SECTION 11335

GRINDER PUMP UNITS

PART 1 GENERAL

1.1 GENERAL DESCRIPTION

A. The Manufacturer shall furnish complete factory-built and tested Grinder Pump Unit(s), each consisting of a grinder pump core suitably mounted on an integral stand of stainless steel, electrical quick disconnect (NEMA 4X), pump removal harness, discharge hose and shut- off valve, anti-siphon valve and check valve assembly, electrical alarm/disconnect panel, and all necessary internal wiring and controls. For ease of serviceability, all pump motor/grinder units shall be of like type and horsepower throughout the system. The City's grinder pump maintenance program applies only to individual residential simplex grinder pump units. Duplex or larger grinder pump units shall not be included in the program.

1.2 GENERAL LAYOUT

A. The layout of the grinder pump basin shall generally be within 25' of the residence and easily accessible to maintenance crews. The basin shall not be installed in any permanently improved space such as in a patio, pool area, driveway, or heavily landscaped area nor shall it be constructed underneath an improvement such as a deck, car port, gazebo, etc. The tank well location should be clear to permit crew access required to perform pump maintenance and repair work; generally two to three feet horizontal and vertical clearance around the circumference of the tank well. The pressure service line to the sewer force main shall be aligned to minimize crossing improvements such as sidewalks and driveways but when necessary all crossings shall be perpendicular to the improvement and sleeved for ease of maintenance. The curb stop ball valve and redundant check valve assembly shall be generally located in the yard near the R.O.W. The assemble shall be no deeper that 24" to finished grade. The control panel shall be installed generally no farther than 25' from the basin without prior approval from Brentwood Water Services (BWS). The panel shall be in line of sight from the basin and shall be installed adjacent to a 30 amp disconnect on the power supply from the house panel. Any deviations from these guidelines must be preapproved by BWS.

1.3 SHOP DRAWINGS

A. After receipt of notice to proceed, the Manufacturer shall furnish shop drawings detailing the equipment to be furnished including dimensional data and materials of construction. Upon receipt of accepted shop drawings, the Manufacturer shall proceed immediately with fabrication of the equipment.

1.3 MANUFACTURER

A. The equipment specified shall be a product of a company with experience in the design and manufacture of grinder pumps for specific use in low pressure sewage systems. The company shall submit detailed installation and user instructions for its product; submit evidence of an established service program including complete parts and service manuals, and be responsible for maintaining a continuing inventory of grinder pump replacement parts.

1.4 OPERATING CONDITIONS

A. The pumps shall be capable of delivering 15 GPM against a total dynamic head of 0 feet (0 PSIG) and 7.8 GPM against a total dynamic head of 185 feet (80 PSIG) at a maximum of 8.0 amps. The pump(s) must also be capable of operating at negative total dynamic head without overloading the motor(s). Under no conditions shall in-line piping or valving be allowed to create a false apparent head.

1.5 WARRANTY

A. The grinder pump Manufacturer shall provide a part(s) and labor warranty on the complete station and accessories, including, but not limited to, panel and redundant check valve, for a period of twenty-four (24) months after notice of Owner's acceptance, but no greater than twenty-seven (27) months after receipt of shipment. Any defects found during the warranty period will be reported to the Manufacturer by the Owner.

PART 2 PRODUCT

2.1 PUMP

A. The pump shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the progressing cavity type with 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. Buna N is not acceptable as a stator material. The material shall be suited for domestic waste water 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.

2.2 GRINDER

A. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece 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 the driven impeller assembly, which shall carry two hardened type 400 series stainless steel cutter bars.

B. This assembly shall be dynamically balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. Sufficient vortex action shall be created to scour tank free of deposits or sludge banks which would impair the operation of the pump. These requirements shall be accomplished by the following, in conjunction with the pump:
   1. The grinder shall be positioned in such a way that solids are fed in an upward flow direction.
   2. 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.
   4. The impeller mechanism must rotate at a nominal speed of no greater than 1800 rpm.

C. The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of "foreign objects", such as paper, wood, plastic, glass, 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.

2.3 ELECTRIC MOTOR

A. The motor shall be a 1 HP, 1725 RPM, 120 or 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.

2.4 MECHANICAL SEAL

A. 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.

2.5 DISCHARGE HOSE AND SLIDEFACE DISCONNECT/VALVE

A. All discharge fittings and piping shall be constructed of 304 Series stainless steel, polypropylene or PVC. The discharge hose assembly shall include a shut-off valve rated for 200 psi WOG and a quick disconnect feature to simplify installation and removal.

2.6 ELECTRICAL QUICK DISCONNECT

A. The grinder pump unit shall include a single NEMA 4X electrical quick disconnect for all power and control functions. An integral tube shall allow venting of the control compartment to assure proper operation of the pressure switch level system. The grinder pump will be furnished with a length of 6 conductor, 14 gauge, type SJOW cable, pre-wired and watertight to meet UL requirements.

2.7 CHECK VALVE

A. The pump discharge shall be equipped with a factory installed, gravity operated, flapper-type integral check valve built into the discharge pipe. 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 back pressure. The valve body shall be an injection molded part made of glass filled PVC.

