SECTION 46 24 00

WASTEWATER GRINDER PUMP STATIONS

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\*\* NOTE TO SPECIFIER \*\* Environment One Corporation; Wastewater Collection and Transport.  
This section is based on the products of Environment One Corporation, which is located at:  
2773 Balltown Rd.  
Niskayuna, NY 12309  
Tel: 518-346-6161  
Email: [request info ()](https://admin.arcat.com/users.pl?action=UserEmail&company=Environment+One+Corporation&coid=49527&rep=&fax=&message=RE:%20Spec%20Question%20(11330eon):%20%20&mf=)  
Web: <http://www.eone.com>   
 [ [Click Here](https://www.arcat.com/arcatcos/cos49/arc49527.html) ] for additional information.  
Environment One Corporation (E/One) is an operating company of Precision Castparts Corp. (PCC), a worldwide manufacturer of complex metal parts and industrial products. With corporate headquarters in New York and regional offices and distribution throughout the industrialized world, E/One is a manufacturer and provider of products and services for the disposal of residential sanitary waste and Utility Systems for the protection and performance optimization of electric utility assets.

1. GENERAL
   1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.

* + 1. Grinder Pump Stations Wetwell / Drywell
       1. Indoor units.
       2. Hardwired. (D series) (W series)
       3. Wireless. (D series) (W series)
  1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 22 14 26.13 - Roof Drains.
  1. SUBMITTALS:
     1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
     2. Product Data:
        1. Manufacturer's data sheets on each product to be used.
        2. Preparation instructions and recommendations.
        3. Storage and handling requirements and recommendations.
        4. Typical installation methods.
        5. Manuals: 4 copies of Operation and Maintenance Manuals to Owner, and one copy to the Engineer.
     3. Evidence of an established service program including complete parts and service manuals, and proof manufacturer maintains a continuing inventory of grinder pump replacement parts.
     4. Shop Drawings: Include six sets of shop drawings detailing equipment to be furnished including dimensional data, materials, construction, and finish. Include relationship with adjacent construction.
        1. Engineer: Review shop Drawing and return two copies as accepted, or with requested modifications. Upon receipt of accepted shop drawings, Manufacturer may proceed with fabrication of equipment.
  2. QUALITY ASSURANCE
     1. Manufacturer Qualifications: Company specializing the design and manufacture of grinder pumps for specific use in low pressure sewage systems, with 10 years' experience.
        1. Provide, a reference and contact list from ten of its largest contiguous grinder pump installations of the type of grinder pumps described within this specification.
        2. Must have 500 successful installations of low pressure sewer systems utilizing grinder pumps. An Installation: 25 pumps discharging into common force main.
        3. In lieu of experience, Supplier of may submit a 5 year performance bond for 100 percent of stipulated equipment cost as bid and as shown in Bid Schedule. Bond guarantees equipment replacement in event it fails within bond period.
     2. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
     3. Source Limitations: Provide each product type from a single manufacturing source to ensure uniformity. Grinder pump stations with appurtenances, to be supplied by one grinder pump station manufacturer. Contractor is responsible for satisfactory operation of entire system.
  3. DELIVERY, STORAGE, AND HANDLING

\*\* NOTE TO SPECIFIER \*\* Applies to outdoor units. Delete if not required.

* + 1. Grinder pump units will be delivered to job site completely assembled, including testing, ready for installation. Field installation of pump in tanks under 96 inches is not allowed. Field installation of level sensor into tank is not allowed. Grinder pump stations will be individually mounted on wooden pallets.

\*\* NOTE TO SPECIFIER \*\* Applies to indoor units. Delete if not required.

* + 1. Grinder pump core units, including level controls, will be delivered to job site completely assembled, including testing, ready for installation. Grinder pump cores will be shipped separately from tanks. Installing cores into tanks is the only assembly step required Grinder pump cores must be boxed for ease of handling.
    2. Store and handle in compliance with manufacturer's instructions and recommendations.
    3. Protect from damage due to weather, excessive temperature, and construction operations.
  1. WARRANTY:
     1. Manufacturer's parts and labor warranty on complete station and accessories, including, the panel for 24 months after notice of Owner's acceptance, but no greater than 27 months after receipt of shipment. Manufacturing defects found during warranty period will be reported to Manufacturer by Owner and corrected by Manufacturer at no cost to the Owner.

\*\* NOTE TO SPECIFIER \*\* The following paragraph applies to hardwired versions. Delete if not required.

* + 1. Certified Installation Program: At no charge, and the same coverage as E/One's standard warranty, may granted for residential applications of the DH071 and DH151 grinder pump stations when installation uses the following:
       1. Uni-Lateral Stainless Steel Curb Stop Assembly.
       2. Sentry Protect Plus alarm panel.
       3. Certified Installation and Start-Up forms have been successfully completed and submitted. Located at apps.eone.com
       4. After installation and start-up data have been completed and submitted via apps.eone.com, the Owner will be issued a 5 Year Certified Installation Program certificate for each applicable grinder pump station. Certificate is proof of program coverage. If submissions are not received, no additional coverage has been applied.
    2. Warranty Performance Certification: Bidders must provide with bid schedule a Warranty Performance Certification statement executed by an executive officer of grinder pump Manufacturer, certifying a 24 month warranty. Detail exclusions from warranty or additional cost items required to maintain equipment in warrantable condition, including associated labor and shipping fees. Certify Manufacturer will bear costs to correct original equipment deficiency for effective period of warranty. Include preventive maintenance type requirements. These include, but not limited to, unjamming of grinder periodic motor maintenance, and periodic cleaning of liquid level controls. Should Supplier elect to submit a performance bond in lieu of experience clause, this Warranty Performance Certification will be used as a criterion to evaluate Supplier's performance over warranty period. Bids with incomplete forms or missing forms will be considered nonresponsive.

1. PRODUCTS
   1. MANUFACTURERS
      1. Acceptable Manufacturer: Environment One Corporation, which is located at: 2773 Balltown Rd.; Niskayuna, NY 12309; Tel: 518-346-6161; Email: [request info ()](https://admin.arcat.com/users.pl?action=UserEmail&company=Environment+One+Corporation&coid=49527&rep=&fax=&message=RE:%20Spec%20Question%20(11330eon):%20%20&mf=); Web: <http://www.eone.com>

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
    2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements and as specified below. If proposing a substitution, Supplier must submit the following:
       1. A complete description of changes necessary to system design, a complete submittal package as outlined in "Submittals: Article in PART 1, a system hydraulic analysis based on proposed pumps, including pipe sizes, flows, velocities, retention times and number and location of recommended valves and cleanouts, if any, a list of exceptions to this specification, and demonstration of compliance with "Quality Assurance" Article 15 business days in advance of bid date.
       2. Installation list with contact persons, phone numbers, and dates of at least 10 installations of type of pumps specified that have been in operation for 10 years.
  1. PERFORMANCE AND DESIGN REQUIREMENTS
     1. Pumps must deliver 15 gpm against a rated total dynamic head of 0 feet (0 psig), 11 gpm against a rated total dynamic head of 92 ft (40 psig), and 7.8 gpm against a rated total dynamic head of 185 ft (80 psig). Pumps must be capable of operating at negative total dynamic head without overloading the motors. Under no conditions shall in-line piping or valving be allowed to create a false apparent head.
     2. Supply 1 grinder pump core for every 50 grinder pump stations installed; with operational controls, level sensors, check valve, anti-siphon valve, pump/motor unit, and grinder.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. GRINDER PUMP STATIONS WETWELL / DRYWELL - INDOOR UNIT
     1. Grinder Pump Stations: Factory-built, tested and mounted in a polyethylene basin. Includes a pump removal system, discharge assembly/shut-off valve, anti-siphon valve/check valve assembled within basin, electrical alarm panel, and necessary internal wiring and controls. For serviceability, pump, motor/grinder units to be of like type and horsepower.
        1. Grinder pump systems requiring field assembly are not acceptable.
     2. Pump: Custom designed, integral, vertical rotor, motor driven, solids handling pump of progressing cavity type with single mechanical seal. Double Radial O-ring Seals: At casting joints.
        1. Pump Castings: Cast iron. Finish: Wet applied epoxy, 8-10 mil dry thickness.
        2. Rotor: Through-hardened, highly polished, precipitation hardened stainless steel.
        3. Stator: Compounded ethylene propylene synthetic elastomer suitable for domestic wastewater service. Physical Properties: Thermally stable with high tear, abrasion, grease, water, detergent, and wear resistance. Excellent aging properties,
           1. Buna-N is not acceptable as a stator material.
        4. Controls: Installed on pump by manufacturer.
     3. Grinder: Placed immediately below pumping elements. Direct-driven by one-piece motor shaft. Reduces components in domestic sewage, including "foreign objects," such as paper, wood, plastic, glass, wipes, rubber, and the like, to finely-divided particles which pass freely through passages of pump and the 1-1/4 inch diameter stainless steel discharge piping.
        1. Impeller (cutter wheel) assembly: Fastened to pump motor shaft by threaded connection. Attachment by means of pins or keys will not be acceptable.
           1. Rotating Cutter Wheel: One-piece, 4140 with teeth inductively hardened to Rockwell 50 to 60c for abrasion resistance.
           2. Shredder Ring: Stationary, made of white cast iron. Teeth, ground into material to achieve effective grinding, to have a staggered pattern with only one edge engaged at a time, maximizing cutting torque.
           3. Nominal speed of no greater than 1800 rpm.
        2. Assembly to be dynamically balanced and operate without objectionable noise or vibration over entire range of operating pressures.
        3. Construct to minimize clogging and jamming under normal conditions and starting.
        4. Create vortex action to scour tank free of deposits or sludge banks.
        5. Maximum flow rate through cutting mechanism: 4 fps to minimize jamming.
        6. Inlet Shroud: 5 inch diameter. Less than 5 inches will not be accepted.
        7. Position grinder such that solids are fed in an upward flow direction.
     4. Electric Motor: 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 ft-lbs.
        1. Press-fit into casting for better heat transfer and longer winding life. Protection against running overloads or locked rotor conditions for pump motor is provided by an automatic-reset, integral thermal overload protector incorporated into motor. Motor protector to be investigated and listed by Underwriters Laboratories Inc.
           1. Non-capacitor start or permanent split capacitor motors are not acceptable.
           2. Wet portion of motor Armature: 300 Series stainless steel.
           3. Oil-filled motors are not acceptable.
           4. Pump operation during potentially damaging high current or low voltage conditions: Inhibited by in-pump electrical monitoring system, investigated, and listed by Underwriters Laboratories Inc.
           5. Motor Start: Controlled by DC driven electromechanical relay integrated within control compartment of pump. Electrical monitoring ensures relay operates reliably. AC Mechanical contactors for motor start are not acceptable.
     5. Mechanical Seal: Mechanical shaft seal to prevent leakage between motor and pump. Seal: A stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.
     6. Tank: Wetwell/drywell rotational molded polyethylene, of a grade providing necessary environmental stress cracking resistance. Nominal Tank Wall: 0.50 inch.
        1. One 4 inch, socket glue type inlet valve for connection to PVC building sewer, 4.50 inch OD. Tank Capacity: 91 gallons. Capable of withstanding static heads of 10 ft without leaking or causing permanent structural damage.
        2. Cover: Aesthetically pleasing, rotationally molded, supplied with tank to protect and conceal pump core, discharge valve, and equalizer diaphragm.
        3. Station to have necessary penetrations molded in and factory sealed. No field penetrations are acceptable.
        4. Discharge Piping: SCH 80 PVC pipe and terminate with a 1-1/4 inch female NPT fitting. Discharge piping to include a PVC ball valve rated for 235 psi WOG.
        5. A 2 inch PVC vent preventing sewage gases from accumulating in tank.
        6. A junction box is not permitted in the tank.
     7. Discharge Disconnect/Valve: Discharge fittings and piping to be polypropylene, EPDM or PVC. Discharge Assembly: Includes a shut-off valve rated for 235 psi WOG and a quick disconnect feature simplifying installation and pump removal.
     8. Electrical Quick Disconnect (EQD): Factory-installed NEMA 6P electrical quick disconnect for power and control functions. Conducive to field wiring as required. Supplied with 12 ft electrical supply cable (ESC) to connect to alarm panel.
        1. No tools required for assembly, sealed against water before electrical connection is made, and includes radial seals to assure a watertight seal regardless of tightening torque. Plug-type connections of power cable onto pump housing are not acceptable. Junction Boxes are not acceptable.
     9. Check Valve on Pump Discharge: Gravity, flapper-type check valve built into discharge piping. Provides a full-ported passageway when open, with friction loss of less than 6 inches of water at maximum rated flow. Rating: Continuous operating pressure of 235 psi. Moving Parts: 300 Series stainless steel and fabric reinforced synthetic elastomer. Hinge: Nonmetallic and part of flapper assembly providing a high degree of freedom ensuring seating even at very low back-pressure. Valve Body: Injection molded thermoplastic resin.
        1. Ball type check valves are not acceptable.
     10. Anti-Siphon Valve on Pump Discharge: Factory-installed, gravity, flapper-type anti-siphon valve built into discharge piping. Moving Parts: 300 Series stainless steel and fabric-reinforced synthetic elastomer. Hinge: Nonmetallic and part of flapper assembly, providing a high degree of freedom ensuring proper operation at very low pressure. Valve Body: Injection-molded thermoplastic resin. Port Diameter: 60 percent of inside diameter of pump discharge piping. Holes or ports in discharge piping are not acceptable anti-siphon devices.
     11. Core Unit of Grinder Pump Station: Cartridge type, removable assembly consisting of pump, motor, grinder, motor controls, check valve, anti-siphon valve, level control, electrical quick disconnect and wiring. Seals to tank deck with stainless steel bolts. Watertight Integrity of Core Unit: Established by 100 percent factory test at minimum of 5 psig.
     12. Controls: Fasteners to be 300 Series stainless steel unless specified otherwise.
         1. Motor Starting Controls: Located in cast iron enclosure of core unit secured by stainless steel fasteners. Locating controls in plastic enclosure is not acceptable.
         2. Level Sensing Controls: Housed in separate enclosure from motor starting controls. Level Sensor Housing: High-impact thermoplastic copolymer over-molded with a thermo plastic elastomer. Sealed via a radial type seal. Integrally attached to pump assembly in a way as to minimize potential for accumulation of grease and debris, and removable from station with the pump.
         3. Non-Fouling Wastewater Level Controls for Controlling Pump Operation: Monitor pressure changes in an integral air column connected to a pressure switch.
            1. Air Column: Molded from thermoplastic elastomer for use in wastewater and impact resistance. Single connection between water level being monitored and pressure switch. Connections: Sealed radially with redundant O-rings.
         4. Level Detection Device: No moving parts in direct contact with wastewater and integral to pump core assembly. Depressing push to run button must operate the pump even with level sensor housing removed from pump.
         5. High-Level Sensing: Accomplish as detailed above, by a separate air column sensor and pressure switch of same type. Closure of high-level sensing device will energize alarm circuit and redundant pump-on circuit. Pump ON/OFF and high-level alarm functions are not to be controlled by the same switch. To assure reliable operation of pressure switches, equip each core with a factory installed equalizer diaphragm that compensates for any atmospheric pressure or temperature changes.
            1. Float switches and float trees are not acceptable.
            2. Tube or piping runs outside of station tank or into tank-mounted junction boxes providing pressure switch equalization are not acceptable.
         6. Furnish grinder pump with a 6 conductor, type SJOW cable, pre-wired and watertight to meet UL requirements with a Factory installed NEMA 6P EQD half attached to it.
     13. Stainless Steel Curb Stop / Check Valve Assembly (Uni-Lateral): Pressure-tight in both directions. Ball valve actuator includes stop features at fully opened and closed positions. Curb stop / check valve assembly to withstand a working pressure of 235 psi.
         1. Stainless steel check valve: Integral with curb stop valve. Provides a full-ported 1-1/4 inch passageway and introduce minimal friction loss at maximum rated flow. Flapper Hinge: Provides maximum degree of freedom and seating at low back pressure.
         2. Engineered Thermoplastic Fittings: To comply with applicable ASTM standards.
         3. Pipe Connections: Compression fittings including a Buna-N O-ring for sealing to outside pipe diameter. Integrate split-collet locking devices into connection fittings to restrain pipe from hydraulic pressure and external loading.
         4. Curb Boxes: ABS per ASTM D1788. Lid: Cast iron, per ASTM A48 Class 25, providing magnetic detectability, and painted black. Components: Inherently corrosion-resistant. Provide height adjustment downward from nominal height.
         5. High Density Polyethylene Pipe: Supplied by others. Working Pressure: 160 psi and classified SDR per ASTM D3035.
         6. Pipe Dimensions: Standard Dimension Ratio (SDR) of pipe to be as specified by Specifying Engineer. SDR 7, 9 and 11 fittings are available from Manufacturer.
         7. Factory Test Curb stop/check Valve: To 100 percent hydrostatically tested to 150 psi.

