLE		LIFT STATION & FORCE MAIN SPECS		N/A			



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HAMILTON SOUTHEASTERN UTILITIES, INC.
GRAVITY SANITARY SEWER SPECIFICATIONS

THIS DOCUMENT AND THE IDEAS, DESIGNS AND CONCEPTS CONTAINED HEREIN ARE THE EXCLUSIVE INTELLECTUAL PROPERTY OF SANITARY MANAGEMENT & ENGINEERING COMPANY, INC. AND ARE NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART, WITHOUT THE WRITTEN CONSENT OF SANITARY MANAGEMENT & ENGINEERING COMPANY, INC. ©2022 BY SANITARY MANAGEMENT & ENGINEERING COMPANY, INC.

LIFT STATION AND FORCE MAIN SPECIFICATIONS

1. Pump controller shall include the following data communication ports: a. (2) Ethernet ports (min. 10Mbit/s) b. (2) RS232 ports (min. 115kbit/s) c. (2) RS485 ports (min. 115kbit/s) d. (1) USB device port	2. Pump controller shall support the following communication types: a. TCP/IP b. UDP c. RS232 d. RS485 e. Private radio over RS232 f. PSTN g. Wireless LAN h. Cellular data i. Cellular voice	3. Pump controller shall support DNP3 (master & slave, level 2 compliant), including: a. Change of state reporting b. Native date/time and quality stamps for each data point c. Event buffering for different classes of data d. Support for multiple masters and slaves to be configured on the unit e. DNP Security (for securing communications between master station and RTU).	4. Pump controller shall support MODBUS (master & slave) including: a. Modbus TCP b. Modbus RTU c. Modbus ASCII d. Support for multiple masters and slaves	5. Pump controller shall meet the following performance and environmental characteristics: a. Central Processing Unit Speed: min. 566MHz b. Central Processing Unit RAM: min. 256 Mbyte c. Central Processing Unit Flash Memory: min. 64 Mbyte d. Real Time clock e. Working temperature -10°C to +60°C f. Storage temperature -40°C to + 90°C g. Humidity 5% to 95% (non-condensing) h. IP Rating controller base unit: IP20, NEMA 1 i. Display Interface IP65, NEMA 4	6. Pump controller shall be provided with a 5-year limited manufacturer's warranty.	1. Control panels shall be manufactured in accordance with ISO 9000-2001 specifications and shall be constructed for the application of an UL Listing Label by an approved UL Control Panel Assembly Facility. 2. All electrical connections shall be properly inspected and torqued in compliance with ISO specifications. External connections to the control panel shall be by way of numbered terminal blocks. 3. Control panels shall be properly checked, and load tested with power applied. A control panel test log shall be supplied with the control panel. 4. Control panels shall be supplied from a UL approved control panel assembly facility with all the required labels properly attached. C. Control Panel Enclosure Environmental Rating 1. Control panel enclosure rating shall be specified in accordance with the Project requirements or the contract drawings as NEMA 4X (stainless-steel).	1.11 A. Electrical Equipment Control Panel - Control system of initial triplex lift stations must incorporate all wiring, controls, relays and components necessary to place a future third pump into service with only the connection of the pump power cable in the junction box. Power distribution system and control system of duplex and triplex lift stations must be sized adequately to allow installation of planned future larger pumps with only the connection of the pump power cord at the junction box and variable frequency drives sized for the next horsepower rating above the larger pumps. 1. Control Panel shall have a minimum of 25% free space on back plate for each low and high voltage side for operational separation. 2. Control Panel must be supplied with 277/480-volt, three (3) phase, four (4) wire, sixty (60) cycle power. 3. A lightning arrester (transient surge protector) must be supplied in the Control Panel and must be connected to each line of the incoming side of the power input terminals. a. All electrical and electronic components of the Control Panel shall be protected against damage due to electrical transients induced in interconnecting lines from lightning discharges and surges in nearby electrical systems. b. Transient surge protector shall be rated for 25kA per phase or larger. c. All devices shall be provided with protection per device manufacturer's requirements. 4. Integral within the Control Panel must be an open network device control bus with back-to-back trunk cable connections, tee connections and terminating resistors. 5. Triplex lift stations must include VFD sized for the next larger horsepower voltage motor and built-in electronic overload protection. 6. All enclosures of the Control Panel must be weatherproof NEMA Type 4X fabricated of 14 gauge stainless-steel mounted near the wet well. Sections must be joined to form a free standing completely enclosed assembly maintaining a safe access distance from the lift station wet well. 7. The dead-front panel must have a piano hinge and a latching device for HSEU padlocks (purchased from HSEU). 8. Interior Control Panel must be painted steel, laser cut sized to cover wiring and components mounted on back of panel; with Allen Bradley push button, hand-off-automatic (H/O/A) switches and LED compatible control function lights, and instrumentation as specified. 