SIMPLEX GRINDER PUMP STATION POLICY

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ISLE OF PALMS WATER & SEWER COMMISSION

1300 PALMS BLVD, ISLE OF PALMS, SC 29451 **(843) 886-6148**

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SIMPLEX GRINDER PUMP STATION DESIGN REQUIREMENTS AND SUBMITTALS

All applicants shall fill out the Grinder Pump Application to connect to the Commission's system. The Commission will provide quote for the Isle of Palms Water and Sewer Commission (IOPWSC) fees according to the most recently approved rate schedule. Applicant shall select a professional engineer licensed in the state of South Carolina to design the grinder pump system and submit the application package (application, drawings, specifications, calculations, and associated fees) to the Commission for review and approval. The site plans including, but not limited to, architectural and landscaping plans shall also be submitted for review if new construction. No exceptions will be made to the easement requirements without proper documentation that the standard easement is not possible. New construction should design buildings, structures, access, around the easement. All grinder pump system designs shall be in accordance with the most recent IOPWSC design specifications and requirements. All new systems shall prove that it is not feasible to connect to the IOPWSC gravity sewer system by providing the distance to the nearest gravity sewer system taking into account private easements are allowed to access the public system, the reason for the inability to connect, and if it is a regulatory hindrance, please provide written correspondence or official documentation from the agency showing denial of access or the proposed system. Failure to submit a complete application may delay the review and/or approval.

Upon approval by IOPWSC, the engineer shall submit an application package in the Owner's name to the South Carolina Department of Environmental Control (SCDHEC) for a construction permit. If required, he engineer shall also submit an application to the South Carolina Department of Transportation (SCDOT) for an encroachment permit. Once all permits are received, the Owner must execute the grinder pump agreement, the grinder system easement agreement, and the grinder maintenance agreement. If the grinder system is connected to a gravity sewer system, then the maintenance agreement is not required. The Owner will then be responsible for all of the operations and maintenance. Grinder agreements will be returned to the engineer for recording at the Charleston County RMC Office. The original recorded document shall be returned to the Commission for filing in the Owner's account file.

The Owner and/or engineer shall select an appropriately licensed contractor to install the grinder system. A registered land surveyor shall prepare a plat showing the station's easement on property. The plat shall be submitted to the IOPWSC for approval and signature. The plat will be returned to engineering firm. The easement plat shall be recorded at the Charleston County RMC office with the Easement Agreement. The original recorded agreement along with plat to the Commission office shall be returned to the Commission.

A pre-construction meeting shall then be scheduled with the Commission staff, contractor, and engineer. Any contractor or Owner who begins construction prior to all permits and approvals being received, shall be subject to disconnection of the property's water service, fees, and/or the project may be delayed. The contractor shall install the system and perform all required testing on the system. Once all permit conditions have been satisfied, as-builts of the system will be required (paper and digital copies) which accurately identifies the location and distances (using state plane coordinates) of all associated infrastructure. The owner and engineer shall then apply for a Permits to Operate from the Commission and/or SCDHEC. Construction permits and grinder pump applications shall only be valid for a period of two years.

If the Owner, after written notification, discharges items into the sewer system that are not suitable for the system such as wipes, grease, rags, etc. that cause repeated maintenance or a sanitary service overflow, water service to the home may be disconnected until the Commission is confident that the abuse of the system will not continue and the Owner's actions are no longer a potential for future overflows or environmental contamination. Fines in access of the clean-up, repair, and maintenance costs, in accordance with the most recent IOPWSC rate schedule, may also be charged to the Owner.

I. GENERAL:

Simplex Grinder Pump Stations shall be as manufactured by Environment One Corporation or approved equal. Requests for variations from these standards must be submitted in writing to the Isle of Palms Water & Sewer Commission.

Environment One Corporation Grinder Pump Stations are available from:

Covalen
6929 Brookville Rd.
Indianapolis, IN 46239
Tele: 877-770-8277

South Carolina Division
3981 Walnut Street
Loris, SC 29569
Tele: 843-331-2205

Simplex station shall be provided complete with grinder pump suitably mounted in a basin constructed of fiberglass or high-density polyethylene (HDPE), electrical disconnect (NEMA 4X), pump removal system, shut off valve, anti-siphon valve, and check valve assembled within the basin, remote electrical alarm/disconnect panel, and all necessary internal wiring and controls.

All Grinder Pump Stations must be designed by a Registered Professional Engineer, licensed to do business in the State of South Carolina. The design and installation of the grinder pump station must meet all applicable DHEC requirements and must be approved by both the Isle of Palms Water & Sewer Commission and DHEC.

