

NOTICE TO BIDDERS
(Chapter 103D, HRS)

COMPETITIVE BIDS for Job No. C00BO91C, Anuenue Fisheries Research Center Annex Facility Improvements – Phase 1B (Sewer Improvements), Sand Island, Oahu shall be submitted to the Department of Land and Natural Resources, Engineering Division on the specified date and time through the Hawaii State e-Procurement (HIePRO). HIePRO is accessible through the State Procurement Office website at www.spo.hawaii.gov.

The Department of Land and Natural Resources Interim General Condition, dated October 1994, as amended, and the General Conditions –AG008, latest revision shall be made part of the specifications. Electronic copies of the General Conditions are available on the State Procurement Office website.

The project is located at 1001 Sand Island Pkwy, Honolulu, HI 96819.

The work generally consists of closure of the existing cesspool and the construction of a low pressure sewer system inclusive of a grinder pump and all the appurtenances.

To be eligible to submit a bid, the Bidder must possess a valid State of Hawaii Contractor’s license classification “A”.

A voluntary pre-bid meeting will be held at the project site, located at 1001 Sand Island Pkwy, on May 8, 2026, at 10:30 am.

All interested parties are invited to attend a State-conducted site visit that will start immediately following the pre-bid conference mentioned above. It is highly recommended that all interested parties attend the site visit to become familiar with the existing field conditions. The site visit is anticipated to start around 10:45am and end around 11:15 am. Please note that the project is located within a secure facility, so there will be no other accommodation for a site visit.

Bidders are advised that anything discussed at the pre-bid conference does not change any part of this solicitation. Any questions or discussions at the pre-bid conference are not official and all questions shall be submitted through the HIePRO solicitation or emailed to the contract person listed in HIePRO. All changes and/or clarifications to this solicitation will be done in the form of an addendum.

The estimated cost of construction is \$300,000.

The award of the contract, if it be awarded, will be subject to the availability of funds.

Since the estimated value of the cost of construction is \$250,000 or more, the apprenticeship agreement preference pursuant to Hawaii Revised Statutes §103-55.6 (ACT 17, SLH 2009) shall apply.

Should there be any questions, please refer to the HIePRO solicitation.

SECTION 02734
LOW PRESSURE SEWER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY:

- A. Work under this section consists of furnishing all labor, materials and equipment to complete the sanitary sewer system as shown on the Drawings and as specified herein.
- B. The Manufacturer shall furnish complete factory-built and tested Wetwell/Drywell Grinder Pump Station(s) consisting of two (2) grinder pump units configured for duplex operation (duty/standby or standby/duty as shown on the Drawings mounted in a basin constructed of polyethylene (HDPE) with dimensions and capacities as shown on the Contract Drawings, NEMA 6P electrical quick disconnect (EQD), pump removal system, stainless steel discharge assembly/shut-off valve, anti-siphon valve/check valve, each assembled in the basin, electrical alarm panel and all necessary internal wiring and controls. Component type grinder pump systems that require field assembly will not be acceptable due to the potential problems that can occur during field assembly. All components and materials shall be in accordance with section 2.0 of this Product Specification. For ease of serviceability, all pump, motor/grinder units shall be of like type and horsepower throughout the system.

1.2 SUBMITTALS:

- A. Submit manufacturer's certificates of compliance or conformance for pipe and pipe joint materials certifying that such materials proposed to be furnished and installed under this section conform to the requirements in the DPW Standard Specifications.
- B. Submit shop drawings detailing the equipment to be furnished including dimensional data and materials of construction.

1.3 MANUFACTURER:

- A. Grinder pump stations, complete with all appurtenances, form an integral system, and as such, shall be supplied by one grinder pump station manufacturer. The Contractor shall be responsible for the satisfactory operation of the entire system. The equipment specified shall be a product of a company experienced in the design and manufacture of grinder pumps for specific use in low pressure sewage systems. The company shall submit detailed installation and user instructions for its product, submit evidence of an established service program including complete parts and service manuals, and be responsible for maintaining a continuing inventory of grinder pump replacement parts. The Manufacturer shall provide, upon request, a reference and contact list from ten of its largest contiguous grinder pump installations of the type of grinder pumps described within this specification
- B. The Manufacturer of the grinder pump station shall be Environment One Corporation (or approved Alternate).
- C. Attention is directed to the fact that the drawings and overall system design are based on a particular piece of equipment from a particular manufacturer. These specifications are intended

to provide guidelines for standard equipment of a recognized manufacturer who already meets all the requirements of this specification.