9. Back panel must be a 12-gauge removable steel panel sized to mount starters, control equipment, and instrumentation. 10. Stainless-steel, continuous vertical hinge to provide one hundred-sixty-five (165) degree swing. 11. Contractor must make all appropriate modifications, with written approval from Engineer, to ensure control panel is suitable for operation with the pumping equipment. 12. All panel conduit penetrations are to be sealed with a removable, non-collapsing, putty-like material (3M or better). Cabinet Heater - sized as required by cabinet dimensions to allow for a minimum interior temperature of sixty (60) degrees Fahrenheit when exterior ambient temperature is minus thirty (-30) degrees Fahrenheit. 1. There shall be a 115 VAC, 299-watt enclosure heater inside the control panel. 2. Cabinet heater shall be Hoffman. 3. The cooling fan kit shall be Rittal SK243.110 or approved equal. D. Line voltage thermostat, Dayton model 2E206 or equal E. Telemetry 1. Control system must provide for remote shut-down of the pump station via Sierra Wireless Cellular modem - Airlink RV50 (DC)NA. 2. The unit must be supplied with an external lightning/surge protection package. F. Instrumentation 1. Pilot Lights - Run (green), Call (amber), Fail (red) supplied w/LED bulb. 2. Digital elapsed time meters must be configurable to each motor starter to indicate total run time in hours and tenths of an hour and programmed to be six (6) digit non-resettable. 3. H/O/A, three (3) position switch manufactured by Allen Bradley. 4. One hundred-twenty-five (125) volt, twenty (20) ampere, two (2) pole, three (3) wire grounding NEMA configuration: 5-20R, 5-20P. 5. Ground Fault Interrupting (GFI) specification grade receptacle as manufactured by Arrow-Hart, Bryant, General Electric, or Engineer approved equal. G. Grounding 1. Entire installation to be grounded in accordance with requirements of NEC. 2. Equipment grounding must be provided for, but not limited to, the following items: panel enclosure, motor frames, receptacles, and junction boxes. 3. Ground must be insulated wire conductors, green color coded, sized according to code and bonded to grounding rod. 4. Control panel enclosure shall be properly grounded in accordance with the National Electrical Code and local code requirements and have a HSEU required three-point grounding rod configuration in undisturbed or cohesive soil. 5. Each analog signal loop shall only have its shield wire connected to the ground at a point for the loop. Shields shall be grounded at	control panels where signals are input to the receiving device and not at the source of the transmitting device. G. Battery Backup 1. Twelve (12) volt DC lithium-ion battery with automatic one hundred-twenty (120) volt charging system. 2. Must provide eight (8) hours of continuous operation of alarm light. 3. Must be mounted inside control panel. H. Alarm Apparatus 1. Alarm signal must be initiated by level control system, backup high level signal or power failure relay. 2. Motor temperature shutdown as previously discussed in these Specifications. Report failure on pump control panel and through SCADA. 3. Seal failure shutdown. Report failure on SCADA system and pump control panel. 4. Contractor must furnish HSEU's standard alarm system, including remote lift station control capability via approved PLC. I. Starters - must be NEMA rated for the loads to be powered. 1. Duplex Lift Stations a. Solid state reduced voltage, ten (10) to fifteen (15) horsepower and below. b. Current ramp duration adjustable two (2) to thirty (30) seconds. c. Current trip adjustable from fifty (50) to four hundred (400) percent. d. End of limit signal to sequence start of motors. e. Must be Allen Bradley SMC3. 2. Triplex Lift Stations a. Solid state variable frequency drive (VFD) shall be Aqua Danfoss with four (4) to twenty (20) milliampere input. b. Software shall be iFIX SCADA and Allen-Bradley PLC operating logic i. Motor starters must be wired to automatically re-energize the pumps when: a) Power is restored after an outage. b) Controls are in the "On" position. c) Controls are in the "Auto" position and the off float indicates the need. ii. Time delay relays must cause the time between multiple pump starts to be greater than the ramp duration of the starter with control system interface. J. Conduit must be non-metallic heavy wall type. K. Circuit Breaker Usage (unless otherwise specified or shown on Construction Plans) L. Minimum Type of Service I.C. Rating Amps Minimum I.C. Rating 120/208 volt 15-100 10,000 RMS Lighting and Power 1. Power circuit breakers shall be thermal magnetic type designed for AC current with a minimum interrupting capacity of 15,000 amperes. 