II. OPERATING CONDITIONS:

The pumps should be capable of delivering 15 gpm against a rated total dynamic head of 0 feet (0 psig) and 9 gpm against a rated total dynamic head of 138 feet (60 psig). The pump must be capable of operating at negative total dynamic head without overloading the motor. Under no conditions shall in-line piping or valving be allowed to create a false apparent head.

III. PUMP:

The pump shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the progressing cavity type with mechanical seal. The rotor shall be through-hardened, highly polished, precipitation hardened stainless steel. The stator shall be of a specifically compounded ethylene propylene synthetic elastomer. The material shall be suited for domestic wastewater service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, good aging properties, and outstanding wear resistance.

IV. GRINDER:

The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece 316 stainless steel motor shaft. The grinder impeller assembly shall be securely fastened to the pump motor shaft. The grinder will be of the rotating type with a stationary hardened and ground chrome steel shredding ring spaced in accurate close annular alignment with driven impeller assembly, which shall carry two hardened type 400 series stainless steel cutter bars. This assembly shall be dynamically balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so to eliminate clogging and jamming under all normal operating conditions including starting. Sufficient vortex action shall be created to scour tank fee of deposits or sludge banks, which would impair the operation of the pump. In conjunction with the pump, these requirements shall be accomplished by the following:

1. The grinder shall be positioned in such a way that solids are fed in an upward direction;
2. The inlet shroud shall have a diameter no less than 5 inches;
3. At maximum flow the average inlet velocity must not exceed 0.2 feet per second; and
4. The impeller mechanism must rotate at a nominal speed of not greater than 1800 rpm.

The grinder shall be capable of reducing all components in normal domestic sewage including a reasonable amount of foreign objects, such as paper, wood, plastic, glass, rubber, and the like, to finely divided particles which will pass freely through the passages of the pump and the 1-1/4" diameter s/s discharge piping.

V. ELECTRIC MOTOR:

As a minimum, the motor shall be a 1 HP, 1725 RPM, 240 VOLT 60 HERTZ, 1 Phase, capacitor start, ball bearing, squirrel cage induction type with a low starting current not to exceed 30 amperes and high starting torque of 8.4 foot pounds. Inherent protection against running overloads or locked rotor conditions for the pump motor shall be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. This motor protector combination shall have been specifically investigated and listed by Underwriters Laboratories, Inc. for the application.

VI. MECHANICAL SEAL:

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

VII. TANK AND INTEGRAL ACCESSWAY:

The tank shall be made of high-density polyethylene of a grade selected for environmental stress cracking resistance. Corrugated sections are to be made of a double wall construction with the internal wall being generally smooth to promote scouring. All seams created during tank construction are to be thermally welded and factory tested for leak tightness. Tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth. All station components must function normally when exposed to maximum external soil and hydrostatic pressure.

The tank shall be furnished with one EPDM grommet fitting to accept a 4.5" OD DWV pipe. Tank capacities shall be determined by the engineer.

The access way shall be an integral extension of the wet well assembly and include a lockable cover assembly providing low profile mounting and watertight capability. Access way design and construction shall facilitate field adjustment of station height in increments of 4" or less without the use of any adhesives or sealants requiring cure time before installation can be completed.

The station shall have all necessary penetrations molded in and factory sealed. No field penetrations shall be acceptable.

All discharge piping shall be constructed of 304 Series Stainless Steel and terminate outside the access way bulkhead with a stainless steel, 1 1/4" female NPT fitting. The discharge piping shall include a stainless-steel ball valve rated for 200 psi WOG. The bulkhead penetration shall be factory installed and warranted by the manufacturer to be watertight.

The access way shall include a single NEMA 4X electrical quick disconnect for all power and control functions, factory installed, with access way penetrations warranted by the manufacturer to be watertight. The access way shall also include a 2" PVC vent to prevent sewage gases from accumulating in the tank.

VIII. CHECK VALVE:

The pump discharge shall be equipped with a factory installed, gravity operated flapper-type integral check valve built into the stainless-steel discharge piping. The check valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Working parts will be made of a 300-series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A non-metallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low backpressure. The valve body shall be an injection-molded part made of glass filled PVC.

Each grinder pump station shall also include one separate check valve for installation in the 1 1/4" service lateral between the grinder pump station and the sewer main, preferably near the curb stop.

IX. CORE UNIT:

The grinder pump station shall have cartridge type easily removable core assemblies containing pump, motor, grinder, controls, check valve, anti-siphon valve, electrical quick disconnect and wiring. The watertight integrity of the core unit shall be established by 100% factory test at a minimum of 5 psig.