\*\* NOTE TO SPECIFIER \*\* Remote Sentry is optional. Delete if not required.

* + 1. Remote Sentry: Grinder pump manufacturer will supply a remote, indoor mounted, high level alarm module with each grinder pump station. Module incorporates a visual and audible (70 Db) high level alarm, a membrane covered push to silence audible alarm button, and a membrane covered push to test visual and audible alarm button housed in a low profile, neutral-colored case placed in conspicuous location within residence by installing contractor.
       1. Case Dimension (WxHxD): 5 x 3 x 1 inches. Connect module to Indoor Grinder Pump Control Panel. Indicate a high-level alarm with or without AC power at grinder pump.
       2. Indoor Alarm Unit: Renewable lithium battery for continued operation without AC power. Low Battery Voltage: LED blinks and audible alarm pulses creating short beeps. Push-to-silence will not change this condition until batteries are replaced.
          1. Visual and Audible alarm: Resets when high level alarm condition is corrected.
       3. Remote Sentry is provided with 100 ft of 22 ga signal wire, factory-wired and sealed into station's alarm panel.
    2. Alarm Panel: Each grinder pump station includes a NEMA 4X Thermoplastic Polyester Enclosure UL-listed alarm panel suitable for wall or pole mounting.
       1. NEMA 4X Enclosure (WxHxD): 10.5 x 14 x 7 inches, or 12.5 x 16 x 7.5 if certain options are included. Cover: Hinged and lockable with padlock, to prevent access to components. One 15-amp, double-pole circuit breaker for pump core's power circuit. One 15-amp single-pole circuit breaker for alarm circuit. Push-to-run feature, internal run indicator, and alarm circuit. Protect circuit boards in alarm panel with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.
       2. Alarm Panel Features: External audible and visual alarm, push-to-run switch, push-to-silence switch, redundant pump start, and high level alarm capability.
       3. Alarm sequence to be as follows when pump and alarm breakers are on:
          1. When Liquid Level in Sewage Wet-Well Rises Above Alarm Level:

Contacts on alarm pressure switch activate, audible and visual alarms are activated, and the redundant pump starting system is energized.

Audible Alarm: Silenced by externally mounted, push-to-silence button.

Visual Alarm: Remains illuminated until sewage level in wet-well drops below the "off" setting of alarm pressure switch.

* + - 1. Visual Alarm Lamp: Inside red, oblong lens (LxWxH): 3.75 x 2.38 x 1.5 inches externally mounted to top of enclosure in a manner to maintain NEMA 4X rating.
      2. Audible Alarm: Externally mounted on bottom of enclosure, capable of 93 dB at 2 ft. Deactivated by depressing a push-type switch encapsulated in weatherproof silicone boot and mounted on bottom of enclosure (push-to-silence button).
      3. Alarm panel, as manufactured and including any of the following options to be listed by Underwriters Laboratories, Inc.

\*\* NOTE TO SPECIFIER \*\* The following items are optional. Delete options not required.

* + - * 1. Alarm Contacts Package:

Alarm Activated Dry Contacts: Normally open relay contact closes upon alarm activation.

Alarm Activated Contacts: Remote Indoor Alarm Module. Works with or without alarm panel power. Works with E/One's Remote Sentry.

Alarm Activated Remote Powered Contacts: Normally open contacts that close on alarm, providing 120V on high level alarm.

* + - * 1. Generator Receptacle and Auto Transfer: 20 amp, 250 VAC. Spring-loaded, gasketed cover, provides access for connection of external generator while maintaining a NEMA 4X rating.

Automatic Transfer Switch: Switches from AC to generator power. Power is provided to alarm panel through generator receptacle whenever power is present at receptacle, allowing audible and visual alarms to function in generator mode. When power is not applied to generator receptacle, panel is switched back to AC Mains power.

No manual switching in panel enclosure to switch from generator to AC Mains. Cannot be left in generator position after pumping down station in generator mode as with a manual transfer switch.

* + - * 1. Service Equipment/Main Service Disconnect Breaker: Separate, internal breaker rated and approved as "service equipment" and acts as a main service disconnect of grinder pump station.
        2. Remote Sentry Indoor Alarm Module: Separate, remote indoor alarm module indicates a high level alarm with or without AC power to grinder pump station.

Internal power source enables its continued operation without AC power.

Audible and Visual Alarm: Resets if high level alarm condition is eliminated. Includes a Silence button for audible alarm and Test button.

* + - * 1. Run-time/Hour Meter: Displays total run-time or operation time for pump core.
        2. Event/Cycle Counter: Displays number of operations of pump core.
        3. Sentry Simplex Protect: Protection from the following operating conditions:

Low Voltage (Brownout) Protection: Lockout cycle prevents motor from operating and illuminates an LED if:

Incoming AC Mains voltage drops below a predetermined minimum, typically 12 percent of nameplate for 2 to 3 seconds regardless of whether motor is running or not.

Lockout cycle will end if incoming AC Mains voltage returns to a predetermined value, typically 10 percent of nameplate.

System retests voltage every second indefinitely. If lockout cycle has been initiated and voltage comes back above predetermined starting voltage, the system will function normally. The LED remains illuminated during a Brownout and remains latched until pump breaker is turned off and then on again (reset). The audible and visual alarm will not be activated unless there is a high wastewater level in tank.

* + - * 1. Run Dry Protection: 20-minute lockout cycle will prevent motor from operating and illuminates an LED when wastewater level in tank is below pump inlet level. Condition is rechecked every 20 minutes. If lockout cycle has been initiated and condition is satisfied, pump is not allowed to cycle normally but LED remains latched. LED will remain latched until pump breaker is turned off and then on again (reset). If condition is not satisfied after 3 consecutive attempts, the visual alarm will be activated until pump breaker is turned off and on (reset) or until there is one cycle of normal operation. If a high level condition is presented at any time, a pump run cycle will be activated.
        2. High System Pressure Protection: 20 minute lockout cycle prevents motor from operating and illuminates an LED when pressure in the discharge line is atypically high (closed valve or abnormal line plug). Condition is rechecked every 20 minutes. If condition is satisfied, pump is allowed to cycle normally but LED remains latched. If condition is not satisfied after 3 consecutive attempts, the pump is locked out indefinitely until condition is removed and power is reset. LED will remain latched until pump breaker is turned off and then on again (reset). The audible and visual alarm will be activated.
      1. In all the above cases, if more than one error condition is presented, LED depicting the most recent error condition will be displayed.
      2. Other Included Features:
         1. Alarm Activated Dry Contacts: Normally open relay contact closes upon alarm activation.
         2. Alarm Activated Contacts for Remote Indoor Alarm Module: Works with or without power to alarm panel. Designed to work with E/One's Remote Sentry.
         3. Includes Inner Door Dead Front.
         4. Separate LEDs for each condition.

\*\* NOTE TO SPECIFIER \*\* Optional. Delete if not required.

* + 1. Sentry Simplex Protect Plus:
       1. All Sentry Protect features as detailed above.
       2. High/Low voltage monitoring with trouble indication.
       3. High/Low wattage. Monitoring with trouble indication. Wattage is used instead of current because it is a better indicator of pump performance.
       4. Extended run time monitoring with trouble indication.
       5. Cycle/Event counter.
       6. Run-time counter. Hour meter.
       7. Run-time limit. Time adjustable, user selected options: 10 minutes (default) to 120 minutes in 1 minute intervals.
       8. Power-up Delay. Time adjustable, user selected options: None (default), to 300 minutes in 1 minute intervals.
       9. Alarm Delay. Time adjustable, user selected options: None (default) or adjustable in 1 minute intervals
       10. System self-test diagnostic.
       11. User selectable alarm latch.
       12. User selectable protect mode disable.
       13. User selectable buzzer timer.
       14. Specific Protect PLUS indicators and programming features shall include:
           1. Ready LED to indicate AC power to the station is satisfactory.
           2. Pump Run LED to indicate pump is operating.
           3. Trouble LED indicator and predictive Visual Alarm notification ("blinking" alarm lamp; clears on Normal cycle).
           4. High Level Alarm LED indicator.
           5. Manual Run switch to manually activate pump.
           6. Menu-driven programmable controller with navigation overlay-type buttons (Enter, Scroll, Up, Down).
           7. Normal Operation LED and Mode button for Mode status.
           8. Pump Performance menu LED with LCD Display of the following pump performance statistics:

Real-time voltage, real-time amperage, and Real-time wattage.

Minimum/maximum/average voltage, amperage, and wattage.

Minimum/maximum Run-time.

Average Run-time.

Last run-time.

Cycle/event counter.

Run time counter. Hour meter.