1.4 EXPERIENCE CLAUSE:

- A. The equipment furnished hereunder shall be the product of a company experienced in the design and manufacture of grinder pumps specifically designed for use in low pressure systems. All manufacturers proposing equipment for this project shall have at least 10 years of experience in the design and manufacture of units of identical size(s) and performance to the specified units. All manufacturers proposing equipment for this project must also have not less than 500 successful installations of low pressure sewer systems utilizing grinder pumps of like type to the grinder pumps specified herein. An installation is defined as a minimum of 25 pumps discharging into a common force main which forms a low pressure sewer system. The contractor (supplier) proposing alternate equipment shall also submit, as part of the bid schedule, an installation list with contact person(s), phone number(s) and date(s) of at least 10 installations of the type of pump specified herein that have been in operation for at least 10 years.
- B. In lieu of this experience clause, the contractor (supplier) of alternate equipment will be required to submit a 5-year performance bond for 100 percent of the stipulated cost of the equipment as bid and as shown in the Bid Schedule. This performance bond will be used to guarantee the replacement of the equipment in the event that it fails within the bond period.

1.5 OPERATING CONDITIONS:

- A. The pumps shall be capable of delivering 15 GPM against a rated total dynamic head of 0 feet (0 PSIG), 11 GPM against a rated total dynamic head of 92 feet (40 PSIG), and 7.8 GPM against a rated total dynamic head of 185 feet (80 PSIG). The pump(s) must also be capable of operating at negative total dynamic head without overloading the motor(s). Under no conditions shall in-line piping or valving be allowed to create a false apparent head.
- B. In duplex configuration, each pump shall be capable of meeting the system design flow independently. When operating together, the combined capacity shall meet peak system demand conditions as indicated on the Drawings
- C. The system shall be designed such that:
- D. 1. One pump (lead) operates under normal conditions
- E. 2. The second pump (lag) automatically engages under high flow or failure conditions
- F. 3. Pumps alternate automatically between cycles to equalize run time

1.6 WARRANTY

- A. The grinder pump Manufacturer shall provide a parts and labor warranty on the complete station and accessories, including, but not limited to, the panel for a period of 24 months after notice of acceptance, but no greater than 27 months after receipt of shipment. Any manufacturing defects found during the warranty period will be reported to the Manufacturer by the Owner and will be corrected by the Manufacturer at no cost to the Owner.
- B. Only after the installation and start-up data have been successfully completed and submitted via apps.eone.com will the Owner be issued a 5-Year Certified Installation Program certificate for

each applicable DH071 or DH151 grinder pump station. This certificate is the proof of the program coverage. If submissions are not received, no additional coverage has been applied.

1.7 WARRANTY PERFORMANCE CERTIFICATION

- A. As a bid certification requirement, each bidder shall provide with their bid schedule a Warranty Performance Certification statement executed by the most senior executive officer of the grinder pump Manufacturer, which certifies a minimum of a 24-month warranty. They must further detail any exclusions from the warranty or additional cost items required to maintain the equipment in warrantable condition, including all associated labor and shipping fees, and certify that the Manufacturer will bear all costs to correct any original equipment deficiency for the effective period of the warranty. All preventive maintenance type requirements shall be included in this form as exclusions. These requirements include, but are not limited to, unjamming of grinder mechanism, periodic motor maintenance, and periodic cleaning of liquid level controls. Should the Contractor elect to submit a performance bond in lieu of the experience clause outlined above, this Warranty Performance Certification shall also be used as a criterion to evaluate the Contractor's performance over the warranty period. A Warranty Performance Certification form is included with the bid schedule and must be completed and submitted as part of the bid package. Bids with incomplete forms or missing forms will be considered nonresponsive

PART 2 - PRODUCTS

2.1 PUMP:

- A. The pump shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the progressing cavity type with a single mechanical seal. Double radial O-ring seals are required at all pump, motor, and control housing joints to minimize corrosion and create a protective barrier. Unit housings constructed of cast iron shall be fully epoxy coated to 8-10 mil Nominal dry thickness, wet applied. Housings not constructed of cast iron shall be injection molded from thermoplastic composite materials specifically selected for excellent corrosion resistance, high impact strength and superior resistance to UV degradation. The rotor shall be through-hardened, highly polished, precipitation hardened stainless steel. The stator shall be of a specifically compounded ethylene propylene synthetic elastomer. This material shall be suitable for domestic wastewater service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, excellent aging properties, and outstanding wear resistance. Buna-N is not acceptable as a stator material because it does not exhibit the properties as outlined above and required for wastewater service.
- B. Two identical pumps shall be provided within each station. Pumps shall be interchangeable and capable of independent operation.
- C. Each pump shall be provided with independent power, motor protection, and control inputs.