2. Control circuit breakers shall be in accordance with section UL 489 with a minimum interrupting capacity of 10,000 amperes. M. Control Voltage Transformer Fuses - Rated one tenth (1/10) to six hundred (600) amperes, six hundred (600) volts AC or less must be UL listed as Class RK1, current-limiting time delay with 200,000 amperes RMS interrupting rating as manufactured by Buss model MDA or equal. Primary side fuses must be Little Fuse model KLCD, Gould Shawmut model ATQR Amp-Trap 2000 time-delay class CC six hundred (600) volt, or equal, based on ability to withstand inrush and spike conditions. Buss: Low Peak; Gould Shawmut: Amp-Trap 11, or equal. All fuse sizes greater than sixty (60) amperes to be Silver Link. N. Control Power Transformers - Control Power Transformers required to provide control system and accessory power. (Class 10 insulation system). O. Voltage/Phase Monitor - Voltage/Phase monitor shall continually measure the voltage of each of the three phases of the incoming power to the equipment and provide protection for three phase motors, as well as sensitive electronics, etc. The phase monitor shall sense the following conditions: under and over-voltage, voltage unbalance, phase loss, and phase reversal. (Pump manufacture recommended system shall override preceding). P. Control Relays (when used to supplement or backup PLC operation) 1. Control relays shall be square base type, 120VAC or 120VDC (based on design schematic). 2. Control relays shall be 4PDT (4 Pole, Double Throw) with normally closed/normally open contacts rated at 120VAC, 5 amps minimum. 3. Control relays shall include an integrated test button and relay energized flag indicator. Q. Full Voltage Magnetic Motor Controller 1. Motor controller shall be a NEMA rated, full voltage, non-reversing, across the line contactor and overload relay combination. 2. Motor overload relay shall be an ambient compensated type with inverse-time-current characteristics and shall be provided with heaters or sensors in each phase matched to nameplate full load current of the specific motor to which it connects. R. GFCI Convenience Receptacle - There shall be a 120VAC, 15 Amp GFCI rated convenience receptacle mounted on the dead front swing door of the control panel. Receptacle circuits shall be protected by a thermal magnetic circuit breaker. S. Wire and Cable (up to 600 volts) 1. Except where otherwise noted in these Specifications, insulation must be color coded thermosetting or thermoplastic type rated six hundred (600) volts as approved by Engineer. 2. Conductors must be soft drawn copper, each strand individually tinned or coated with approved alloy. 3. Conductors #10 or smaller: a. Use stranded conductors for final connections to motors and all locations where vibration or movement is present. b. Use solid conductors for all other locations. 4. Use double braid, stranded conductor #8 and larger. 5. Minimum wire size: General - #12, over one hundred (100) feet - #10, over one hundred-fifty (150) feet - #8, Control - #14 or as required by equipment manufacturer. Signal - #18. 6. Types and uses (75 or 90 degree Celsius) as directed by Engineer: a. Feeders and service entrance conductors: XHHW b. Power circuits above forty (40) amperes: THWN (#8 and larger)	c. Branch lighting, receptacle, and small power circuits: THWN (#12 and #10) d. Direct burial feeders and branch circuits: UF e. Control: To match the pump manufacturer specified size: THWN and XHHW 7. Main and feeder cables must be wire tagged in all pull boxes, wire ways, and wiring gutters of panels. Tags must identify wire or cable number and/or equipment served as shown on the Construction Plans. Tags must be of flame resisting adhesive material, T & B type WSL or equal. T. Cable Terminals and Connectors (for copper conductors only) 1. Conductor sizes #8 or smaller, to include compression/indentor type terminals, splices, and wire joints: a. For terminals (rings, forks, disconnects): Thomas & Betts; Stakon; Burndy Hydent; Buchanan Press-Sure; or equal. b. For splices (butt-type): Thomas & Betts; Stakon; Burndy Hydent; Buchanan Press-Sure; or equal. c. For wire joints (twist-on): Thomas & Betts; Piggy; Scotchklok; Ideal wing-Nut; or equal. 2. Conductor sizes larger than #8, to include mechanical set screw, or split bolt type connectors: a. For mechanical or set-screw type connector: Thomas & Betts; Lugit; Bundy Quiklug; Penn Union E2; or equal. b. For split-bolt type connectors: Thomas & Betts; Burndy Hydent; Penn Union; or equal. 3. For compression connections sizes #8 and larger, to include one-hole lugs, two lugs, butt splices, H-taps, C-taps, and anti-oxidizing compound: Thomas & Betts; Burndy Hydent; Penn Union; or equal. 4. A quick connect coupling generator receptacle must be provided on the control panel that will allow Engineer to utilize HSEU's standby power generator. One (1) automatic transfer switch must be provided in the control panel for HSEU's emergency generator.	U. Spare Parts Furnish one (1) lot spare parts as recommended by station and pump manufacturer. B. At a minimum, spare parts to include the following: 1. Two (2) sets of pump seals. 2. Two (2) Wear rings. 3. Two (2) sets of O-rings and gaskets. 4. One (1) spare impeller for current operation conditions. 5. Future impellers (if specified on the Lift Station Plan) 6. Other items defined as expendable by manufacturers.	V. Back-up Power Back-up Power Generator 1. Back-up power generator is to be manufactured by MTU, 60 Hz, natural gas fuel source for 25kW to 125kW, >125kW diesel with 48-hour integral tank. 2. Size depends on 1.5 SF of FLA. 3. Prepaid two (2) year service and maintenance with HSEU designated generator service provider. 4. As an alternate, a portable generator may be required by Engineer. 5. Provide battery tender and block heater with associated cable. 