B. Each grinder pump station shall also include a separate curb stop valve assembly including a wastewater check valve and a ball valve installed on the 1 ½" PVC service lateral at the R.O.W. or edge of easement. The curb stop valve assembly shall be pressure-tight in both directions. The ball valve actuator shall include position stop features at the fully opened and closed positions. The curb stop/check valve assembly shall be designed to withstand a working pressure of 235 psi. The stainless steel check valve shall be integral with the curb stop valve. The check valve will provide a full-ported 1-1/4" passageway and shall introduce minimal friction loss at maximum rated flow. The flapper hinge design shall provide a maximum degree of freedom and ensure seating at low back pressure.

2.8 CORE UNIT

A. The Grinder Pump Station shall have an easily removable core assembly containing pump, motor, grinder, all motor 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.

2.9 CONTROLS

A. All necessary controls shall be located in the top housing of the core unit. The top housing will be attached with stainless steel fasteners. Non-fouling waste water 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 waste water. High-level sensing will be accomplished in the manner detailed above by a separate air-bell sensor and pressure switch of the same type.

B. 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.

C. The grinder pump will be furnished with a length of 6 conductor 14 gauge, type SJOW cable, pre-wired and watertight to meet UL requirements.

2.10 ALARM/DISCONNECT PANEL

A. Each grinder pump station shall include a NEMA 3R, UL listed ALARM/DISCONNECT PANEL suitable for wall or pole mounting. The NEMA 3R enclosure shall be manufactured of thermoplastic to assure corrosion resistance. The enclosure shall include a hinged, pad lockable cover, secured dead front and component knockouts. The enclosure shall not exceed 7.5"W x 8.75"H x 3.75"D.

B. 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.

C. The Alarm/Disconnect Panel shall include the following features: audio & visual alarm, push to run switch, 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.
3. Visual alarm remains illuminated until the sewage level in the wet-well drops below the "off" setting of the alarm pressure switch.

D. 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 3R rating. For duplex units, in addition to the above, two high level indicator lights shall be mounted behind the access cover. During a high level alarm condition the appropriate light will illuminate to indicate which pump core requires servicing.

E. 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 de-activated by depressing a push-type switch which is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure.

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

2.11 SERVICEABILITY

A. The grinder pump core unit shall have two lifting hooks complete with polypropylene 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 trouble shooting.

B. All motor control components shall be mounted on a readily replaceable bracket for ease of field service.

2.12 CORROSION PROTECTION

A. All materials exposed to waste water shall have inherent corrosion protection. Acceptable corrosion protection includes epoxy powder coat, cast iron, fiberglass, stainless steel, PVC.

2.13 SAFETY

A. 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.

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

PART 3 EXECUTION

3.1 FACTORY TEST

A. 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. All factory tests shall incorporate each of the above listed items. Actual appurtenances and controls which will be installed in the field, shall be particular to the tested pump only. A common set of appurtenances and controls for all pumps will not be acceptable. The Engineer reserves the right to inspect testing procedures with representatives of the Owner, at the grinder pump Manufacturer's facility.

3.2 DELIVERY

A. All Grinder Pump units will be delivered to the job site, 100% completely assembled, including testing, ready for installation.

3.3 INSTALLATION

A. Remove packing material. Users instructions MUST be given to the WSD.
   1. Hardware supplied with the unit, if required, will be used at installation. Once installed, the property shall be restored to its original condition in all respects, including, but not limited to, curb and sidewalk replacement, landscaping, loaming and seeding, and restoration of the traveled ways, as directed by the WSD.
   2. The electrical enclosure shall be furnished, installed and wired to the Grinder Pump Station by the Contractor. An alarm device is required on every installation, there shall be NO EXCEPTIONS. Location of the grinder unit and panel shall be at the direction of the WDS.

B. The CONTRACTOR shall mount the alarm device in a conspicuous location approved by the WSD, as per national and local codes. The Alarm/disconnect Panel will be connected to the Grinder Pump Station by a length of six (6) conductor 12 gauge TC type cable in conduit as shown on the contract drawings. The power and alarm circuits must be on separate power circuits.

3.4 START-UP AND FIELD TESTING

A. The Manufacturer shall provide the services of qualified factory trained technician(s) who shall inspect the placement and wiring of each station, perform field tests as specified herein, and instruct the WSD's personnel in the operation and maintenance of the equipment before the stations are accepted by the WSD. All equipment and materials necessary to perform testing shall be the responsibility of the Developer or installing Contractor.

B. Upon completion of the installation, the authorized factory technicians will perform the following test on each station:

1. Make certain the discharge shut-off valve is fully open. This valve must not be closed when the pump is operating. In some installations, there may be a valve(s) at the street main that must also be open.
2. Turn ON the alarm power circuit.
3. Fill the wet well with water to a depth sufficient to verify the high level alarm is operating. Shut off water.
4. Turn ON pump power circuit. Initiate pump operation to verify automatic "on/off" controls are operative. Pump should immediately turn ON. Within one (1) minute alarm light will turn OFF. Within three (3) minutes the pump will turn OFF.

C. Upon completion of the start-up and testing, the Manufacturer shall submit to the project Engineer and WSD the start-up authorization form describing the results of the tests performed for each Grinder Pump Station. Final acceptance of the system will not occur until authorization forms have been received for each pump station installed.

3.5 MANUALS

A. The Manufacturer shall supply two (2) copies of Operation and Maintenance Manuals to the WSD.

END OF SECTION 11335 - GRINDER PUMP UNITS