2.2 GRINDER

- A. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece motor shaft. The grinder impeller (cutter wheel) assembly shall be securely fastened to the pump motor shaft by means of a threaded connection attaching the grinder impeller to the motor shaft. Attachment by means of pins or keys will not be acceptable. The grinder impeller shall be a one-piece, 4140 cutter wheel of the rotating type with inductively hardened cutter teeth. The cutter teeth shall be inductively hardened to Rockwell 50 – 60c for

abrasion resistance. The shredder ring shall be of the stationary type and the material shall be white cast iron. The teeth shall be ground into the material to achieve effective grinding. The shredder ring shall have a staggered tooth pattern with only one edge engaged at a time, maximizing the cutting torque. These materials have been chosen for their capacity to perform in the intended environment as they are materials with wear and corrosive resistant properties.

- B. This assembly shall be dynamically balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to minimize clogging and jamming under all normal operating conditions including starting. Sufficient vortex action shall be created to scour the tank free of deposits or sludge banks which would impair the operation of the pump. These requirements shall be accomplished by the following, in conjunction with the pump:
1. The grinder shall be positioned in such a way that solids are fed in an upward flow direction.
 - 2.
 3. The maximum flow rate through the cutting mechanism must not exceed 4 feet per second. This is a critical design element to minimize jamming and as such must be adhered to.
 - 4.
 5. The inlet shroud shall have a diameter of no less than 5 inches. Inlet shrouds that are less than 5 inches in diameter will not be accepted due to their inability to maintain the specified 4 feet per second maximum inlet velocity which by design prevents unnecessary jamming of the cutter mechanism and minimizes blinding of the pump by large objects that block the inlet shroud.
 - 6.
 7. The impeller mechanism must rotate at a nominal speed of no greater than 1800 rpm.
- C. The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of "foreign objects," such as paper, wood, plastic, glass, wipes, rubber and the like, to finely-divided particles which will pass freely through the passages of the pump and the 1-1/4" diameter stainless steel discharge piping.

2.3 ELECTRIC MOTOR

- A. As a maximum, the motor shall be a 1 HP, 1725 RPM, 240 Volt 60 Hertz, 1 Phase, capacitor start, ball bearing, air-cooled induction type with Class F insulation, low starting current not to exceed 30 amperes and high starting torque of 8.4 foot pounds. The motor shall be press-fit into the casting for better heat transfer and longer winding life. Inherent protection against running overloads or locked rotor conditions for the pump motor shall be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. The motor protector shall be specifically investigated and listed by Underwriters Laboratories Inc. for the application. Non-capacitor start motors or permanent split capacitor motors will not be accepted because of their reduced starting torque and consequent diminished grinding capability. The wet portion of the motor armature must be 300 Series stainless steel. To reduce the potential of environmental concerns, the expense of handling and disposing of oil, and the associated maintenance costs, oil-filled motors will not be accepted. Pump operation during instances of potentially damaging high current or low voltage conditions shall be inhibited by an in-pump electrical monitoring system that has been investigated and listed by Underwriters Laboratories Inc. for the application. Motor start shall be controlled by a DC driven electromechanical relay integrated within the control compartment of the pump. Electrical monitoring shall ensure the relay operates reliably. AC Mechanical contactors for motor start are susceptible to damage from short cycling and will not be accepted

2.4 MECHANICAL SEAL

- A. The pump/core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal shall have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.