* + - * 1. Diagnostics Menu LED.
        2. Initialize System Menu LED.
        3. Run Limit Menu LED.
        4. Alarm Delay Menu LED.
        5. Power Delay Menu LED.
    1. Serviceability: Two lifting handles connected to top housing of grinder pump core / level sensor assembly. Level Sensor Assembly: Easily removable from pump assembly. Mechanical and Electrical Connections: Disconnect capability for core unit removal and installation. Each EQD half must include a water-tight cover to protect internal electrical pins while EQD is unplugged. Pump push-to-run feature: For field trouble shooting, must operate pump even if level sensor is removed from pump assembly. Motor Control Components: Mounted on readily replaceable bracket.
    2. OSHA Confined Space: Maintenance tasks for grinder pump station must be possible without entry into grinder pump station as per OSHA 1910.146, permit-required confined spaces. "Entry: Action by which person passes through opening into a permit-required confined space. Includes ensuing work activities in that space and considered to occur as soon as any part of entrant's body breaks plane of an opening into the space."
    3. Safety: Grinder pump to be free from electrical and fire hazards as required in residential environments. The completely assembled and wired grinder pump station must be listed by Underwriters Laboratories, Inc., to be safe and appropriate for intended use.
       1. Grinder Pump: Meet standards for plumbing equipment for use in or near residences. Be free of noise, odor, or health hazards, and tested by independent laboratory certifying its capability to perform as specified in individual or low pressure sewer system applications. As evidence of compliance, grinder pump to bear seal of NSF International. Third-party testing to NSF standard is not acceptable.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. GRINDER PUMP STATIONS WETWELL / DRYWELL - D-SERIES
     1. Grinder Pump Stations: Factory-built and tested Wetwell/Drywell Grinder Pump Stations. Grinder pumps suitably mounted in a basin constructed of polyethylene (HDPE) for simplex stations and polyethylene or fiberglass reinforced polyester resin for duplex stations. Dimensions and capacities as shown on 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 necessary internal wiring and controls. All pump, motor/grinder units to be of like type and horsepower throughout the system.
        1. Component type grinder pump systems requiring field assembly are not acceptable
     2. Pump: Custom designed, integral, vertical rotor, motor driven, solids handling progressing cavity type pump with a single mechanical seal.
        1. Double Radial O-Ring Seals: At casting joints.
        2. Pump Castings: Cast Iron. Finish: Wet Applied Epoxy: 8 to 10 mil dry thickness.
        3. Rotor: Through-hardened, highly polished, precipitation hardened stainless steel.
        4. Stator: Compounded ethylene propylene synthetic elastomer suitable for domestic wastewater service. Physical Properties: Thermally stable with high tear, abrasion, grease, water, detergent, and wear resistance. Excellent aging properties,
           1. Buna-N is not acceptable as a stator material.
     3. Grinder: Placed immediately below pumping elements. Direct-driven by one-piece motor shaft. Reduces components in domestic sewage, including "foreign objects," such as paper, wood, plastic, glass, wipes, rubber, and the like, to finely-divided particles which pass freely through passages of pump and the 1-1/4 inch diameter stainless steel discharge piping.
        1. Impeller (cutter wheel) assembly: Fastened to pump motor shaft by threaded connection. Attachment by means of pins or keys will not be acceptable.
           1. Rotating Cutter Wheel: One-piece, 4140 with teeth inductively hardened to Rockwell 50 to 60c for abrasion resistance.
           2. Shredder Ring: Stationary, made of white cast iron. Teeth, ground into material to achieve effective grinding, to have a staggered pattern with only one edge engaged at a time, maximizing cutting torque.
           3. Nominal speed of no greater than 1800 rpm.
        2. Assembly to be dynamically balanced and operate without objectionable noise or vibration over entire range of operating pressures.
        3. Construct to minimize clogging and jamming under normal conditions and starting.
        4. Create vortex action to scour tank free of deposits or sludge banks.
        5. Maximum flow rate through cutting mechanism: 4 fps to minimize jamming.
        6. Inlet Shroud: 5 inch diameter. Less than 5 inches will not be accepted.
        7. Position grinder such that solids are fed in an upward flow direction.
     4. Electric Motor: 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 ft-lbs.
        1. Press-fit into casting for better heat transfer and longer winding life. Protection against running overloads or locked rotor conditions for pump motor is provided by an automatic-reset, integral thermal overload protector incorporated into motor. Motor protector to be investigated and listed by Underwriters Laboratories Inc.
           1. Non-capacitor start or permanent split capacitor motors are not acceptable.
           2. Wet portion of motor Armature: 300 Series stainless steel.
           3. Oil-filled motors are not acceptable.
           4. Pump operation during potentially damaging high current or low voltage conditions: Inhibited by in-pump electrical monitoring system, investigated, and listed by Underwriters Laboratories Inc.
           5. Motor Start: Controlled by DC driven electromechanical relay integrated within control compartment of pump. Electrical monitoring ensures relay operates reliably. AC Mechanical contactors for motor start are not acceptable.
     5. Mechanical Seal: Mechanical shaft seal to prevent leakage between motor and pump. Seal: A stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.
     6. Tank and Integral Accessway - 70 Gallon:

\*\* NOTE TO SPECIFIER \*\* Delete model option not required.

* + - 1. Model DH071. Hardwired.
      2. Model DR071. Wireless
      3. Wetwell/Drywell design of high density polyethylene, of a grade providing necessary environmental stress cracking resistance.
         1. Corrugated Sections: Double wall construction. Corrugations of Outside Wall: Minimum amplitude of 1-1/2 inches providing necessary transverse stiffness.
         2. Internal Wall: Smooth to promote scouring.
         3. Incidental Single Wall Construction Sections: 0.250 inch thick minimum.
         4. Construction Seams: Thermally welded and factory tested for leak tightness.
         5. Tank Wall and Bottom: Withstand pressure exerted by saturated soil loading at maximum burial depth. Station components must function normally when exposed to 150 percent of maximum external soil and hydrostatic pressure.
         6. One EPDM grommet fitting to accept a 4.50 inch OD DWV or Schedule 40 pipe. Tank Capacities: As shown on Contract Drawings.
      4. Drywell Accessway: An integral extension of Wetwell assembly. Allow field adjustment of station height in 4 inches increments without using adhesives or sealants requiring cure time before installation can be completed.
         1. Lockable Cover Assembly: Low profile mounting. Watertight capability.
      5. Have all necessary penetrations molded in and factory sealed. No field penetrations are acceptable to ensure a leak free installation.
      6. Discharge Piping: 304 stainless steel. Terminates outside accessway bulkhead with stainless steel, 1-1/4 inch Female NPT fitting. Bulkhead Penetration: Factory installed warranted watertight by manufacturer. Stainless steel ball valve rated 235 psi WOG.
      7. Accessway: Includes a NEMA 6P Electrical Quick Disconnect (EQD) for power and control functions. Factory installed. Penetrations warranted to be watertight. Integral 2 inch vent for venting sewage gases from tank.
         1. EQD: Supplied with 32 ft of useable Electrical Supply Cable (ESC) outside station, to connect to alarm panel.

No tools required for connecting.

Seal against water before electrical connection is made.

Radial seals to ensure a watertight seal regardless of tightening torque. Designed to be conducive to field wiring as required.

* + - * 1. ESC: Installed in basin by Manufacturer.
        2. Junction boxes are not permitted in accessway.
    1. TANK AND INTEGRAL ACCESSWAY 150 GALLON:

\*\* NOTE TO SPECIFIER \*\* Delete model option not required.

* + - 1. Model DH151. Hard wired.
      2. Models DR151. Wireless.
      3. Wetwell/Drywell design of polyethylene, with a grade selected to provide necessary environmental stress cracking resistance.
         1. Corrugated Sections: Double wall construction. Corrugations of Outside Wall: Minimum amplitude of 1-1/2 inches to provide transverse stiffness.
         2. Internal Wall: Smooth to promote scouring.
         3. Incidental Single Wall Construction Sections: 0.250 inch thick minimum.
         4. Seams Created During Tank Construction: Thermally welded and factory tested for leak tightness.
         5. Tank Wall and Bottom: Withstand pressure exerted by saturated soil loading at maximum burial depth. Station components must function normally when exposed to 150 percent of maximum external soil and hydrostatic pressure.
         6. One EPDM grommet fitting to accept a 4.50 inch OD DWV or Schedule 40 pipe. Tank Capacities: As shown on Contract Drawings.
      4. Drywell Accessway: Integral extension of Wetwell assembly. Enable field adjustment of station height in 3 inches increments without using adhesives or sealants requiring cure time before installation can be completed.
         1. Lockable Cover Assembly: Low profile mounting. Watertight capability. Green high density polyethylene. Load Rating: 150 lbs per sq ft.
      5. Have all necessary penetrations molded in and factory sealed. No field penetrations are acceptable to ensure a leak free installation.
      6. Discharge Piping: 304 stainless steel. Terminates outside accessway bulkhead with stainless steel, 1-1/4 inch Female NPT fitting. Bulkhead Penetration: Factory installed warranted watertight by manufacturer. Stainless steel ball valve rated 235 psi WOG.
      7. Accessway: Includes a NEMA 6P Electrical Quick Disconnect (EQD) for power and control functions. Factory installed. Penetrations warranted to be watertight.
         1. EQD: Supplied with 32 ft, of useable Electrical Supply Cable (ESC) outside station, to connect to alarm panel.

No tools for connecting.

Sealed against water before electrical connection is made.

Radial seals to assure a watertight seal regardless of tightening torque. Designed to be conducive to field wiring as required.

* + - * 1. ESC: Installed in basin by Manufacturer.
        2. Junction boxes are not permitted in accessway.
    1. TANK AND INTEGRAL ACCESSWAY 275 GALLON - HARDWIRED:

\*\* NOTE TO SPECIFIER \*\* Delete model options not required.

* + - 1. Model DH272, 275-Gallon Duplex. Hard wired.
      2. Model DH502, 500-Gallon Duplex. Hard wired.
      3. Model DR272, 275-Gallon Duplex. Wireless.
      4. Model DR502, 500-Gallon Duplex. Wireless.
      5. Wetwell/drywell design constructed of fiberglass reinforced polyester resin with a high density polyethylene accessway.
         1. Corrugated Sections: Double wall construction. Corrugations of Outside Wall: Minimum amplitude of 1-1/2 inches to provide transverse stiffness.
         2. Internal Wall: Smooth to promote scouring.
         3. Incidental Single Wall Construction Sections: 0.250 inch thick minimum.
         4. Seams Created During Tank Construction: Thermally welded and factory tested for leak tightness.
         5. Tank Wall and Bottom: Withstand pressure exerted by saturated soil loading at maximum burial depth. Station components must function normally when exposed to 150 percent of maximum external soil and hydrostatic pressure.
         6. One EPDM grommet fitting to accept a 4.50 inch OD DWV or Schedule 40 pipe. Tank Capacities: As shown on Contract Drawings.
      6. Drywell Accessway: Integral extension of Wetwell assembly. Enable field adjustment of station height in 4 inches increments without using adhesives or sealants requiring cure time before installation can be completed.
         1. Lockable Cover Assembly: Low profile mounting. Watertight capability. Green high density polyethylene. Load Rating: 150 lbs per sq ft.
      7. Have all necessary penetrations molded in and factory sealed. No field penetrations are acceptable to ensure a leak free installation.
      8. Discharge Piping: 304 stainless steel. Terminates outside accessway bulkhead with stainless steel, 1-1/4 inch Female NPT fitting. Bulkhead Penetration: Factory installed warranted watertight by manufacturer. Stainless steel ball valve rated 235 psi WOG.
      9. Accessway: Includes a NEMA 6P Electrical Quick Disconnect (EQD) for power and control functions. Factory installed. Penetrations warranted to be watertight.
         1. EQD: Supplied with 32 ft, of useable Electrical Supply Cable (ESC) outside station, to connect to alarm panel.

No tools for connecting.

Sealed against water before electrical connection is made.

Radial seals to assure a watertight seal regardless of tightening torque. Designed to be conducive to field wiring as required.

* + - * 1. ESC: Installed in basin by Manufacturer.
        2. Junction boxes are not permitted in accessway.
    1. Check Valve on Pump Discharge: Gravity, flapper-type check valve built into discharge piping. Provides a full-ported passageway when open, with friction loss of less than 6 inches of water at maximum rated flow. Rating: Continuous operating pressure of 235 psi. Moving Parts: 300 Series stainless steel and fabric reinforced synthetic elastomer. Hinge: Nonmetallic and part of flapper assembly providing a high degree of freedom ensuring seating even at very low back-pressure. Valve Body: Injection molded thermoplastic resin.
    2. Anti-Siphon Valve on Pump Discharge: Factory-installed, gravity, flapper-type anti-siphon valve built into discharge piping. Moving Parts: 300 Series stainless steel and fabric-reinforced synthetic elastomer. Hinge: Nonmetallic and part of flapper assembly, providing a high degree of freedom ensuring proper operation at very low pressure. Valve Body: Injection-molded thermoplastic resin. Port Diameter: 60 percent of inside diameter of pump discharge piping. Holes or ports in discharge piping are not acceptable anti-siphon devices.
    3. Core Unit of Grinder Pump Station: Cartridge type, removable assembly consisting of pump, motor, grinder, motor controls, check valve, anti-siphon valve, level control, electrical quick disconnect and wiring. installed in basin by the Manufacturer. Seals to tank deck with stainless steel latch assembly, actuated utilizing a single quick release mechanism requiring no more than a half turn of a wrench. Watertight Integrity of Core Unit: Established by 100 percent factory test at minimum of 5 psig.
       1. Stations taller than 96 inches (mm) may be shipped on their side without cores assembled in the basin for freight purposes but this is the only exception.
    4. Controls: Fasteners to be 300 Series stainless steel unless specified otherwise.
       1. Motor starting controls: Located in cast iron enclosure of core unit secured by stainless steel fasteners. Locating controls in a plastic enclosure is not acceptable.
       2. Level Sensing Controls: Housed in separate enclosure from motor starting controls.
       3. Level Sensor Housing: High-impact thermoplastic copolymer over-molded with a thermo plastic elastomer. Sealed via a radial type seal. Integrally attached to pump assembly in a way as to minimize potential for accumulation of grease and debris, and removable from station with the pump.
       4. Non-Fouling Wastewater Level Controls for Controlling Pump Operation: Monitor pressure changes in an integral air column connected to a pressure switch.
          1. Air Column: Molded from thermoplastic elastomer for use in wastewater and impact resistance. Single connection between water level being monitored and pressure switch. Connections: Sealed radially with redundant O-rings.
       5. Level Detection Device: No moving parts in direct contact with wastewater and be integral to pump core assembly. Depressing push to run button must operate the pump even with level sensor housing removed from pump.

\*\* NOTE TO SPECIFIER \*\* Applies to wireless units. Delete if not required.