X. CONTROLS:

Necessary controls should be located in the top housing of the core unit. The top housing will be attached with stainless steel fasteners.

Non-fouling wastewater level detection for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air-bell level sensor connected to a pressure switch. The level detection device shall have no moving parts in direct contact with the wastewater. High-level sensing will be accomplished in the manner detailed above by a separate air-bell sensor and pressure switch of the same type.

To assure reliable operation of the pressure sensitive switches, each core shall be equipped with a breather assembly, complete with a suitable means to prevent accidental entry of water into the motor compartment.

The grinder pump will be furnished with a length of 6 conductors, 12 gauge, type SJOW cable; pre-wired and watertight to meet UL requirements.

XI. ALARM AND DISCONNECT PANEL:

Each grinder pump station shall include a NEMA 4X UL listed ALARM/DISCONNECT PANEL suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic to assure corrosion resistance. The enclosure shall include a hinged padlocked cover, secured dead front and component knockouts. The enclosure shall not exceed 7.5"W x 8.75"H x 3.75"D. A disconnect shall be provided outside the building to provide a means of disconnecting power to the Alarm/Disconnect panel at the pump.

For each core, the panel shall contain one (1) 15 amp, double pole circuit breaker for the power circuit and one (1) 15-amp single pole circuit breaker for the alarm circuit. The panel shall contain terminal blocks, integral power bus, push to run feature and a complete alarm circuit.

The Alarm/Disconnect Panel shall include the following features: Audio & visual alarm, push to run switch, runtime hour meter, and high level (redundant) pump starting control. The alarm sequence is to be as follows:

1. When liquid level in the sewage wet-well rises above the alarm level, visual and audio alarms will be activated. The contacts on the alarm pressure switch will close. The redundant pump starting system will be energized;
2. The audio alarm may be silenced by means of the externally mounted push-to-silence button; and
3. Visual alarm remains illuminated until the sewage level in the wet-well drops below the "off" setting of the alarm pressure switch.

The visual alarm lamp shall be inside a red fluted lens at least 2 5/8" in diameter and 1 11/16" in height. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating.
The audio alarm shall be a printed circuit board in conjunction with an 86-dB buzzer with quick mounting terminal strip mounted in the interior of the enclosure. The audio alarm shall be capable of being deactivated by depressing a push-type switch, which is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosures.

The entire Alarm/Disconnect Panel as manufactured shall be listed by Underwriters Laboratories, Inc.

XII. SERVICEABILITY:

The grinder pump core unit shall have two lifting hooks complete with nylon lift-out harness connected to its top housing to facilitate easy core removal when necessary. All mechanical and electrical connections must provide easy disconnect accessibility for core unit removal and installation. A push to run feature will be provided for field troubleshooting. All motor control components shall be mounted on a readily replaceable bracket for ease of field service.

XIII. CORROSION PROTECTION:

All materials exposed to wastewater shall have inherent corrosion protection: i.e., epoxy powder coated ductile iron, stainless steel, or HDPE. No PVC pipe or fittings shall be used between the isolation valve and the pump station without prior approval from the Commission. All stainless steel shall be 316 stainless steel.

XIV. SAFETY:

All maintenance tasks for the grinder pump station must be possible without entry into the grinder pump station as per OSHA 1910.146.

The grinder pump shall be free from electrical and fire hazards as required in a residential environment. As evidence of compliance with this requirement, the completely assembled and wired grinder pump station in its tank shall be listed by Underwriters Laboratories, Inc. to be safe and appropriate for the intended use.

The grinder pump shall meet accepted standards for plumbing equipment for use in or near residences, shall be free from noise, odor, or health hazards, and have been tested by an independent laboratory to certify its capability to perform as specified in either individual or low-pressure system applications. As evidence of compliance with this requirement, the grinder pump shall bear the National Sanitation Foundation seal.

XV. REQUIRED FACTORY TESTS:

Each grinder pump shall be submerged and operated for 5 minutes (minimum). Included in this procedure will be the testing of all ancillary components such as the anti-siphon valve, check valve, discharge line, level sensors and each unit's dedicated controls. A common set of appurtenances and controls for all pumps will not be acceptable. Certified test results shall be available upon request showing the operation of each grinder pump at two (2) different points on the curve with the maximum pressure no less than 60 psi.

All completed stations shall be factory leak tested to assure the integrity of all joints, seams and penetrations. All necessary penetrations such as inlets, discharge fittings and cable connectors shall be included in this test along with their respective sealing means (grommets, gaskets, etc.).