2.5 TANK AND INTEGRAL ACCESSWAY: HIGH DENSITY POLYETHYLENE CONSTRUCTION

- A. The tank shall be a Wetwell/Drywell design made of high density polyethylene, with a grade selected to provide the necessary environmental stress cracking resistance. Corrugated sections are to be made of a double wall construction with the internal wall being generally smooth to promote scouring. The corrugations of the outside wall are to be a minimum amplitude of 1-1/2" to provide necessary transverse stiffness. Any incidental sections of a single wall construction are to be 0.250" thick (minimum). All seams created during tank construction are to be thermally welded and factory tested for leak tightness. The tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth. All station components must function normally when exposed to 150 percent of the maximum external soil and hydrostatic pressure. The tank base shall be designed in a manner that does not require a concrete anti-flotation collar.
- B. The tank shall be furnished with one EPDM grommet fitting to accept a 4.50" OD DWV or Schedule 40 pipe. The tank capacities shall be as shown on the contract drawings.
- C. The Drywell accessway shall be an integral extension of the Wetwell assembly and shall include a lockable cover assembly providing low profile mounting and watertight capability. The accessway design and construction shall enable field adjustment of the station height in increments of 3" or less without the use of any adhesives or sealants requiring cure time before installation can be completed.
- D. All discharge piping shall be constructed of 304 stainless steel. The discharge shall terminate outside the accessway bulkhead with a stainless steel, 1-1/4" Female NPT fitting. The discharge piping shall include a stainless steel ball valve rated for 235 psi WOG; PVC ball valves or brass ball/gate will not be accepted. The bulkhead penetration shall be factory installed and warranted by the manufacturer to be watertight.
- E. The accessway shall include a single NEMA 6P Electrical Quick Disconnect (EQD) for all power and control functions, factory installed with accessway penetrations warranted by the manufacturer to be watertight. The EQD will be supplied with 32', 25' of useable Electrical Supply Cable (ESC) outside the station, to connect to the alarm panel. The ESC shall be installed in the basin by the manufacturer. Field assembly of the ESC into the basin is not acceptable because of potential workmanship issues. The EQD shall require no tools for connecting, seal against water before the electrical connection is made, and include radial seals to assure a watertight seal regardless of tightening torque. Plug-type connections of the power cable onto the pump housing will not be acceptable due to the potential for leaks and electrical shorts. A junction box shall not be permitted in the accessway due to the large number of potential leak points. The EQD shall be so designed to be conducive to field wiring as required. The accessway shall also include an integral 2-inch vent to prevent sewage gases from accumulating in the tank.
- F. The basin shall be sized and configured to accommodate two complete grinder pump assemblies, including adequate clearance for piping, maintenance access, and removal of either pump independently.

- G. Basin volume shall be sufficient to prevent excessive pump cycling and to allow proper duplex operation, including lag pump activation volume.

2.6 CHECK VALVE

- A. The pump discharge shall be equipped with a factory installed, gravity operated, flapper-type integral check valve built into the stainless steel discharge piping. The check valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Moving parts will be made of a 300 Series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low back-pressure. The valve body shall be an injection molded part made of a thermoplastic composite resin. The valve shall be rated for continuous operating pressure of 235 psi. Ball-type check valves are unacceptable due to their limited sealing capacity in slurry applications.

2.7 ANTI-SIPHON VALVE

- A. The pump discharge shall be equipped with a factory-installed, gravity-operated, flapper-type integral anti-siphon valve built into the stainless steel discharge piping. Moving parts will be made of 300 Series stainless steel and fabric-reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly, providing a maximum degree of freedom to ensure proper operation even at a very low pressure. The valve body shall be injection-molded from a thermoplastic composite resin. Holes or ports in the discharge piping are not acceptable anti-siphon devices due to their tendency to clog from the solids in the slurry being pumped. The anti-siphon port diameter shall be no less than 60% of the inside diameter of the pump discharge piping.

2.8 CORE UNIT

- A. The grinder pump station shall have a cartridge type, easily removable core assembly consisting of pump, motor, grinder, all motor controls, check valve, anti-siphon valve, level controls, electrical quick disconnect and wiring. The core unit shall be installed in the basin by the manufacturer. Field assembly of the pump and controls into the basin is not acceptable because of potential workmanship issues and increased installation time. In some cases, stations taller than 96" may be shipped on their side without the cores assembled in the basin for freight purposes but this is the only exception. The core unit shall seal to the tank deck with a stainless steel latch assembly. The latch assembly must be actuated utilizing a single quick release mechanism requiring no more than a half turn of a wrench. The watertight integrity of each core unit shall be established by a 100 percent factory test at a minimum of 5 PSIG.