* + - 1. Level Control System: Electrically connected to motor controls using inductive means requiring no wiring between compartments.
      2. High-Level Sensing: Accomplish as detailed above by a separate air column sensor and pressure switch of same type. Closure of high-level sensing device will energize alarm circuit and redundant pump-on circuit. Pump ON/OFF and high-level alarm functions are not to be controlled by the same switch. To assure reliable operation of pressure switches, equip each core with a factory installed equalizer diaphragm that compensates for any atmospheric pressure or temperature changes.
         1. Float switches and float trees, are not acceptable.
         2. Tube or piping runs outside of station tank or into tank-mounted junction boxes providing pressure switch equalization are not acceptable.
      3. Furnish grinder pump with a 6 conductor, type SJOW cable, pre-wired and watertight to meet UL requirements with a Factory installed NEMA 6P EQD half attached to it.
    1. Stainless Steel Curb Stop / Check Valve Assembly (Uni-Lateral): Pressure-tight in both directions. Ball valve actuator includes stop features at fully opened and closed positions. Curb stop / check valve assembly to withstand a working pressure of 235 psi.
       1. Stainless steel check valve: Integral with curb stop valve. Provides a full-ported 1-1/4 inch passageway and introduce minimal friction loss at maximum rated flow. Flapper Hinge: Provides maximum degree of freedom and seating at low back pressure.
       2. Engineered Thermoplastic Fittings: To comply with applicable ASTM standards.
       3. Pipe Connections: Compression fittings including a Buna-N O-ring for sealing to outside pipe diameter. Integrate split-collet locking devices into connection fittings to restrain pipe from hydraulic pressure and external loading.
       4. Curb Boxes: ABS per ASTM D1788. Lid: Cast iron, per ASTM A48 Class 25, providing magnetic detectability, and painted black. Components: Inherently corrosion-resistant. Provide height adjustment downward from nominal height.
       5. High Density Polyethylene Pipe: Supplied by others. Working Pressure: 160 psi and classified SDR per ASTM D3035.
       6. Pipe Dimensions: Standard Dimension Ratio (SDR) of pipe to be as specified by Specifying Engineer. SDR 7, 9 and 11 fittings are available from Manufacturer.
       7. Factory Test Curb stop/check Valve: To 100 percent hydrostatically tested to 150 psi.
    2. Alarm Panel: Each grinder pump station includes a NEMA 4X Thermoplastic Polyester Enclosure UL-listed alarm panel suitable for wall or pole mounting.
       1. NEMA 4X Enclosure (WxHxD): 10.5 x 14 x 7 inches, or 12.5 x 16 x 7.5 if certain options are included. Cover: Hinged and lockable with padlock, to prevent access to components. One 15-amp, double-pole circuit breaker for pump core's power circuit. One 15-amp single-pole circuit breaker for alarm circuit. Push-to-run feature, internal run indicator, and alarm circuit. Protect circuit boards in alarm panel with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.
       2. Alarm Panel Features: External audible and visual alarm, push-to-run switch, push-to-silence switch, redundant pump start, and high level alarm capability.
       3. Alarm sequence to be as follows when pump and alarm breakers are on:
          1. When Liquid Level in Sewage Wet-Well Rises Above Alarm Level:

Contacts on alarm pressure switch activate, audible and visual alarms are activated, and the redundant pump starting system is energized.

Audible Alarm: Silenced by externally mounted, push-to-silence button.

Visual Alarm: Remains illuminated until sewage level in wet-well drops below the "off" setting of alarm pressure switch.

* + - 1. Visual Alarm Lamp: Inside red, oblong lens (LxWxH): 3.75 x 2.38 x 1.5 inches externally mounted to top of enclosure in a manner to maintain NEMA 4X rating.
      2. Audible Alarm: Externally mounted on bottom of enclosure, capable of 93 dB at 2 ft. Deactivated by depressing a push-type switch encapsulated in weatherproof silicone boot and mounted on bottom of enclosure (push-to-silence button).
      3. Alarm panel, as manufactured and including any of the following options to be listed by Underwriters Laboratories, Inc.

\*\* NOTE TO SPECIFIER \*\* The following items are optional. Delete options not required.

* + - * 1. Alarm Contacts Package:

Alarm Activated Dry Contacts: Normally open relay contact closes upon alarm activation.

\*\* NOTE TO SPECIFIER \*\* Applies to wired units. Delete if not required.

Alarm Activated Contacts for Remote Sentry Indoor Alarm Module - Will work with or without power to the alarm panel and is designed to work with E/One's Remote Sentry.

\*\* NOTE TO SPECIFIER \*\* The next two paragraphs apply to wireless units. Delete if not required.

Alarm Activated Contacts for Remote Sentry Indoor Alarm Module - In normal, powered operation, the Remote Sentry Alarm Module will operate as a high level alarm. In a power outage (no power to core), the Remote Indoor Alarm Module will operate as a power loss indicator.

Alarm Activated Remote (Powered) Contacts - Normally open contacts that close on alarm, providing 120V on high level alarm.

* + - * 1. Generator Receptacle and Auto Transfer: 20 amp, 250 VAC. Spring-loaded, gasketed cover, provides access for connection of external generator while maintaining a NEMA 4X rating.

Automatic Transfer Switch: Switches from AC to generator power. Power is provided to alarm panel through generator receptacle whenever power is present at receptacle, allowing audible and visual alarms to function in generator mode. When power is not applied to generator receptacle, panel is switched back to AC Mains power.

No manual switching required in panel enclosure to switch from generator to AC Mains. Cannot be left in generator position after pumping down station in generator mode as is the case with a manual transfer switch.

* + - * 1. Service Equipment/Main Service Disconnect Breaker: Separate, internal breaker rated and approved as "service equipment" and acts as a main service disconnect of grinder pump station.
        2. Remote Sentry Indoor Alarm Module: Separate, remote indoor alarm module indicates a high level alarm with or without AC power to grinder pump station.

Internal power source enables its continued operation without AC power.

Audible and Visual Alarm: Resets if high level alarm condition is eliminated. Includes a Silence button for audible alarm and Test button.

* + - * 1. Run-time/Hour Meter: Displays total run-time or operation time for pump core.
        2. Event/Cycle Counter: Displays number of operations of pump core.
        3. Sentry Simplex Protect: Protection from the following operating conditions:

Low Voltage (Brownout) Protection: Lockout cycle prevents motor from operating and illuminates an LED if:

Incoming AC Mains voltage drops below a predetermined minimum, typically 12 percent of nameplate for 2 to 3 seconds regardless of whether motor is running or not.

Lockout cycle will end if incoming AC Mains voltage returns to a predetermined value, typically 10 percent of nameplate.

System retests voltage every second indefinitely. If lockout cycle has been initiated and voltage comes back above predetermined starting voltage, the system will function normally. The LED remains illuminated during a Brownout and remains latched until pump breaker is turned off and then on again (reset). The audible and visual alarm will not be activated unless there is a high wastewater level in tank.

* + - * 1. Run Dry Protection: 20-minute lockout cycle will prevent motor from operating and illuminates an LED when wastewater level in tank is below pump inlet level. Condition is rechecked every 20 minutes. If lockout cycle has been initiated and condition is satisfied, pump is not allowed to cycle normally but LED remains latched. LED will remain latched until pump breaker is turned off and then on again (reset). If condition is not satisfied after 3 consecutive attempts, the visual alarm will be activated until pump breaker is turned off and on (reset) or until there is one cycle of normal operation. If a high level condition is presented at any time, a pump run cycle will be activated.
        2. High System Pressure Protection: 20 minute lockout cycle prevents motor from operating and illuminates an LED when pressure in the discharge line is atypically high (closed valve or abnormal line plug). Condition is rechecked every 20 minutes. If condition is satisfied, pump is allowed to cycle normally but LED remains latched. If condition is not satisfied after 3 consecutive attempts, the pump is locked out indefinitely until condition is removed and power is reset. LED will remain latched until pump breaker is turned off and then on again (reset). The audible and visual alarm will be activated.
      1. In all the above cases, if more than one error condition is presented, LED depicting the most recent error condition will be displayed.
      2. Other Included Features:
         1. Alarm Activated Dry Contacts: Normally open relay contact closes upon alarm activation.
         2. Alarm Activated Contacts For Remote Indoor Alarm Module: Works with or without power to alarm panel. Designed to work with E/One's Remote Sentry.
         3. Includes Inner Door Dead Front.
         4. Separate LED's for each condition.

\*\* NOTE TO SPECIFIER \*\* Optional. Delete if not required.

* + 1. Sentry Simplex Protect Plus:
       1. All Sentry Protect features as detailed above.
       2. High/Low voltage monitoring with trouble indication.
       3. High/Low wattage. Monitoring with trouble indication. Wattage is used instead of current because it is a better indicator of pump performance.
       4. Extended run time monitoring with trouble indication.
       5. Cycle/Event counter.
       6. Run-time counter. Hour meter.
       7. Run-time limit. Time adjustable, user selected options: 10 minutes (default) to 120 minutes in 1 minute intervals.
       8. Power-up Delay. Time adjustable, user selected options: None (default), to 300 minutes in 1 minute intervals.
       9. Alarm Delay. Time adjustable, user selected options: None (default) or adjustable in 1 minute intervals
       10. System self-test diagnostic.
       11. User selectable alarm latch.
       12. User selectable protect mode disable.
       13. User selectable buzzer timer.
       14. Specific Protect PLUS indicators and programming features shall include:
           1. Ready LED to indicate AC power to the station is satisfactory.
           2. Pump Run LED to indicate pump is operating.
           3. Trouble LED indicator and predictive Visual Alarm notification ("blinking" alarm lamp; clears on Normal cycle).
           4. High Level Alarm LED indicator.
           5. Manual Run switch to manually activate pump.
           6. Menu-driven programmable controller with navigation overlay-type buttons (Enter, Scroll, Up, Down).
           7. Normal Operation LED and Mode button for Mode status.
           8. Pump Performance menu LED with LCD Display of the following pump performance statistics:

Real-time voltage, real-time amperage, and Real-time wattage.

Minimum/maximum/average voltage, amperage, and wattage.

Minimum/maximum Run-time.

Average Run-time.

Last run-time.

Cycle/event counter.

Run time counter. Hour meter.

* + - * 1. Diagnostics Menu LED.
        2. Initialize System Menu LED.
        3. Run Limit Menu LED.
        4. Alarm Delay Menu LED.
        5. Power Delay Menu LED.
    1. Duplex Station - Hard Wired: MOD T260 DUPLEX:
       1. UL-Listed Control and Alarm Panel: Suitable for wall or pole mounting. Push-to-run feature, internal run indicator, and complete alarm circuit.
          1. NEMA 4X Thermoplastic Enclosure (WxHxD): 12.5 x 16 x 7.5 inches. Hinged, lockable cover with padlock,
          2. Circuit Breakers: One 15-amp single pole for alarm circuit. One 15-amp double pole per core for power circuit.
          3. Circuit Boards: Conformal coating, both sides.
          4. AC Power Circuit: Auto resetting fuse.
          5. Visual Alarm Lamp: Inside Red Oblong Lens (LxWxH): 3.75 x 2.38 x 1.5. Mounted to top of enclosure as to maintain NEMA 4X rating.
          6. Audible Alarm: Externally mounted on bottom of enclosure. Capable of 93 dB at 2 ft. Deactivate Alarm: Depress a push-type switch encapsulated in weatherproof silicone boot and mounted on bottom of enclosure.
          7. High-Level Alarm System Operation:

Panel goes into alarm mode if a pump alarm switch closes. During Initial Alarm Mode: Both pumps run, and alarm light and buzzer are delayed for period of time based on user settings (default is 3-1/2 minutes). If station is still in high-level alarm after delay, the light and buzzer activate.

Audible Alarm: Silenced by externally mounted push-to-silence button.

Visual Alarm: Remains illuminated until sewage level in wet well drops below "Off" setting of alarm switch for both pumps.

* + - * 1. The alarm panel, as manufactured including any of the following options is to be listed by Underwriters Laboratories, Inc.

\*\* NOTE TO SPECIFIER \*\* The following items are optional. Delete options not required.

* + - * 1. Generator Receptacle and Auto Transfer: 20 amp, 250 VAC. Spring-loaded, gasketed cover, provides access for connection of external generator while maintaining a NEMA 4X rating.

Automatic Transfer Switch: Switches from AC to generator power. Power is provided to alarm panel through generator receptacle whenever power is present at receptacle, allowing audible and visual alarms to function in generator mode. When power is not applied to generator receptacle, panel is switched back to AC Mains power.

No manual switching required in panel enclosure to switch from generator to AC Mains. Cannot be left in generator position after pumping down station in generator mode as is the case with a manual transfer switch.

* + - * 1. Service Equipment/Main Service Disconnect Breaker: Separate, internal breaker rated and approved as "service equipment" and acts as a main service disconnect of grinder pump station.
        2. Remote Sentry Indoor Alarm Module: Separate, remote indoor alarm module indicates a high level alarm with or without AC power to grinder pump station.

Internal power source enables its continued operation without AC power.

Audible and Visual Alarm: Resets if high level alarm condition is eliminated. Includes a Silence button for audible alarm and Test button.

Run-time/Hour Meter: Displays total run-time or operation time for pump core.

Event/Cycle Counter: Displays number of operations of pump core.

External Autodialer:

Four separate voice message alarm zones.

Calls up to 8 telephones, cell phones or pagers.

Built-in line seizure.

Remote Turn Off feature allows termination of activated channel.

EEPROM Memory retains program despite power loss.

Listen-in verification and communication.

Universal dial tone.

Built-in auxiliary output to drive external siren, strobe, or relay.

Five optional settings for notifications of a power loss occurrence; instantaneous, 15 minutes, 2 hours, 12 hours, or 24 hours.

One Channel: Power-loss sensing. 3 Hardwired Channels: Additional input.

Dialer senses loss of power and based on setting; will notify parties of loss condition only when specified time has elapsed.

If power restores before set time has elapsed, no call will be made

Package includes battery backup and transformer.

* + 1. Duplex Stations - Wireless: MOD T260 DUPLEX:
       1. UL-Listed Control and Alarm Panel: Suitable for wall or pole mounting. Push-to-run feature, an internal run indicator, and a complete alarm circuit.
          1. NEMA 4X, thermoplastic or fiberglass enclosure with a hinged lockable cover with padlock.
          2. Circuit Breakers: One 15-amp single pole for alarm circuit. One 15-amp double pole per core for power circuit.
          3. Circuit Boards: Conformal coating, both sides.
          4. AC Power Circuit: Auto resetting fuse.
          5. The control/alarm panels shall include the following features:

Terminal blocks & ground lugs

Alarm Dry Contacts

Lead/Lag indicator lights

Alarm indicator lights

Run indicator lights

Manual Push-to-Run

* + - * 1. Visual Alarm: Inside red fluted lens, 2-5/8 inch diameter by 1-11/16 inches in height. Mounted on top of enclosure in a manner to maintain NEMA 4X rating.
        2. Audible Alarm: Externally mounted on bottom of enclosure. Capable of 93 dB at 2 ft. Deactivate alarm by depressing a push-type switch encapsulated in a weatherproof silicone boot and mounted on bottom of enclosure.
        3. High-Level Alarm System Operation:

Panel goes into alarm mode if a pump alarm switch closes. During Initial Alarm Mode: Both pumps run, and alarm light and buzzer are delayed for period of time based on user settings (default is 3-1/2 minutes). If station is still in high-level alarm after delay, the light and buzzer activate.