6. The generator is to have noise suppression enclosure to comply with OSHA and noise ordinance standards. B. Systems less than 100kW shall have a bypass breaker system generator plug hookup and associated connection to generator. C. Generator Control (greater than 100kW) shall be MTU provided with: 1. Display and I/O remote annunciator capability per operation, runtime, RPM, oil pressure (Hot PSI & Cold PSI), engine coolant temperature, voltmeter, ammeter, pre-alarms, and emergency alarm operation. 2. Remote start/stop capability. 3. Software login for voltage regulation and governing 4. Automatic start with programmed cranking cycle D. Transfer Switch 1. Transfer switch is to be ASCO Automatic Transfer Switch - NEMA 4X stainless steel. 2. Otherwise, run direct bury cable in three (3) inch sand envelope. 3. Must be capable of integrated communication interfacing using Ethernet or LAN line. E. Docking Station - TryStar Docking Station sized for generator. Following options to be included with docking station: two-wire auto start, battery charger receptacle, block heater receptacle, 100% grounded, strip heater and thermostat, surge protection device.	W. Odor Control The odor control system shall be approved by Engineer.	X. Access Drive and Generator Pad 1. An asphalt drive must be constructed from the nearest public street to the concrete interconnecting wet well/valve vault/generator/control system/odor control slab. Asphalt drive must be constructed for heavy duty traffic. 2. Lift station site must be situated so vehicles can access the wet well for pump removal without driving over the valve vault or manholes of the influent sewers and have more than adequate maneuvering space for a 14-yard vactor truck to drive directly on to public roadway. 3. Support vehicular parking is to also be sufficient to simultaneously have a crane truck, an electrical service van and foreman truck on pavement without obstructing lift station wet well access. 4. If a portable generator is approved for use, a level (all directions) fourteen (14) foot by twenty (20) foot generator parking area must be provided as integral to the wet well/valve vault/odor control interconnecting concrete slab. 5. If a portable generator is approved for lift station application, the control panel generator receptacle must be located within ten (10) feet of the lift station drive so that a portable generator can be readily connected.	Y. Pump Installation A. Pump anchoring - Mount base plates using stainless-steel anchor bolts. B. Assemble guide rails to access frame. Plumb assembly. Electrical and Telemetry Installation A. All grounding type receptacles are to have grounding slot connected to outlet box. B. Service entrance neutral must be grounded in accordance with Article 250-94 NEC. Grounding system is to be 3/5/8" X 10" copper ground rods installed in a triangular 10' pattern beyond the over-dig area and Cad welded to earth. C. To maintain switchboard short circuit rating, Contractor must rope tie the cable connected to the switches of the control panel per UL 891. D. Coordination with electrical energy provider. 1. Coordinate with electrical energy provider and verify the limits of responsibility with respect to metering, terminations, and the like. 2. In cases where these Specifications do not conform to electrical energy provider requirements, the latter must govern the Project. E. Circuit Breakers 1. Provide circuit breakers when indicated of proper sizes for loads served. 2. Do not install two (2) poles in single module. 3. Install multiple pole breakers with single operating handle. Do not install external mechanical ties between single pole breakers. F. Control Installation (must be Schedule 80) 1. Conduit system to be electrically continuous and must be grounded in accordance with NEC. Provide grounding conductors in all new raceways sized in accordance with NEC Table 2250-95 (1993 edition). 2. All conduit terminations to be equipped with lock nuts and bushings. Conduits one and one quarter (1 1/4) inch and larger must have insulating bushing and have lock nuts inside and outside the enclosure. 3. Conduits supported by pipe straps must have supports spaced out not more than four (4) feet on center. Secure supports by means of toggle bolts, inserts, or expansion bolts. 4. Protect conduits during construction with temporary pipes or caps. G. Wiring 1. Run all wires of same circuit in same conduit. 2. No wire can be pulled until conduit installation is finalized. 3. Do not pull thermoplastic wire at ambient temperatures lower than thirty-three (33) degrees Fahrenheit. 4. Use approved pull-in compound (similar to Wire-Lube or Y-Er-Ease) to facilitate pulling of wire. 5. Splices are not to occur. 6. If indicated on the Construction Plans, run all wiring in conduit, otherwise, run direct bury cable in three (3) inch sand envelope. Conduit and direct bury cable must be at least thirty (30) inches below finished grade. H. Wire and Cable Identification 1. Identify control wires at terminations with schematics and number list provided by HSEU. 2. Train and lace wiring inside equipment and panel boards with plastic tie wraps for a neat appearance. 