XVI. INSTALLATION:

All grinder pump units will be delivered to the job site, 100% completely assembled, including testing, ready for installation. Grinder pump units will be individually mounted on wooden pallets.

Installation instructions supplied by the manufacturer shall be followed, as well as the Commissions specifications. Special attention shall be paid to the electrical installation instructions regarding the electrical cable from the motor to the control panel. If not followed as indicated, the warranty will be voided.

The Installation Contractor shall be responsible for handling groundwater to provide a firm, dry sub grade for the structure and shall guard against flotation or other damage resulting from ground water or flooding. The Installation Contractor shall also be responsible for any necessary sheeting and bracing. The grinder pump station shall not be set into the excavation until the Isle of Palms Water & Sewer Commission has approved the installation procedures and excavation. The Representative shall be present at time station is set into excavation. The Installation contractor shall be responsible for correcting any discrepancies found with the installation.

Hardware supplied with the unit, if required, will be used at installation. The basin will be supplied with a standard 4" inlet grommet (4.50" OD) for connecting the incoming sewer line. Appropriate inlet piping must be used. **The basin shall not be dropped, rolled or laid on its side for any reason.**

The isolation valve and check valve shall be located no closer than (3') three feet from the basin. Only HDPE or Polyethylene piping shall be used on the discharge line up to the isolation valve assembly.

Installation shall be accomplished so that a minimum of no less than six inches (6") of access way, below the bottom of the lid, extends above the finished grade line or slab under foot print of the building it is serving. The finished grade shall slope away from the unit. The diameter of the hole must be large enough to allow for the concrete anchor.

A 6" (minimum) layer of naturally rounded aggregate, clean and free flowing, with particle size of not less than 1/8" or more than 3/4" shall be used as bedding material under each unit. A concrete anti-flotation collar, sized according to the manufacturer's instructions, shall be required and shall be pre-cast to the grinder pump or poured in place. Each grinder pump station with its pre-cast anti-flotation

collar shall have a minimum of four (4) lifting eyes for loading and unloading purposes. The unit shall be leveled and filled with water to the bottom of the inlet to help prevent the unit from shifting while the concrete is being poured. The concrete must be manually vibrated to ensure there are no voids. If it is necessary to pour the concrete to a level higher than the inlet piping, an 8" sleeve is required over the inlet prior to the concrete being poured. The installer will provide and install a four (4) foot piece of SCH 40 PVC pipe with cap to stub-out the inlet for the property owner's installation contractor. Backfill of clean native earth, free of rocks, roots, and foreign objects shall be thoroughly compacted in lifts not exceeding 12" to a final proctor density of not less than 85%.

Marker posts/signs shall be placed every 150 feet along the right of way indicating that the force main is located in area. Sign shall say, "DANGER Sanitary sewer force main located in this area. Call Utility Locate Service Before Digging at 1-888-721-7877. 72-hour notice required before digging." The markers shall be placed at the property corners of the lots they are located by and out of the right of way.

XVII. CONNECTING TO AN EXISTING MANHOLE OR FORCE MAIN:

When connecting to an existing manhole, the manhole shall be cored and an appropriate flexible watertight joint installed at the point of entry to the manhole. The joint shall be wedged rubber shape equivalent to "Press Wedge II", or a rubber sleeve equivalent to "Kor-N-Seal" or "Lock Joint". No penetration shall be made into the cone of the manhole. All penetrations shall be made below the first ring in the manhole. The force main shall be affixed to the inside of the manhole with SS supports anchored into the manhole walls using SS anchoring systems. The force main shall be extended to the bottom of the manhole in such manner that no splashing of liquids shall occur.

The manhole shall be lined with an epoxy coating equivalent to Raven Coat or a Commission approved coating. The purpose of this coating is to prevent decay of the concrete structure caused by hydrogen sulfide gases produced by the sewage.

When connecting to an existing Commission owned force main, the connection shall be "Wet Tapped" using a Romac Style 202S saddle, no equivalent, for taps ranging from 1¼" up to and including 2" or by cutting an appropriate sized tee in the existing force main. A corporation stop or plug valve with a 2" operating nut shall be used for isolation at this point. No PVC valves shall be used. A brass nipple shall be installed between the valve and the residences force main. A Romac SST tapping saddle, no equivalent, shall be used for all taps 3" and greater in size. When a force main larger than 2" is connected to an existing Commission owned large diameter force main, then a minimum of twelve feet of lined ductile iron pipe shall be installed between the valve and the residences force main using EBBA Ironworks Mega lugs, no equivalent. A plug valve shall be used for isolation at this point. The plug valve shall be a Milliken Eccentric valve or equivalent.