Audible Alarm: Silenced by externally mounted push-to-silence button.

Visual Alarm: Remains illuminated until sewage level in wet well drops below "Off" setting of alarm switch for both pumps.

* + - * 1. The alarm panel, as manufactured including any of the following options is to be listed by Underwriters Laboratories, Inc.

\*\* NOTE TO SPECIFIER \*\* The following items are optional. Delete options not required.

* + - * 1. Generator Receptacle and Auto Transfer: 20 amp, 250 VAC. Spring-loaded, gasketed cover, provides access for connection of external generator while maintaining a NEMA 4X rating.

Automatic Transfer Switch: Switches from AC to generator power. Power is provided to alarm panel through generator receptacle whenever power is present at receptacle, allowing audible and visual alarms to function in generator mode. When power is not applied to generator receptacle, panel is switched back to AC Mains power.

No manual switching required in panel enclosure to switch from generator to AC Mains. Cannot be left in generator position after pumping down station in generator mode as is the case with a manual transfer switch.

* + - * 1. Service Equipment/Main Service Disconnect Breaker: Separate, internal breaker rated and approved as "service equipment" and acts as a main service disconnect of grinder pump station.
        2. Remote Sentry Indoor Alarm Module: Separate, remote indoor alarm module indicates a high level alarm with or without AC power to grinder pump station.

Internal power source enables its continued operation without AC power.

Audible and Visual Alarm: Resets if high level alarm condition is eliminated. Includes a Silence button for audible alarm and Test button.

* + - * 1. Run-time/Hour Meter: Displays total run-time or operation time for pump core.
        2. Event/Cycle Counter: Displays number of operations of pump core.
    1. Duplex Protect Plus: For each grinder pump station.
       1. Alarm Panel (WxHxD): 12.5 x 16 x 7.5 inch maximum. Thermoplastic NEMA 4X, UL-listed for wall or pole mounting. Cover: Hinged and lockable with padlock. One 15 amp single pole circuit breaker for alarm circuit. One 15-amp double pole circuit breaker per core for power circuit. Push-to-run feature, internal run indicator, and complete alarm circuit. Circuit boards in alarm panel to be protected with conformal coating on both sides. AC power circuit includes an auto resetting fuse.
       2. Visual Alarm Lamp Inside Red, Oblong Lens (LxWxH): 3.75 x 2.38 x 1.5 inch. Mounted to top of enclosure in a manner to maintain NEMA 4X rating.
       3. Audible Alarm: Externally mounted on bottom of enclosure, capable of 93 dB at 2 ft. Deactivate by depressing a push-type switch encapsulated in weatherproof silicone boot and mounted on bottom of enclosure.
       4. High-level alarm system shall operate as follows:
          1. Panel goes into alarm mode if either pump's alarm switch closes. During initial alarm mode both pumps will run, and alarm light and buzzer will be delayed for a period of time based on user settings (default is 3-1/2 minutes). If station is still in high-level alarm after delay, the light and buzzer will be activated.
          2. Audible alarm may be silenced by externally mounted push-to-silence button.
          3. Visual alarm remains illuminated until sewage level in wet well drops below "off" setting of alarm switch for both pumps.
       5. Alarm panel, including any of the following options to be listed by Underwriters Laboratories, Inc.

\*\* NOTE TO SPECIFIER \*\* The following items are optional. Delete options not required.

* + - 1. Contains the following Features:
         1. Alarm Activated Dry Contacts: Normally open relay contact closes upon alarm activation.
         2. Alarm Activated Contacts for Remote Indoor Alarm Module: Works with or without power to alarm panel. Works with E/One's Remote Sentry.
         3. Includes inner door dead front.
         4. Separate LEDs for each condition.
      2. Provides protection from following operating conditions:
         1. Low Voltage (Brownout) Protection: Lockout cycle prevents motor from operating and illuminates the Trouble LED.

Incoming AC Mains voltage drops below a predetermined minimum, typically 12 percent of nameplate voltage, for 2 to 3 seconds, regardless of whether motor is running

Lockout cycle ends if incoming AC Mains voltage returns to predetermined value, typically 10 percent of nameplate voltage.

* + - * 1. System retests voltage every second indefinitely. If lockout cycle is initiated and voltage comes back above predetermined starting voltage, the system will function normally.

Trouble LED: Remains illuminated during Brownout conditions and corresponding Brownout message displays on LCD screen.

LED turns off when Brownout condition ends, and LCD message remains latched until panel is reset. Audible and visual alarms will not activate unless there is a high wastewater level in tank.

* + - * 1. Run Dry Protection: 20 minute lockout cycle prevents motor from operating and illuminates the Trouble LED when tank wastewater level is below pump inlet shroud. A Run Dry message displays on LCD screen. Condition is rechecked every 20 minutes. LCD message remains latched. If condition is fixed, pump cycles normally and the Trouble LED goes out, but LCD message remains until panel is reset. If condition is not satisfied after 3 consecutive attempts, visual alarm activates until panel is reset or until there is one cycle of normal operation. If a high level condition is presented at any time, a pump run cycle is activated.
        2. High System Pressure Protection: 20 minute lockout cycle prevents motor from operating and illuminates an LED when pressure in the discharge line is atypically high (closed valve or abnormal line plug). Condition is rechecked every 20 minutes. If condition is satisfied, pump is allowed to cycle normally but LED remains latched. If condition is not satisfied after 3 consecutive attempts, the pump is locked out indefinitely until condition is removed and power is reset. LED will remain latched until pump breaker is turned off and then on again (reset). The audible and visual alarm will be activated.
      1. In all the above cases, if more than one error condition is presented, the LCD message depicting the most recent error condition will be displayed.
      2. Protect Plus Features:
         1. High/Low voltage monitoring with trouble indication.
         2. High/Low wattage monitoring with trouble indication.
         3. Extended run time monitoring with trouble indication.
         4. Cycle/event counter.
         5. Run time counter (Hour meter).
         6. Run Time Limit: Time adjustable, user-selected options: 10 minutes (default) to 120 minutes in 1 minute intervals.
         7. Power-Up Delay: Time adjustable, user-selected options: None (default), to 300 minutes in 1 minute intervals.
         8. Alarm Delay: Time adjustable, user-selected options: 0 to 10 minutes in 30 second increments; 4 minutes is default.
         9. System self-test diagnostic.
         10. User-selectable Alarm latch.
         11. User-selectable protect mode disable.
         12. User-selectable buzzer timer.
      3. Specific Duplex Protect PLUS indicators and programming features will include:
         1. Ready LED to indicate AC power to station is satisfactory.
         2. Pump Run LED to indicate pump is operating (LCD indicates which pump is running).
         3. Trouble LED indicator and predictive Visual Alarm notification ("blinking" alarm lamp; clears on Normal cycle).
         4. High Level Alarm LED indicator (LCD indicates which pump is in alarm).
         5. Manual Run switch to manually activate pumps.
         6. Lead/Lag indication (LCD indicates which pump is lead).
         7. Menu-driven programmable controller with navigation overlay-type buttons (Enter, Scroll, Up, Down).
         8. Normal Operation LED and Mode button for Mode status.
         9. Pump Performance menu LED with LCD display of the following pump performance statistics:

Real-time voltage, real-time amperage, and Real-time wattage.

Minimum/maximum/average voltage, amperage, and wattage.

Minimum/Maximum run-time.

Average run-time.

Last run-time.

Cycle/event counter.

Run time counter (Hour meter).

* + - * 1. Diagnostics menu LED.
        2. Initialize system menu LED.
        3. Run limit menu LED.
        4. Alarm delay menu LED.
        5. Power delay menu LED.
        6. Pump alternating options (no alternation, adjustable time based and test).
        7. Pump alternating time options: 24 to 72 hours in 12-hour increments.

\*\* NOTE TO SPECIFIER \*\* The following items are optional. Delete options not required.

* + - 1. Generator Receptacle and Auto Transfer: 20 amp, 250 VAC with spring-loaded gasketed cover provides access for connection of external generator while maintaining a NEMA 4X rating. Automatic transfer switch from AC to generator power. Power is provided to alarm panel through generator receptacle whenever power is present at receptacle. When power is no longer applied to generator receptacle, panel switches back to AC Mains power. No manual switching is needed to switch generator power back to AC Mains.
      2. Service Equipment/Main Service Disconnect Breaker: Separate, internal breaker rated and approved for use as "service equipment" acts main service disconnect of grinder pump station.
      3. Remote Sentry Indoor Alarm Module: Indicates a high level alarm with or without AC power to grinder pump station. Internal power source enables continued operation without AC power. Audible and visual alarms will reset if high level alarm condition is eliminated. Includes a Silence button for audible alarm and a Test button.
      4. External Autodialer:
         1. Four separate voice message alarm zones.
         2. Calls up to 8 telephones, cell phones or pagers.
         3. Built-in line seizure.
         4. Remote Turn Off feature allows termination of activated channel.
         5. EEPROM Memory retains program despite power loss.
         6. Listen-in verification and communication.
         7. Universal dial tone.
         8. Built-in auxiliary output to drive external siren, strobe or relay.
         9. Five optional settings for notifications of a power loss occurrence: Instantaneous, 15 minutes, 2 hours, 12 hours, or 24 hours.
         10. One Channel: Power-loss sensing. 3 Hardwired Channels: Additional input.
         11. Dialer senses loss of power and based on setting; will notify parties of loss condition only when specified time has elapsed.
         12. If power restores before set time has elapsed, no call will be made.
         13. Package includes battery backup and transformer
    1. Serviceability: Two lifting hooks with lift-out harness connected to top housing of grinder pump core, for core removal when necessary. Level sensor assembly must be easily removed from pump assembly for service or replacement. Mechanical and electrical connections must provide easy disconnect for core unit removal and installation. Each EQD half must include a water-tight cover to protect internal electrical pins while EQD is unplugged. Pump push-to-run feature for field trouble shooting must operate pump even if level sensor assembly is removed from pump assembly. Motor control components to be mounted on a readily replaceable bracket for ease of field service.
    2. OSHA Confined Space: Maintenance tasks for grinder pump station must be possible without entry into grinder pump station as per OSHA 1910.146, permit-required confined spaces. "Entry: Action by which person passes through opening into a permit-required confined space. Includes ensuing work activities in that space and considered to occur as soon as any part of entrant's body breaks plane of an opening into the space."
    3. Safety: Grinder pump to be free from electrical and fire hazards as required in residential environments. The completely assembled and wired grinder pump station must be listed by Underwriters Laboratories, Inc., to be safe and appropriate for intended use.
       1. Grinder Pump: Meet standards for plumbing equipment for use in or near residences. Be free of noise, odor, or health hazards, and tested by independent laboratory certifying its capability to perform as specified in individual or low pressure sewer system applications. As evidence of compliance, grinder pump to bear seal of NSF International. Third-party testing to NSF standard is not acceptable.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. GRINDER PUMP STATIONS WETWELL / DRYWELL - W-SERIES
     1. Grinder Pump Stations: Factory-built and tested Wetwell/Drywell Grinder Pump Stations. Grinder pump cores mounted on integral stand of stainless steel, tank, electrical quick disconnect (NEMA 6P), pump removal harness, discharge assembly/shut-off valve, anti-siphon valve/check valve assembly, electrical alarm assembly and necessary internal wiring and controls. Pump motor/grinder units to be of like type and horsepower throughout the system.
     2. Pump: Custom designed, integral, vertical rotor, motor driven, solids handling progressing cavity type pump with a single mechanical seal.
        1. Double Radial O-Ring Seals: At casting joints.
        2. Pump Castings: Cast Iron. Finish: Wet Applied Epoxy: 8 to 10 mil dry thickness.
        3. Rotor: Through-hardened, highly polished, precipitation hardened stainless steel.
        4. Stator: Compounded ethylene propylene synthetic elastomer suitable for domestic wastewater service. Physical Properties: Thermally stable with high tear, abrasion, grease, water, detergent, and wear resistance. Excellent aging properties,
           1. Buna-N is not acceptable as a stator material.
     3. Grinder: Placed immediately below pumping elements. Direct-driven by one-piece motor shaft. Reduces components in domestic sewage, including "foreign objects," such as paper, wood, plastic, glass, wipes, rubber, and the like, to finely-divided particles which pass freely through passages of pump and the 1-1/4 inch diameter stainless steel discharge piping.
        1. Impeller (cutter wheel) assembly: Fastened to pump motor shaft by threaded connection. Attachment by means of pins or keys will not be acceptable.
           1. Rotating Cutter Wheel: One-piece, 4140 with teeth inductively hardened to Rockwell 50 to 60c for abrasion resistance.
           2. Shredder Ring: Stationary, made of white cast iron. Teeth, ground into material to achieve effective grinding, to have a staggered pattern with only one edge engaged at a time, maximizing cutting torque.
           3. Nominal speed of no greater than 1800 rpm.
        2. Assembly to be dynamically balanced and operate without objectionable noise or vibration over entire range of operating pressures.
        3. Construct to minimize clogging and jamming under normal conditions and starting.
        4. Create vortex action to scour tank free of deposits or sludge banks.
        5. Maximum flow rate through cutting mechanism: 4 fps to minimize jamming.
        6. Inlet Shroud: 5 inch diameter. Less than 5 inches will not be accepted.
        7. Position grinder such that solids are fed in an upward flow direction.
     4. Electric Motor: 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 ft-lbs.
        1. Press-fit into casting for better heat transfer and longer winding life. Protection against running overloads or locked rotor conditions for pump motor is provided by an automatic-reset, integral thermal overload protector incorporated into motor. Motor protector to be investigated and listed by Underwriters Laboratories Inc.
           1. Non-capacitor start or permanent split capacitor motors are not acceptable.
           2. Wet portion of motor Armature: 300 Series stainless steel.
           3. Oil-filled motors are not acceptable.