3. Make all spare wires in cabinets or panel boards of adequate length for connections. Terminate with insulating tape and tag. I. Wire Connections and Devices 1. Thoroughly clean wires before installing lugs and connectors so that joint will carry full capacity of conductors without perceptible rise in temperature. 2. Use lugs or connectors of approved size for conductor. Lugs or connectors must be installed according to manufacturer's recommendations.	Z. Fence Posts A. Posts must be 6" square steel powder coated 3/16" tubing. B. Posts must have caps on top to exclude moisture. C. Gate - aluminum picket style commercial grade by Alumi-Guard with Barrette Estate gate hinge 2 1/2" kit and Y-Latch2.5, black gate and hardware. D. Gate opening must be 16 feet wide. E. All metal posts are to be grounded to separate 5/8" X 10" copper rod and cad welded. Line Posts (where called for by Engineer) A. Line posts must be 3" outside diameter galvanized pipe weighing 2.72 pounds per lineal foot. B. Roll form sections, schedule 40, or equal. C. Posts must have ball caps on top to exclude moisture. Tension Bars and Truss Rods (where called for by Engineer) A. Tension bars for braces must be hot-dipped galvanized and have a nominal size of 3/8" X 3/4". B. Truss rods for braces must be hot-dipped galvanized and be 3/8" diameter. Fittings (where called for by Engineer) All caps, beveled tension and brace bands, and connectors must be galvanized pressed steel, malleable steel, or cast steel. Appurtenances A. Engineer must approve all hardware (latching, hinges, locking devices, etc.). Samples or shop drawings must be submitted to Engineer for approval. B. All gate hardware must be heavy-duty industrial design. Hardware subject to movement must be field painted with touch-up paint specifically formulated for this purpose. C. Double swing gates must have hold-closed and hold-back devices installed to engage frames in closed and open (minimum 90 degree) positions. Latching devices must have provisions for HSEU's padlocks (purchase from HSEU).	AA. Inspection A. Verify that grading in fence location is finished without irregularities that would interfere with fence installation. B. Do not commence work until unsatisfactory conditions have been corrected. Preparation A. Measure and layout entire fence line. B. Measure parallel to surface of ground. C. Locate and mark position of posts. D. Locate line posts at equal distance spacing, not exceeding 8 feet on center. E. Locate corner posts at positions where fence changes direction more than 10 degrees. Fence Installation A. Set posts in concrete footings, use 3,500 psi concrete, at least 60 inches deep for gate posts and at least 48 inches deep for line posts. B. Slats must be attached in shadowbox configuration and board on board configuration. C. Where a new fence joins an old fence at any point, a corner post must be set at the junction (braced and anchored as corner post). D. Supply viewing access through fence for electric meter. E. Coordinate size and location of access with Engineer. The bottom of the fence must be a maximum of 4 inches from finished grade. Clear Wood Stain A. Stain all wood incorporated into the Project with an oil-based cedar tone stain approved by Engineer. B. Wood must be dry and free of all dirt, oil, grease, and other surface contaminants before staining. C. Stain wood only when the humidity and temperature are within the manufacturer's recommended application ranges for at least 24 hours after the application. D. Provide 2 coats, the first a thin coat by brush, and the second an equivalent minimum dry film thickness of 2 mils by brush or spray. Allow first coat to dry for at least 48 hours before application of second coat. Adjust A. Adjust truss rods, brace rails, and wires for rigid construction. B. Tighten hardware, fasteners, and accessories.																																														
1.08 A. Level Control System and High-Water Alarm System Backup Float Switch 1. Furnish backup float switch assembly - in polyurethane or polypropylene housing with an adequate amount of cable for continuous length to control panel. 2. Furnish polypropylene cord grips and polypropylene mounting hardware for switch assemblies. B. Air-Break Box 1. Furnish air-break box for installation prior to control panel. 2. Stainless steel materials conforming to specifications for NEMA Type 4X 304 stainless-steel enclosure. 3. Seal entrance of all conduits entering control panel to exclude sewer gases. (3M Products or better) C. Backup High-Water Alarm Light D. Furnish separate float switch assembly, signal relay, for back-up high-water alarm light function. Signal relay must complete twelve (12) VDC circuit for external alarm light. Electrical or mechanical indicator, visible on the front of interior control panel, must indicate high wet well levels exist, must energize alarm light, and must cause PLC to indicate alarm sequence. Signal relay must maintain alarm signal until wet well level has been lowered and circuit has been manually reset.	