2.9 CONTROLS

- A. The duplex grinder pump system shall be provided with a fully integrated control system capable of:
 1. Automatic alternation of pumps (lead/lag control)
 2. Automatic lag pump start upon:
 3. a. High liquid level
 4. b. Failure of lead pump
 5. Independent pump operation and protection
 6. Simultaneous operation of both pumps when required

- B. All necessary motor starting controls shall be located in the core unit. Locating the motor starting controls in a separate enclosure is not acceptable. The wastewater level sensing controls shall be housed in a separate enclosure from motor starting controls. The level sensor housing must be sealed via a radial type seal; solvents or glues are not acceptable. The level sensing control housing must be integrally attached to pump assembly so that it may be removed from the station with the pump and in such a way as to minimize the potential for the accumulation of grease and debris accumulation, etc. The level sensing housing must be constructed from a high-impact thermoplastic composite. The use of PVC for the level sensing housing is not acceptable.
- C. Non-fouling wastewater level controls for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air column connected to a pressure switch. The air column shall be molded from a thermoplastic composite suitable for use in wastewater and with excellent impact resistance. The air column shall have only a single connection between the water level being monitored and the pressure switch. Any connections are to be sealed radially with redundant O-rings. The level detection device shall have no moving parts in direct contact with the wastewater and shall be integral to the pump core assembly in a single, readily-exchanged unit. Depressing the push to run button must operate the pump even with the level sensor housing removed from the pump.
- D. All fasteners throughout the assembly shall be 300 Series stainless steel. High-level sensing will be accomplished in the manner detailed above by a separate air column sensor and pressure switch of the same type. Closure of the high-level sensing device will energize an alarm circuit as well as a redundant pump-on circuit. For increased reliability, pump ON/OFF and high-level alarm functions shall not be controlled by the same switch. Float switches of any kind, including float trees, will not be accepted due to the periodic need to maintain (rinsing, cleaning) such devices and their tendency to malfunction because of incorrect wiring, tangling, grease buildup, and mechanical cord fatigue. To assure reliable operation of the pressure switches, each core shall be equipped with a factory installed equalizer diaphragm that compensates for any atmospheric pressure or temperature changes. Tube or piping runs outside of the station tank or into tank-mounted junction boxes providing pressure switch equalization will not be permitted due to their susceptibility to condensation, kinking, pinching, and insect infestation. The grinder pump will be furnished with a 6 conductor 14 gauge, type SJOW cable, pre-wired and watertight to meet UL requirements with a FACTORY INSTALLED NEMA 6P EQD half attached to it.

2.10 STAINLESS STEEL CURB STOP/CHECK VALVE ASSEMBLY

- A. The curb stop shall be pressure-tight in both directions. The ball valve actuator shall include position stop features at the fully opened and closed positions. The curb stop/check valve assembly shall be designed to withstand a working pressure of 235 psi.
- B. The stainless steel check valve shall be integral with the curb stop valve. The check valve will provide a full-ported 1-1/4" passageway and shall introduce minimal friction loss at maximum rated flow. The flapper hinge design shall provide a maximum degree of freedom and ensure seating at low back pressure.
- C. Thermoplastic Composite Fittings – All plastic fitting components are to be in compliance with applicable ASTM standards.
- D. All pipe connections shall be made using compression fitting connections including a Buna-N O-ring for sealing to the outside diameter of the pipe. A split-collet locking device shall be integrated into all pipe connection fittings to securely restrain the pipe from hydraulic pressure and external loading caused by shifting and settling.