\*\* NOTE TO SPECIFIER \*\* Applies to hard wired versions only. Delete options not required.

* + - * 1. Pump operation during potentially damaging high current or low voltage conditions: Inhibited by in-pump electrical monitoring system, investigated, and listed by Underwriters Laboratories Inc.
        2. Motor Start: Controlled by DC driven electromechanical relay integrated within control compartment of pump. Electrical monitoring ensures relay operates reliably. AC Mechanical contactors for motor start are not acceptable.
    1. Mechanical Seal: Mechanical shaft seal to prevent leakage between motor and pump. Seal: A stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.

\*\* NOTE TO SPECIFIER \*\* Delete tank type not required.

* + 1. Tank: Wetwell design of high density polyethylene of a grade selected for environmental stress cracking resistance.
       1. Corrugated Sections: Double wall construction. Corrugations of Outside Wall: Minimum amplitude of 1-1/2 inches providing necessary transverse stiffness.
       2. Internal Wall: Smooth to promote scouring.
       3. Incidental Single Wall Construction Sections: 0.250 inch thick minimum.
       4. Construction Seams: Thermally welded and factory tested for leak tightness.
       5. Tank Wall and Bottom: Withstand pressure exerted by saturated soil loading at maximum burial depth. Station components must function normally when exposed to maximum external soil and hydrostatic pressure.
       6. Factory Installed Inlet Flange: To accept 4.50 inch OD (4 inch DWV or SCH 40) pipe.
       7. Lockable Cover Assembly: Low profile mounting and watertight. High density green polyethylene, with load rating of 150 psf. Cover to include integral 2 inch vent to prevent sewage gases from accumulating in tank.
       8. Accessway: Facilitate station height adjustment of 3 inch increments or less without adhesives or sealants requiring cure time before installation can be completed.
       9. An electrical junction box is not permitted in tank.

\*\* NOTE TO SPECIFIER \*\* The next two paragraphs apply to hard wired versions only. Delete if not required.

* + - 1. Power and control cable will connect to pump by means of provided NEMA 6P Electrical Quick Disconnect (EQD) and enter tank through factory installed watertight strain relief connector.
      2. Tank Heights: As shown on Contract Drawings.
      3. Station to have all necessary penetrations factory sealed and tested. No field penetrations are acceptable.
    1. Tank: Wetwell design of single wall, laminated fiberglass construction.
       1. Resin: Commercial grade suitable for environment.
       2. Reinforcing Material: Commercial grade glass fiber capable of bonding with resin.
       3. Inner Surface: Smooth finish free of cracks and crazing.
       4. Exterior Surface: Smooth with no exposed fiber or sharp projections.
       5. Tank Wall and Bottom: Sufficient thickness and construction to withstand imposed loading due to saturated soil at specified burial depth for each available tank height. All station components must function normally when exposed to external soil and hydrostatic pressures developed at specified burial depth. Tank Bottom: Reinforced with fiberglass plate extending beyond tank walls to support concrete anchoring, as required, to prevent flotation.
       6. Discharge Bulkhead: Stainless steel. Terminates outside tank wall with 1-1/4 inch female pipe thread. Factory installed and warranted by manufacturer to be watertight.
       7. EPDM grommet to accept a 4.50 inch OD (4 inch DWV or SCH 40) inlet pipe.
       8. Power and Control Cable: Connect to pump by provided NEMA 6P Electrical Quick Disconnect (EQD) and enter tank through field installed watertight strain relief connector supplied by Manufacturer. Electrical junction box is not permitted in tank. Installation of inlet grommet and cable strain relief will require field penetration of tank wall by installing party. Vent tank with factory-provided, field-installed mushroom vent to prevent sewage gases from accumulating. Station cover to be factory drilled to accept mushroom vent. Tank and discharge bulkhead to be factory-tested.
       9. Consult Contract Drawings for station tank sizes, diameter, and height.
    2. Discharge Hose and Disconnect/Valve: Discharge fittings and piping: Constructed of polypropylene, EPDM or PVC. Discharge Hose Assembly: Include shut-off valve rated for 200 psi WOG and quick disconnect feature.
    3. Electrical Quick Disconnect: Factory-installed NEMA 6P electrical quick disconnect (EQD) for power and control functions. EQD supplied with 32 ft of useable, electrical supply cable (ESC) to connect to alarm panel. EQD will require no tools for assembly and seal against water before electrical connection is made and include radial seals to assure a watertight seal regardless of tightening torque. EQD to be conducive to field wiring as required.
    4. Check Valve on Pump Discharge: Gravity, flapper-type check valve built into discharge piping. Provides a full-ported passageway when open, with friction loss of less than 6 inches of water at maximum rated flow. Rating: Continuous operating pressure of 235 psi. Moving Parts: 300 Series stainless steel and fabric reinforced synthetic elastomer. Hinge: Nonmetallic and part of flapper assembly providing a high degree of freedom ensuring seating even at very low back-pressure. Valve Body: Injection molded thermoplastic resin.
    5. Anti-Siphon Valve on Pump Discharge: Factory-installed, gravity, flapper-type anti-siphon valve built into discharge piping. Moving Parts: 300 Series stainless steel and fabric-reinforced synthetic elastomer. Hinge: Nonmetallic and part of flapper assembly, providing a high degree of freedom ensuring proper operation at very low pressure. Valve Body: Injection-molded thermoplastic resin. Port Diameter: 60 percent of inside diameter of pump discharge piping. Holes or ports in discharge piping are not acceptable anti-siphon devices.
    6. CORE UNIT: Grinder pump station to have a removable core containing pump, motor, grinder, controls, check valve, anti-siphon valve, electrical quick disconnect and wiring. Watertight integrity of core unit to be established by a 100 percent factory test at 5 psig.
    7. Controls: Fasteners to be 300 Series stainless steel unless specified otherwise.
       1. Motor Starting Controls: Located in cast iron enclosure of core unit secured by stainless steel fasteners. Locating controls in plastic enclosure is not acceptable.
       2. Level Sensing Controls: Housed in separate enclosure from motor starting controls. Level Sensor Housing: High-impact thermoplastic copolymer over-molded with a thermo plastic elastomer. Sealed via a radial type seal. Integrally attached to pump assembly in a way as to minimize potential for accumulation of grease and debris, and removable from station with the pump.
       3. Non-Fouling Wastewater Level Controls for Controlling Pump Operation: Monitor pressure changes in an integral air column connected to a pressure switch.
          1. Air Column: Molded from thermoplastic elastomer for use in wastewater and impact resistance. Single connection between water level being monitored and pressure switch. Connections: Sealed radially with redundant O-rings.
       4. Level Detection Device: No moving parts in direct contact with wastewater and integral to pump core assembly. Depressing push to run button must operate the pump even with level sensor housing removed from pump.
       5. High-Level Sensing: Accomplish as detailed above, by a separate air column sensor and pressure switch of same type. Closure of high-level sensing device will energize alarm circuit and redundant pump-on circuit. Pump ON/OFF and high-level alarm functions are not to be controlled by the same switch. To assure reliable operation of pressure switches, equip each core with a factory installed equalizer diaphragm that compensates for any atmospheric pressure or temperature changes.
          1. Float switches and float trees are not acceptable.
          2. Tube or piping runs outside of station tank or into tank-mounted junction boxes providing pressure switch equalization are not acceptable.
       6. Furnish grinder pump with a 6 conductor, type SJOW cable, pre-wired and watertight to meet UL requirements with a Factory installed NEMA 6P EQD half attached to it.
    8. Stainless Steel Curb Stop / Check Valve Assembly (Uni-Lateral): Pressure-tight in both directions. Ball valve actuator includes stop features at fully opened and closed positions. Curb stop / check valve assembly to withstand a working pressure of 235 psi.
       1. Stainless steel check valve: Integral with curb stop valve. Provides a full-ported 1-1/4 inch passageway and introduce minimal friction loss at maximum rated flow. Flapper Hinge: Provides maximum degree of freedom and seating at low back pressure.
       2. Engineered Thermoplastic Fittings: To comply with applicable ASTM standards.
       3. Pipe Connections: Compression fittings including a Buna-N O-ring for sealing to outside pipe diameter. Integrate split-collet locking devices into connection fittings to restrain pipe from hydraulic pressure and external loading.
       4. Curb Boxes: ABS per ASTM D1788. Lid: Cast iron, per ASTM A48 Class 25, providing magnetic detectability, and painted black. Components: Inherently corrosion-resistant. Provide height adjustment downward from nominal height.
       5. High Density Polyethylene Pipe: Supplied by others. Working Pressure: 160 psi and classified SDR per ASTM D3035.
       6. Pipe Dimensions: Standard Dimension Ratio (SDR) of pipe to be as specified by Specifying Engineer. SDR 7, 9 and 11 fittings are available from Manufacturer.
       7. Factory Test Curb stop/check Valve: To 100 percent hydrostatically tested to 150 psi.
       8. Compaction Materials: Specified by Specifying Engineer. Where compaction of 85 percent Standard Proctor Density is not attainable, Specifying Engineer may wish to increase SDR of 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 unless directed otherwise by the Specifying Engineer.
    9. Alarm Panel: Each grinder pump station includes a NEMA 4X Thermoplastic Polyester Enclosure UL-listed alarm panel suitable for wall or pole mounting.
       1. NEMA 4X Enclosure (WxHxD): 10.5 x 14 x 7 inches, or 12.5 x 16 x 7.5 if certain options are included. Cover: Hinged and lockable with padlock, to prevent access to components. One 15-amp, double-pole circuit breaker for pump core's power circuit. One 15-amp single-pole circuit breaker for alarm circuit. Push-to-run feature, internal run indicator, and alarm circuit. Protect circuit boards in alarm panel with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.
       2. Alarm Panel Features: External audible and visual alarm, push-to-run switch, push-to-silence switch, redundant pump start, and high level alarm capability.
       3. Alarm sequence to be as follows when pump and alarm breakers are on:
          1. When Liquid Level in Sewage Wet-Well Rises Above Alarm Level:

Contacts on alarm pressure switch activate, audible and visual alarms are activated, and the redundant pump starting system is energized.

Audible Alarm: Silenced by externally mounted, push-to-silence button.

Visual Alarm: Remains illuminated until sewage level in wet-well drops below the "off" setting of alarm pressure switch.

* + - 1. Visual Alarm Lamp: Inside red, oblong lens (LxWxH): 3.75 x 2.38 x 1.5 inches externally mounted to top of enclosure in a manner to maintain NEMA 4X rating.
      2. Audible Alarm: Externally mounted on bottom of enclosure, capable of 93 dB at 2 ft. Deactivated by depressing a push-type switch encapsulated in weatherproof silicone boot and mounted on bottom of enclosure (push-to-silence button).
      3. Alarm panel, as manufactured and including any of the following options to be listed by Underwriters Laboratories, Inc.

\*\* NOTE TO SPECIFIER \*\* The following items are optional. Delete options not required.

* + - * 1. Alarm Contacts Package:

Alarm Activated Dry Contacts: Normally open relay contact closes upon alarm activation.

Alarm Activated Contacts: Remote Indoor Alarm Module. Will work with or without power to alarm panel. Designed to work with E/One's Remote Sentry.

Alarm Activated Remote (Powered) Contacts: Normally open contacts that close on alarm, providing 120V on high level alarm.

* + - * 1. Generator Receptacle and Auto Transfer: 20 amp, 250 VAC. Spring-loaded, gasketed cover, provides access for connection of external generator while maintaining a NEMA 4X rating.

Automatic Transfer Switch: Switches from AC to generator power. Power is provided to alarm panel through generator receptacle whenever power is present at receptacle, allowing audible and visual alarms to function in generator mode. When power is not applied to generator receptacle, panel is switched back to AC Mains power.

No manual switching required in panel enclosure to switch from generator to AC Mains. Cannot be left in generator position after pumping down station in generator mode as is the case with a manual transfer switch.

* + - * 1. Service Equipment/Main Service Disconnect Breaker: Separate, internal breaker rated and approved as "service equipment" and acts as a main service disconnect of grinder pump station.
        2. Remote Sentry Indoor Alarm Module: Separate, remote indoor alarm module indicates a high level alarm with or without AC power to grinder pump station.

Internal power source enables its continued operation without AC power.

Audible and Visual Alarm: Resets if high level alarm condition is eliminated. Includes a Silence button for audible alarm and Test button.

* + - * 1. Run-time/Hour Meter: Displays total run-time or operation time for pump core.
        2. Event/Cycle Counter: Displays number of operations of pump core.
        3. Sentry Simplex Protect: Protection from the following operating conditions:

Low Voltage (Brownout) Protection: Lockout cycle prevents motor from operating and illuminates an LED if:

Incoming AC Mains voltage drops below a predetermined minimum, typically 12 percent of nameplate for 2 to 3 seconds regardless of whether motor is running or not.

Lockout cycle will end if incoming AC Mains voltage returns to a predetermined value, typically 10 percent of nameplate.

System retests voltage every second indefinitely. If lockout cycle has been initiated and voltage comes back above predetermined starting voltage, the system will function normally. The LED remains illuminated during a Brownout and remains latched until pump breaker is turned off and then on again (reset). The audible and visual alarm will not be activated unless there is a high wastewater level in tank.