1.09 A. Backup Control System (level Control Relays) Description - Backup control system shall consist of one or more level sensing relays. Backup level control relays shall be MPElectronics or equal. B. Level sensing relays shall be supplied with the following specification: Relay shall accept 2 or 3 level inputs from a conductive level probe as approved by Engineer. C. Mounting and Installation: Din rail Base Mount D. Level Sensing Equipment (Conductive Type Probe): 1. Description - A multi-stage level sensing device designed to detect liquid level at specified intervals in tanks and interface with an electronic controller for pump control and liquid level display. Level sensing equipment shall be an MPElectronics probe. 2. Construction - Where the level sensing technique utilizes a sensing device inserted into the liquid, all cavities within each sensor unit assembly shall be PVC injected to seal the unit and prevent any moisture from entering the sensor assembly. 3. Cable - Flexible cable used for the level sensing probe shall be comprised of PVC/PVC multi-conductor construction with a common over-sheath that is water and oil resistant. Cables shall be secured to the top of probe bodies by synthetic rubber compression fittings for strain relief. Flexible cables shall be rated to physically support the combined weight of the level sensing probe and any suspended cable connected to the probe. Cable shall be continuous to control panel. 4. Mounting and Installation - Mounting connections shall be stainless-steel. Mounting assemblies for probes shall include a device available to maintenance personnel to clean the level sensing probe at desired maintenance intervals. 5. Failsafe Functionality - Probe shall contain an integral transducer to serve as additional backup to the level control system. The transducer is mounted on bottom of the probe. When used with a controller, it will provide failsafe functionality (monitoring the probe).	1.10 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.11 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.12 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.13 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.14 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.15 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.16 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.17 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.18 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.19 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.20 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.21 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.22 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.23 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.24 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.25 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.26 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.27 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.28 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.29 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.30 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.31 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.32 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.33 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.34 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.35 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.36 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.37 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.38 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.39 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.40 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.41 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.42 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.43 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.44 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.45 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.46 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.47 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.48 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.49 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.50 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.51 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.52 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.53 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.54 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.55 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.56 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.57 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.58 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.59 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.60 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.61 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.62 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.63 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.64 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.65 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.66 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.67 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.68 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.69 A. Control Panel Construction and Assembly Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following: 1. Control Panel Equipment - as previously stated. 2. LED interior lighting along the side and top. B. General Requirements	1.70 A.