- E. Curb Boxes – Curb boxes shall be constructed of ABS, conforming to ASTM-D 1788. Lid top casting shall be cast iron, conforming to ASTM A-48 Class 25, providing magnetic detectability, and be painted black. All components shall be inherently corrosion-resistant to ensure durability in the ground. Curb boxes shall provide height adjustment downward (shorter) from their nominal height.
- F. High Density Polyethylene Pipe (Supplied by others) – Pipe shall be have a working pressure of 160 psi minimum and shall be classified SDR per ASTM D 3035.
- G. Factory Test – The stainless steel, combination curb stop/check valve component shall be 100 percent hydrostatically tested to 150 psi in the factory.
- H. Construction Practices – Pipe shall be stored on clean, level ground to prevent undue scratching or gouging of the pipe. If the pipe must be stacked for storage, such stacking should be in accordance with the pipe manufacturer’s recommendations. The pipe should be handled in such a manner that it is not damaged by being dragged over sharp objects or cut by chokers or lifting equipment.
- I. Segments of pipe having cuts or gouges in excess of 10 percent of the wall thickness of the pipe shall be cut out and removed. The undamaged portions of the pipe shall be rejoined using the butt fusion joining method. Sections of polyethylene pipe should be joined into continuous lengths on the job site above ground. The joining method shall be the butt-fusion method and shall be performed in strict accordance with the pipe manufacturer’s recommendations. The butt-fusion equipment used in the joining procedure shall be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, fusion temperature, alignment, and fusion pressure.
- J. Fused segments of pipe shall be handled so as to avoid damage to the pipe. When lifting fused sections of pipe, chains or cable-type chokers should be avoided. Nylon slings are preferred. Spreader bars should be used when lifting long, fused sections. Care should be exercised to avoid cutting or gouging the pipe.
- K. Assemble the compression fittings according to the fitting manufacturer’s recommendations.
- L. The trench and trench bottom should be constructed in accordance with ASTM D 2321. Embedment materials should be Class I, Class II or Class III materials as defined in ASTM D 2321. The use of Class IV and/or Class V materials for embedment is not recommended and should be allowed only with the approval of the Engineer. Bedding of the pipe should be performed in accordance with ASTM D 2321. Compaction should be as specified in ASTM D 2321. Deviations from the specified compaction shall be approved by the SPECIFYING ENGINEER.
- M. Haunching and initial backfill should be as specified in ASTM D 2321 using Class I, Class II or Class III materials. In cases where a compaction of 85 percent Standard Proctor Density is not attainable, the Engineer may wish to increase the SDR of the pipe to provide adequate stiffness. ASTM D 2321 sections titled “Minimum Cover for Load Application,” “Use of Compaction Equipment” and “Removal of Trench Protection” should apply.

2.11 ALARM PANEL

- A. The system shall include a DUPLEX CONTROL PANEL designed to operate two pumps.

- B. The control panel shall include:
 1. Separate circuit breakers for each pump
 2. Alternating control relay/system
 3. Pump run indicators (Pump 1 / Pump 2)
 4. High level alarm (audible and visual)
 5. Pump failure indication
 6. Manual HAND-OFF-AUTO controls for each pump

- C. Each grinder pump station shall include a NEMA 4X, UL-listed alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic composite to ensure corrosion resistance. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel. The enclosure shall not exceed 10.5" W x 14" H x 7" D, or 12.5" W x 16" H x 7.5" D if certain options are included.

- D. The alarm panel shall contain one 15-amp, double-pole circuit breaker for the pump core's power circuit and one 15-amp, single-pole circuit breaker for the alarm circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.

- E. The alarm panel shall include the following features: external audible and visual alarm; push-to-run switch; push-to-silence switch; redundant pump start; and high level alarm capability. The alarm sequence is to be as follows when the pump and alarm breakers are on:
 1. When liquid level in the sewage wet-well rises above the alarm level, the contacts on the alarm pressure switch activate, audible and visual alarms are activated, and the redundant pump starting system is energized.
 - 2.
 3. The audible alarm may be silenced by means of the externally mounted, push-to-silence button.
 - 4.
 5. Visual alarm remains illuminated until the sewage level in the wet-well drops below the "off" setting of the alarm pressure switch.

- F. The visual alarm lamp shall be inside a red, oblong lens at least 3.75" L x 2.38" W x 1.5" H. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. The audible alarm shall be externally mounted on the bottom of the enclosure, capable of 93 dB @ 2 feet. The audible alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).

- G. The entire alarm panel, as manufactured and including any of the following options shall be listed by Underwriters Laboratories, Inc

2.12 ELECTRICAL COORDINATION

- A. Electrical service, panelboards, and conductors shall be sized to accommodate simultaneous operation of both pumps.

- B. Coordinate duplex pump requirements with Division 16 to verify:

- C. 1. Electrical capacity

- D. 2. Panel capacity
- E. 3. Breaker sizing
- F. 4. Conduit sizing

PART 3 - EXECUTION

3.1 FACTORY TEST

- A. Each grinder pump shall be submerged and operated for 1.5 minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the anti-siphon valve, check valve, discharge assembly and each unit's dedicated level controls and motor controls. All factory tests shall incorporate each of the above listed items. Actual appurtenances and controls which will be installed in the field shall be particular to the tested pump only. A common set of appurtenances and controls for all pumps is not acceptable. Certified test results shall be available upon request showing the operation of each grinder pump at two different points on its curve. Additional validation tests include: integral level control performance, continuity to ground and acoustic tests of the rotating components.
- B. The Engineer reserves the right to inspect such testing procedures with representatives of the Owner, at the Grinder Pump Manufacturer's facility.
- C. All completed stations shall be factory leak tested to assure the integrity of all joints, seams and penetrations. All necessary penetrations such as inlets, discharge fittings and cable connectors shall be included in this test along with their respective sealing means (grommets, gaskets etc.).