* + - * 1. Run Dry Protection: 20-minute lockout cycle will prevent motor from operating and illuminates an LED when wastewater level in tank is below pump inlet level. Condition is rechecked every 20 minutes. If lockout cycle has been initiated and condition is satisfied, pump is not allowed to cycle normally but LED remains latched. LED will remain latched until pump breaker is turned off and then on again (reset). If condition is not satisfied after 3 consecutive attempts, the visual alarm will be activated until pump breaker is turned off and on (reset) or until there is one cycle of normal operation. If a high level condition is presented at any time, a pump run cycle will be activated.
        2. High System Pressure Protection: 20 minute lockout cycle prevents motor from operating and illuminates an LED when pressure in the discharge line is atypically high (closed valve or abnormal line plug). Condition is rechecked every 20 minutes. If condition is satisfied, pump is allowed to cycle normally but LED remains latched. If condition is not satisfied after 3 consecutive attempts, the pump is locked out indefinitely until condition is removed and power is reset. LED will remain latched until pump breaker is turned off and then on again (reset). The audible and visual alarm will be activated.
      1. In all the above cases, if more than one error condition is presented, LED depicting the most recent error condition will be displayed.
      2. Other Included Features:
         1. Alarm Activated Dry Contacts: Normally open relay contact closes upon alarm activation.
         2. Alarm Activated Contacts for Remote Indoor Alarm Module: Works with or without power to alarm panel. Designed to work with E/One's Remote Sentry.
         3. Includes Inner Door Dead Front.
         4. Separate LEDs for each condition.

\*\* NOTE TO SPECIFIER \*\* Optional. Delete if not required.

* + 1. Sentry Simplex Protect Plus:
       1. All Sentry Protect features as detailed above.
       2. High/Low voltage monitoring with trouble indication.
       3. High/Low wattage. Monitoring with trouble indication. Wattage is used instead of current because it is a better indicator of pump performance.
       4. Extended run time monitoring with trouble indication.
       5. Cycle/Event counter.
       6. Run-time counter. Hour meter.
       7. Run-time limit. Time adjustable, user selected options: 10 minutes (default) to 120 minutes in 1 minute intervals.
       8. Power-up Delay. Time adjustable, user selected options: None (default), to 300 minutes in 1 minute intervals.
       9. Alarm Delay. Time adjustable, user selected options: None (default) or adjustable in 1 minute intervals
       10. System self-test diagnostic.
       11. User selectable alarm latch.
       12. User selectable protect mode disable.
       13. User selectable buzzer timer.
       14. Specific Protect PLUS indicators and programming features shall include:
           1. Ready LED to indicate AC power to the station is satisfactory.
           2. Pump Run LED to indicate pump is operating.
           3. Trouble LED indicator and predictive Visual Alarm notification ("blinking" alarm lamp; clears on Normal cycle).
           4. High Level Alarm LED indicator.
           5. Manual Run switch to manually activate pump.
           6. Menu-driven programmable controller with navigation overlay-type buttons (Enter, Scroll, Up, Down).
           7. Normal Operation LED and Mode button for Mode status.
           8. Pump Performance menu LED with LCD Display of the following pump performance statistics:

Real-time voltage, real-time amperage, and Real-time wattage.

Minimum/maximum/average voltage, amperage, and wattage.

Minimum/maximum Run-time.

Average Run-time.

Last run-time.

Cycle/event counter.

Run time counter. Hour meter.

* + - * 1. Diagnostics Menu LED.
        2. Initialize System Menu LED.
        3. Run Limit Menu LED.
        4. Alarm Delay Menu LED.
        5. Power Delay Menu LED.

\*\* NOTE TO SPECIFIER \*\* Paragraph applies to hardwired version. Delete options not required.

* + 1. Duplex Station - Hard Wired: MOD T260 DUPLEX:
       1. UL-Listed Control and Alarm Panel: Suitable for wall or pole mounting. Push-to-run feature, internal run indicator, and complete alarm circuit.
          1. NEMA 4X Thermoplastic Enclosure (WxHxD): 12.5 x 16 x 7.5 inches. Hinged, lockable cover with padlock,
          2. Circuit Breakers: One 15-amp single pole for alarm circuit. One 15-amp double pole per core for power circuit.
          3. Circuit Boards: Conformal coating, both sides.
          4. AC Power Circuit: Auto resetting fuse.
          5. Visual Alarm Lamp: Inside Red Oblong Lens (LxWxH): 3.75 x 2.38 x 1.5. Mounted to top of enclosure as to maintain NEMA 4X rating.
          6. Audible Alarm: Externally mounted on bottom of enclosure. Capable of 93 dB at 2 ft. Deactivate Alarm: Depress a push-type switch encapsulated in weatherproof silicone boot and mounted on bottom of enclosure.
          7. High-Level Alarm System Operation:

Panel goes into alarm mode if a pump alarm switch closes. During Initial Alarm Mode: Both pumps run, and alarm light and buzzer are delayed for period of time based on user settings (default is 3-1/2 minutes). If station is still in high-level alarm after delay, the light and buzzer activate.

Audible Alarm: Silenced by externally mounted push-to-silence button.

Visual Alarm: Remains illuminated until sewage level in wet well drops below "Off" setting of alarm switch for both pumps.

* + - * 1. The alarm panel, as manufactured including any of the following options is to be listed by Underwriters Laboratories, Inc.

\*\* NOTE TO SPECIFIER \*\* Paragraph applies to wireless version. Delete options not required.

* + 1. Duplex Station - Wireless: MOD T260 DUPLEX:
       1. UL-Listed Control and Alarm Panel: Suitable for wall or pole mounting. Push-to-run feature, an internal run indicator, and a complete alarm circuit.
          1. NEMA 4X, thermoplastic or fiberglass enclosure with a hinged lockable cover with padlock.
          2. Circuit Breakers: One 15-amp single pole for alarm circuit. One 15-amp double pole per core for power circuit.
          3. Circuit Boards: Conformal coating, both sides.
          4. AC Power Circuit: Auto resetting fuse.
          5. The control/alarm panels shall include the following features:

Terminal blocks & ground lugs

Alarm Dry Contacts

Lead/Lag indicator lights

Alarm indicator lights

Run indicator lights

Manual Push-to-Run

* + - * 1. Visual Alarm: Inside red fluted lens, 2-5/8 inch diameter by 1-11/16 inches in height. Mounted on top of enclosure in a manner to maintain NEMA 4X rating.
        2. Audible Alarm: Externally mounted on bottom of enclosure. Capable of 93 dB at 2 ft. Deactivate alarm by depressing a push-type switch encapsulated in a weatherproof silicone boot and mounted on bottom of enclosure.
        3. High-Level Alarm System Operation:

Panel goes into alarm mode if a pump alarm switch closes. During Initial Alarm Mode: Both pumps run, and alarm light and buzzer are delayed for period of time based on user settings (default is 3-1/2 minutes). If station is still in high-level alarm after delay, the light and buzzer activate.

Audible Alarm: Silenced by externally mounted push-to-silence button.

Visual Alarm: Remains illuminated until sewage level in wet well drops below "Off" setting of alarm switch for both pumps.

* + - * 1. The alarm panel, as manufactured including any of the following options is to be listed by Underwriters Laboratories, Inc.

\*\* NOTE TO SPECIFIER \*\* The following items are optional. Delete options not required.

* + - * 1. Generator Receptacle and Auto Transfer: 20 amp, 250 VAC. Spring-loaded, gasketed cover, provides access for connection of external generator while maintaining a NEMA 4X rating.

Automatic Transfer Switch: Switches from AC to generator power. Power is provided to alarm panel through generator receptacle whenever power is present at receptacle, allowing audible and visual alarms to function in generator mode. When power is not applied to generator receptacle, panel is switched back to AC Mains power.

No manual switching required in panel enclosure to switch from generator to AC Mains. Cannot be left in generator position after pumping down station in generator mode as is the case with a manual transfer switch.

* + - * 1. Service Equipment/Main Service Disconnect Breaker: Separate, internal breaker rated and approved as "service equipment" and acts as a main service disconnect of grinder pump station.

\*\* NOTE TO SPECIFIER \*\* Applies to hardwired versions. Delete if not required.

* + - * 1. Remote Sentry Indoor Alarm Module: Separate, remote indoor alarm module indicates a high level alarm with or without AC power to grinder pump station.

Internal power source enables its continued operation without AC power.

Audible and Visual Alarm: Resets if high level alarm condition is eliminated. Includes a Silence button for audible alarm and Test button.

\*\* NOTE TO SPECIFIER \*\* Applies to wireless versions. Delete if not required.

* + - * 1. Remote Sentry Indoor Alarm Module: Separate, remote indoor alarm module indicates a high level alarm when AC power is applied to grinder pump station, and a power loss alarm when no power is applied.

Internal power source enables its continued operation without AC power.

Audible and Visual Alarm: Resets if high level alarm or power loss condition is eliminated. Includes a Silence button for audible alarm and Test button.

* + - * 1. Run-time/Hour Meter: Displays total run-time or operation time for pump core.
        2. Event/Cycle Counter: Displays number of operations of pump core.

\*\* NOTE TO SPECIFIER \*\* Applies to hardwired versions. Delete options not required.

* + - * 1. External Autodialer:

Four separate voice message alarm zones.

Calls up to 8 telephones, cell phones or pagers.

Built-in line seizure.

Remote Turn Off feature allows termination of activated channel.

EEPROM Memory retains program despite power loss.

Listen-in verification and communication.

Universal dial tone.

Built-in auxiliary output to drive external siren, strobe, or relay.

Five optional settings for notifications of a power loss occurrence: Instantaneous, 15 minutes, 2 hours, 12 hours, or 24 hours.

One Channel: Power-loss sensing. 3 Hardwired Channels: Additional input.

Dialer senses loss of power and based on setting; will notify parties of loss condition only when specified time has elapsed.

If power restores before set time has elapsed, no call will be made.

Package includes battery backup and transformer

* + 1. Duplex Protect Plus: For each grinder pump station.
       1. Alarm Panel (WxHxD): 12.5 x 16 x 7.5 inch maximum. Thermoplastic NEMA 4X, UL-listed for wall or pole mounting. Cover: Hinged and lockable with padlock. One 15 amp single pole circuit breaker for alarm circuit. One 15-amp double pole circuit breaker per core for power circuit. Push-to-run feature, internal run indicator, and complete alarm circuit. Circuit boards in alarm panel to be protected with conformal coating on both sides. AC power circuit includes an auto resetting fuse.
       2. Visual Alarm Lamp Inside Red, Oblong Lens (LxWxH): 3.75 x 2.38 x 1.5 inch. Mounted to top of enclosure in a manner to maintain NEMA 4X rating.
       3. Audible Alarm: Externally mounted on bottom of enclosure, capable of 93 dB at 2 ft. Deactivate by depressing a push-type switch encapsulated in weatherproof silicone boot and mounted on bottom of enclosure.
       4. High-level alarm system shall operate as follows:
          1. Panel goes into alarm mode if either pump's alarm switch closes. During initial alarm mode both pumps will run, and alarm light and buzzer will be delayed for a period of time based on user settings (default is 3-1/2 minutes). If station is still in high-level alarm after delay, the light and buzzer will be activated.
          2. Audible alarm may be silenced by externally mounted push-to-silence button.
          3. Visual alarm remains illuminated until sewage level in wet well drops below "off" setting of alarm switch for both pumps.
       5. Alarm panel, including any of the following options to be listed by Underwriters Laboratories, Inc.

\*\* NOTE TO SPECIFIER \*\* The following items are optional. Delete options not required.

* + - 1. Contains the following Features:
         1. Alarm Activated Dry Contacts: Normally open relay contact closes upon alarm activation.
         2. Alarm Activated Contacts for Remote Indoor Alarm Module: Works with or without power to alarm panel. Works with E/One's Remote Sentry.
         3. Includes inner door dead front.
         4. Separate LEDs for each condition.
      2. Provides protection from following operating conditions:
         1. Low Voltage (Brownout) Protection: Lockout cycle prevents motor from operating and illuminates the Trouble LED.

Incoming AC Mains voltage drops below a predetermined minimum, typically 12 percent of nameplate voltage, for 2 to 3 seconds, regardless of whether motor is running

Lockout cycle ends if incoming AC Mains voltage returns to predetermined value, typically 10 percent of nameplate voltage.

* + - * 1. System retests voltage every second indefinitely. If lockout cycle is initiated and voltage comes back above predetermined starting voltage, the system will function normally.

Trouble LED: Remains illuminated during Brownout conditions and corresponding Brownout message displays on LCD screen.

LED turns off when Brownout condition ends, and LCD message remains latched until panel is reset. Audible and visual alarms will not activate unless there is a high wastewater level in tank.

* + - * 1. Run Dry Protection: 20 minute lockout cycle prevents motor from operating and illuminates the Trouble LED when tank wastewater level is below pump inlet shroud. A Run Dry message displays on LCD screen. Condition is rechecked every 20 minutes. LCD message remains latched. If condition is fixed, pump cycles normally and the Trouble LED goes out, but LCD message remains until panel is reset. If condition is not satisfied after 3 consecutive attempts, visual alarm activates until panel is reset or until there is one cycle of normal operation. If a high level condition is presented at any time, a pump run cycle is activated.
        2. High System Pressure Protection: 20 minute lockout cycle prevents motor from operating and illuminates an LED when pressure in the discharge line is atypically high (closed valve or abnormal line plug). Condition is rechecked every 20 minutes. If condition is satisfied, pump is allowed to cycle normally but LED remains latched. If condition is not satisfied after 3 consecutive attempts, the pump is locked out indefinitely until condition is removed and power is reset. LED will remain latched until pump breaker is turned off and then on again (reset). The audible and visual alarm will be activated.
      1. In all the above cases, if more than one error condition is presented, the LCD message depicting the most recent error condition will be displayed.
      2. Protect Plus Features:
         1. High/Low voltage monitoring with trouble indication.
         2. High/Low wattage monitoring with trouble indication.
         3. Extended run time monitoring with trouble indication.
         4. Cycle/event counter.
         5. Run time counter (Hour meter).
         6. Run Time Limit: Time adjustable, user-selected options: 10 minutes (default) to 120 minutes in 1 minute intervals.
         7. Power-Up Delay: Time adjustable, user-selected options: None (default), to 300 minutes in 1 minute intervals.
         8. Alarm Delay: Time adjustable, user-selected options: 0 to 10 minutes in 30 second increments; 4 minutes is default.
         9. System self-test diagnostic.
         10. User-selectable Alarm latch.
         11. User-selectable protect mode disable.
         12. User-selectable buzzer timer.
      3. Specific Duplex Protect PLUS indicators and programming features will include:
         1. Ready LED to indicate AC power to station is satisfactory.
         2. Pump Run LED to indicate pump is operating (LCD indicates which pump is running).
         3. Trouble LED indicator and predictive Visual Alarm notification ("blinking" alarm lamp; clears on Normal cycle).
         4. High Level Alarm LED indicator (LCD indicates which pump is in alarm).
         5. Manual Run switch to manually activate pumps.
         6. Lead/Lag indication (LCD indicates which pump is lead).
         7. Menu-driven programmable controller with navigation overlay-type buttons (Enter, Scroll, Up, Down).
         8. Normal Operation LED and Mode button for Mode status.
         9. Pump Performance menu LED with LCD display of the following pump performance statistics:

Real-time voltage, real-time amperage, and Real-time wattage.

Minimum/maximum/average voltage, amperage, and wattage.

Minimum/Maximum run-time.

Average run-time.

Last run-time.

Cycle/event counter.

Run time counter (Hour meter).

* + - * 1. Diagnostics menu LED.
        2. Initialize system menu LED.
        3. Run limit menu LED.
        4. Alarm delay menu LED.
        5. Power delay menu LED.
        6. Pump alternating options (no alternation, adjustable time based and test).
        7. Pump alternating time options: 24 to 72 hours in 12-hour increments.
      1. Generator Receptacle and Auto Transfer: 20 amp, 250 VAC with spring-loaded gasketed cover provides access for connection of external generator while maintaining a NEMA 4X rating. Automatic transfer switch from AC to generator power. Power is provided to alarm panel through generator receptacle whenever power is present at receptacle. When power is no longer applied to generator receptacle, panel switches back to AC Mains power. No manual switching is needed to switch generator power back to AC Mains.
      2. Service Equipment/Main Service Disconnect Breaker: Separate, internal breaker rated and approved for use as "service equipment" acts main service disconnect of grinder pump station.

\*\* NOTE TO SPECIFIER \*\* Applies to hardwired verDelete options not required.

* + - 1. Remote Sentry Indoor Alarm Module: Indicates a high level alarm with or without AC power to grinder pump station. Internal power source enables continued operation without AC power. Audible and visual alarms will reset if high level alarm condition is eliminated. Includes a Silence button for audible alarm and a Test button.

\*\* NOTE TO SPECIFIER \*\* Applies to wireless versions. Delete options not required.

* + - 1. Remote Sentry Indoor Alarm Module: Indicates a high level alarm when AC power is applied to grinder pump station, and power loss alarm when no power is applied. Internal power source enables continued operation without AC power. Audible and visual alarms will reset if high level alarm or power loss condition is eliminated. Includes a Silence button for audible alarm and a Test button.
      2. External Autodialer:
         1. Four separate voice message alarm zones.
         2. Calls up to 8 telephones, cell phones or pagers.
         3. Built-in line seizure.
         4. Remote Turn Off feature allows termination of activated channel.
         5. EEPROM Memory retains program despite power loss.
         6. Listen-in verification and communication.
         7. Universal dial tone.
         8. Built-in auxiliary output to drive external siren, strobe, or relay.
         9. Five optional settings for notifications of a power loss occurrence: Instantaneous, 15 minutes, 2 hours, 12 hours, or 24 hours.
         10. One Channel: Power-loss sensing. 3 Hardwired Channels: Additional input.
         11. Dialer senses loss of power and based on setting; will notify parties of loss condition only when specified time has elapsed.
         12. If power restores before set time has elapsed, no call will be made.
         13. Package includes battery backup and transformer
    1. Serviceability: Two lifting hooks with lift-out harness connected to top housing of grinder pump core, for core removal when necessary. Level sensor assembly must be easily removed from pump assembly for service or replacement. Mechanical and electrical connections must provide easy disconnect for core unit removal and installation. Each EQD half must include a water-tight cover to protect internal electrical pins while EQD is unplugged. Pump push-to-run feature for field trouble shooting must operate pump even if level sensor assembly is removed from pump assembly. Motor control components to be mounted on a readily replaceable bracket for ease of field service.
    2. OSHA Confined Space: Maintenance tasks for grinder pump station must be possible without entry into grinder pump station as per OSHA 1910.146, permit-required confined spaces. "Entry: Action by which person passes through opening into a permit-required confined space. Includes ensuing work activities in that space and considered to occur as soon as any part of entrant's body breaks plane of an opening into the space."
    3. Safety: Grinder pump to be free from electrical and fire hazards as required in residential environments. The completely assembled and wired grinder pump station must be listed by Underwriters Laboratories, Inc., to be safe and appropriate for intended use.
       1. Grinder Pump: Meet standards for plumbing equipment for use in or near residences. Be free of noise, odor, or health hazards, and tested by independent laboratory certifying its capability to perform as specified in individual or low pressure sewer system applications. As evidence of compliance, grinder pump to bear seal of NSF International. Third-party testing to NSF standard is not acceptable.

1. EXECUTION
   1. FACTORY TESTING:
      1. Each Grinder Pump: Submerge and operate for 90 seconds. Test Ancillary Components: Anti-siphon valve, check valve, discharge assembly, and dedicated level and motor controls. Test appurtenances and controls assembled to or field installed on each pump. Certified Test Results: By request showing operation of grinder pump at two points on its curve. Leak Test Complete Stations: Ensure integrity of joints, seams, and penetrations. Necessary penetrations, inlets, discharge fittings and cable connectors to be included in this test along with their respective sealing means, grommets, gaskets etc. Validation Tests: Integral level control performance, continuity to ground and acoustics tests. Engineer and Owner representative may inspect testing procedures, at manufacturer's facility.
   2. CERTIFIED SERVICE PROGRAM
      1. Manufacturer must implement a program as described in this specification to certify service companies as authorized serviced centers. Manufacturer will provide, upon request, evidence they have maintained a service department for 30 years and employ 5 employees in the service department.
         1. Manufacturer must annually evaluate service technicians and service organizations.
         2. Service Companies: Authorized by Manufacturer to make independent warranty judgments. Areas covered by program to include, as a minimum:
            1. Pump Population Information: Service companies will maintain detailed databases for grinder pumps in territory tracking serial numbers by address.
            2. Inventory Management: Service companies must maintain an appropriate level of inventory including regular inventory reviews and proper inventory labeling. Maintain a spare parts inventory and spare cores on service vehicles.
            3. Service Personnel Certification: Technicians will annually maintain their level-specific certification in field troubleshooting, repair, and training.
            4. Service Documentation and Records: Start up sheets, service call records, and customer feedback will be recorded and available by the service company.
   3. INSTALLATION - INDOOR UNITS
      1. Per Manufacturers installation instructions. User instructions will be given to homeowner.
      2. 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 pipe lateral outside the home between the pump discharge and the street main on all installations.
      3. Electrical enclosure to be furnished, installed, and wired to grinder pump station by the Contractor. Alarm device is required on every installation. Contractor and Engineer will coordinate with individual property owners to determine optimum location for Alarm Panel.
      4. Mount alarm panel per applicable codes. Connect panel to grinder pump station by conductor cable per Contract Drawings. Place power and alarm on separate power circuits.
   4. INSTALLATION - HARDWIRED AND WIRELESS UNITS
      1. General:
         1. Assemble compression fittings per manufacturer's recommendations.
         2. Trench and trench bottom: Constructed in accordance with ASTM D2321. Embedment Materials: Class I, II or III materials as defined in ASTM D2321. Class IV or V materials is allowed only with approval of Specifying Engineer.
         3. Bedding of Pipe: Per ASTM D 2321.
         4. Compaction: Per ASTM D 2321. Deviations approved by Specifying Engineer.
         5. Haunching and Initial Backfill: Per ASTM D 2321; Class I, II or III materials.
         6. Compaction Materials: Where 85 percent Standard Proctor Density compaction is not attainable, Specifying Engineer may wish to increase SDR of pipe to provide adequate stiffness. ASTM D 2321 sections titled "Minimum Cover for Load Application," "Use of Compaction Equipment", and "Removal of Trench Protection" apply unless directed otherwise by Specifying Engineer.
      2. Earth excavation and backfill are specified under site work but .are also to be done as a part of the work in this section, including any necessary sheeting and bracing.
         1. Contractor is responsible for handling ground water providing firm, dry subgrade for structure, and guard against flotation or damage from general water or flooding.
         2. Grinder pump stations are not set into excavation until installation procedures and excavation have been approved by the Engineer.
         3. Remove packing material. Give user instructions to Owner. Hardware supplied with unit, if required, will be used at installation. Basin will be supplied with 4 inch inlet grommet (4.50 inch OD) for connecting incoming sewer line. Appropriate inlet piping must be used. Basin may not be dropped, rolled, or laid on its side.
         4. Install so 1 to 4 inches of accessway, below bottom of lid, extends above finished grade line. Finished grade to slope away from unit. Diameter of excavated hole must be large enough to allow for concrete anchor.
         5. A 6 inch layer of naturally rounded aggregate, clean and free flowing, with particle size not less than 1/8 or more than 3/4 inches to be used as bedding material under units.
         6. Concrete anti-flotation collar, as detailed on drawings, and sized per manufacturer's instructions, to be pre-cast to grinder pump or poured in place. Grinder pump stations with pre-cast anti-flotation collars to have three lifting eyes for loading and unloading.
         7. If concrete is poured in place, unit to be leveled, and filled with water, to bottom of inlet, to prevent unit from shifting while concrete is poured. Manually vibrate concrete to ensure there are no voids. If necessary to pour concrete to a level higher than inlet piping, an 8 inch sleeve is required over inlet prior to pouring concrete.
         8. Install 4 ft piece of 4 inch SCH 40 PVC pipe with watertight cap, to stub-out inlet for installation contractor, as depicted on Contract Drawings.
         9. E/One requires 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 pipe lateral outside the home between pump discharge and street main.
         10. Electrical Enclosure: Furnished, installed, and wired to grinder pump station by Contractor. Alarm device is required on every installation. Contractor and Engineer are to coordinate with property owners to determine optimum location for Alarm Panel.
         11. Mount alarm device in conspicuous location, per national and local codes. Connect alarm panel to grinder pump station by a length of 6 conductor type TC cable as shown on Contract Drawings. Power and alarm must be on separate power circuits. Grinder pump stations will be provided with 32 feet of useable, electrical supply cable to connect station to alarm panel. Cable is supplied with factory installed EQD half to connect to mating EQD half on core.
   5. BACKFILL REQUIREMENTS:

\*\* NOTE TO SPECIFIER \*\* Backfill Classes I or II. Class 1A and 1B where frost heave is a concern. Class 1B is preferred when native soil is sand or if a high, fluctuating water table is expected. Class 1, angular crushed stone does not require compaction. Class II: Rounded stone, may require compactive effort, or tamping, to achieve proper density. If 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 acceptable. If unsure of native soil consistency obtain a geotechnical evaluation of material before specifying backfill. Another Option: Flowable fill, low slump concrete is referred 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. Heavy, non-compactible clays and silts are not suitable backfill for underground structures such as inlet or discharge lines.

* + 1. Backfill: Per ASTM D2321. \_\_\_\_\_\_\_\_\_. Surround unit to grade with backfill.
       1. Compact backfill in lifts of 1 ft to reach a final Proctor Density between 85 and 90 percent. Improper backfilling may damage accessways. Install grinder pump stations at minimum depth from grade to top of the 1-1/4 inch discharge line, to assure maximum frost protection. Finish Grade Line: 1 to 4 inches below bottom of lid. Final grade to slope away from grinder pump station.
       2. Restoration: Contractor's responsibility. Include per unit costs in bid price for individual grinder pump stations. Items to be restored to original condition in all respects, include, but not limited to, curb and sidewalk replacement, landscaping, loaming, and seeding, and traveled pathways, as directed by the Engineer.
  1. START-UP AND FIELD TESTING:
     1. Manufacturer will provide services of qualified factory trained technicians to inspect placement and wiring of stations, perform field tests, and instruct Owner's personnel in operation and maintenance of equipment before stations are accepted by Owner.
     2. Equipment and materials to perform testing to be the responsibility of Installing Contractor. Includes, at minimum a portable generator and power cable if temporary power is required, water in each basin, of sufficient depth to verify high level alarm is operating and opening of System valves. Complete these steps prior to qualified factory trained technicians arrival.
     3. Services of trained factory-authorized technician to be provided at a rate of 40 hours for every 100 grinder pump stations supplied.
     4. Upon installation completion, authorized factory technicians will perform the following test on each station:
        1. Make certain discharge shut-off valve in station is fully open.
        2. Turn ON alarm power circuit and verify alarm is functioning properly.
        3. Turn ON pump power circuit. Initiate pump operation to verify automatic "on/off" controls are operative. Pump should immediately turn ON.
        4. Consult Manufacturer's Service Manual for detailed start-up procedures.
     5. Upon completion of start-up and testing, Manufacturer will submit to Engineer, start-up authorization form describing results of tests performed for each grinder pump station. Final acceptance of system will not occur until authorization forms have been received for each pump station installed and any installation deficiencies corrected.

END OF SECTION