3.2 CERTIFIED SERVICE PROGRAM:

- A. The grinder pump Manufacturer shall provide a program implemented by the Manufacturer's personnel as described in this specification to certify the service company as an authorized serviced center. As evidence of this, the Manufacturer shall provide, when requested, sufficient evidence that they have maintained their own service department for a minimum of 30 years and currently employ a minimum of five employees specifically in the service department.
- B. As part of this program, the Manufacturer shall evaluate the service technicians as well as the service organization annually. The service company will be authorized by the Manufacturer to make independent warranty judgments. The areas covered by the program shall include, as a minimum.
 - 1. Pump Population Information — The service company will maintain a detailed database for the grinder pumps in the territory that tracks serial numbers by address.
 - 2.
 - 3. Inventory Management — The service company must maintain an appropriate level of inventory (pumps, tanks, panels, service parts, etc.) including regular inventory review and proper inventory labeling. Service technicians will also maintain appropriate parts inventory and spare core(s) on service vehicles.
 - 4.
 - 5. Service Personnel Certification — Service technicians will maintain their level-specific certification annually. The certifications are given in field troubleshooting, repair, and training.
 - 6.

7. Service Documentation and Records — Start up sheets, service call records, and customer feedback will be recorded and available by the service company.
- 8.
9. Shop Organization — The service company will keep its service shop organized and pumps will be tagged with site information at all times. The shop will have all required equipment, a test tank, and cleaning tools necessary to service pumps properly.

3.3 DELIVERY

- A. All grinder pump units will be delivered to the job site 100 percent completely assembled, including testing, ready for installation. Field installation of the pump in tanks under 96 inches is not allowed. Field installation of the level sensor into the tank is not allowed. Grinder pump stations will be individually mounted on wooden pallets.

3.4 INSTALLATION

- A. Earth excavation and backfill are specified under SECTION 02220 – Excavation and Fill, but are also to be done as a part of the work under this section, including any necessary sheeting and bracing.
- B. The Contractor shall be responsible for handling ground water to provide a firm, dry subgrade for the structure, and shall guard against flotation or other damage resulting from general water or flooding.
- C. The grinder pump stations shall not be set into the excavation until the installation procedures and excavation have been approved by the Engineer.
- D. Remove packing material. User instructions must be given to the Owner. Hardware supplied with the unit, if required, will be used at installation. The basin will be supplied with a standard 4" inlet grommet (4.50" OD) for connecting the incoming sewer line. Appropriate inlet piping must be used. The basin may not be dropped, rolled or laid on its side for any reason.
- E. Installation shall be accomplished so that 1 inch to 4 inches of accessway, below the bottom of the lid, extends above the finished grade line. The finished grade shall slope away from the unit. The diameter of the excavated hole must be large enough to allow adequate clearance for field connections, backfill installation and compaction.
- F. A 6" inch minimum layer of naturally rounded aggregate, clean and free flowing, with particle size of not less than 1/8" or more than 3/4" shall be used as bedding material under each unit.
- G. A concrete anti-flotation collar, as detailed on and sized according to the manufacturer's instructions, shall be required and shall be pre-cast to the grinder pump tank or poured in place. Each grinder pump station with its pre-cast anti-flotation collar shall have a minimum of three lifting eyes for loading and unloading purposes. All Model DH071 tanks have been designed such that a concrete anti-flotation collar is not required. Other D-Series Models may require an anti-flotation collar.
- H. The Contractor will provide and install a 4-foot piece of 4-inch SCH 40 PVC pipe with water tight cap, to stub-out the inlet for the property owners' installation contractor, as depicted on the contract drawings.

- I. E/One requires that an E/One Uni-Lateral assembly (E/One part number NB0184PXX or NC0193GXX) or E/One Redundant Check Valve (E/One part number PC0051GXX) be installed in the pipe lateral outside the home between the pump discharge and the street main on all installations.
- J. The electrical enclosure shall be furnished, installed and wired to the grinder pump station by the Contractor. An alarm device is required on every installation, there shall be no exceptions.
- K. The Contractor shall mount the alarm device in a conspicuous location, as per national and local codes. The alarm panel will be connected to the grinder pump station by a length of 6-conductor type TC cable as shown on the contract drawings. The power and alarm circuits must be on separate power circuits. The grinder pump stations will be provided with 32 feet, 25 feet of useable, electrical supply cable to connect the station to the alarm panel. This cable shall be supplied with a factory installed EQD half to connect to the mating EQD half on the core.

3.5 BACKFILL REQUIREMENTS

- A. Proper backfill is essential to the long-term reliability of any underground structure. Several methods of backfill are available to produce favorable results with different native soil conditions. The most highly recommended method of backfilling is to surround the unit to grade using Class I or Class II backfill material as defined in ASTM 2321.
- B. Class 1, angular crushed stone offers an added benefit in that it doesn't need to be compacted. Class II, naturally rounded stone, may require more compactive effort, or tamping, to achieve the proper density. If the native soil condition consists of clean compactible soil, with less than 12 percent fines, free of ice, rocks, roots and organic material, it may be an acceptable backfill. Such soil must be compacted in lifts not to exceed one foot to reach a final Proctor Density of between 85 percent and 90 percent. Non-compactible clays and silts are *not* suitable backfill for this or any underground structure such as inlet or discharge lines. If you are unsure of the consistency of the native soil, it is recommended that a geotechnical evaluation of the material is obtained before specifying backfill.
- C. Another option is the use of a flowable fill (i.e., low slump concrete). This is particularly attractive when installing grinder pump stations in augured holes where tight clearances make it difficult to assure proper backfilling and compaction with dry materials. Flowable fills should not be dropped more than 4 feet from the discharge to the bottom of the hole to avoid separation of the constituent materials.
- D. Improper backfilling may result in damaged stations. The grinder pump station shall be installed at a minimum depth from grade to the top of the 1 1/4" discharge line, to assure maximum frost protection. The finish grade line shall be 1" to 4" below the bottom of the lid, and final grade shall slope away from the grinder pump station.
- E. All restoration will be the responsibility of the Contractor. Per unit costs for this item shall be included in the Contractor's bid price for the individual grinder pump stations. The properties shall be restored to their original condition in all respects, including, but not limited to, curb and sidewalk replacement, landscaping, loaming and seeding, and restoration of the traveled ways.

3.6 START-UP AND FIELD TESTING

- A. The Manufacturer shall provide the services of qualified factory trained technicians who shall inspect the placement and wiring of each station, perform field tests as specified herein, and

instruct the Owner's personnel in the operation and maintenance of the equipment before the stations are accepted by the Owner.

- B. All equipment and materials necessary to perform testing shall be the responsibility of the Contractor. This includes, as a minimum, a portable generator and power cable (if temporary power is required), water in each basin (filled to a depth sufficient to verify the high level alarm is operating), and opening of all valves in the system. These steps shall be completed prior to the qualified factory trained technicians arrival on site.
- C. Upon completion of the installation, the authorized factory technician(s) will perform the following test on each station:
 - 1. Make certain the discharge shut-off valve in the station is fully open.
 - 2.
 - 3. Turn ON the alarm power circuit and verify the alarm is functioning properly.
 - 4. Turn ON the pump power circuit. Initiate the pump operation to verify automatic "on/off" controls are operative. The pump should immediately turn ON.
 - 5. Consult the Manufacturer's Service Manual for detailed start-up procedures.
- D. Upon completion of the start-up and testing, the Manufacturer shall submit to the Engineer the start-up authorization form describing the results of the tests performed for each grinder pump station. Final acceptance of the system will not occur until authorization forms have been received for each pump station installed and any installation deficiencies corrected
- E. During start-up, the following shall be verified:
 - F. 1. Alternating lead/lag pump operation
 - G. 2. Lag pump activation at high liquid level
 - H. 3. Simultaneous operation of both pumps
 - I. 4. Alarm conditions for:
 - J. - High water level
 - K. - Pump failure

PART 4 - EXECUTION

4.1 MANUALS

- A. The Manufacturer shall supply four copies of Operation and Maintenance Manuals to the Owner, and one copy of the same to the Engineer.

END OF SECTION