SECTION 15033

HYDRAULIC SUBMERSIBLE PUMP WITH AUTOMATICALLY CONTROLLED DIESEL HYDRAULIC POWER UNIT

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Requirements for providing permanently installed hydraulically operated diesel powered submersible pump with automatically starting diesel power unit. Submersible pump shall be rail mounted on typical "FLYGT" pipe rail system and mate to "FLYGT" type floor mounted base elbow similar to the electrical powered submersible pumps which will be a part of the lift station as well.

B. Operation of pump shall be both in rotation with controls for electric submersible pumps and capable of automatic operation independently after power failure.

C. Diesel Powered Hydraulic Unit shall be base skid mounted for either ground installation or mounting on a raised platform. Unit shall be fully enclosed in sound attenuated corrosion resistant housing, with stainless steel base tank.

1.02 UNIT PRICES

A. No separate payment will be made for work performed under this Section. Include payment in unit price for related work.

1.03 SUBMITTALS

A. Submittals shall conform to requirements of Section 01300 - Submittals.

B. Submit manufacturer's product data for proposed pumps for approval as specified below.

1.04 GENERAL

A. The specifications herein state the minimum requirements of the City of Galveston. All bids must be regular in every respect. Unauthorized conditions, limitations, or provisions shall be cause for rejection. The Owner may consider as "irregular" or "non-responsive", any bid not prepared and submitted in accordance with the bid documents and specification, or any bid lacking sufficient technical literature to enable the Owner to make a reasonable determination of compliance to the specification. It shall be the

bidder's responsibility to carefully examine each item of the specification. Failure to offer a completed bid or failure to respond to each section of the technical specification will cause the proposal to be rejected, without review, as "non-responsive". All variances, exceptions, and/or deviations shall be fully described in the appropriate section. Improperly documented response to the requirements of these specifications will be cause for rejection.

B. Bids will be accepted for consideration on any make and model that is equal to the specified Godwin "Heidra" Hydraulic Submersible Pumpset, hydraulic submersible pump and hydraulic power unit. Contractor shall submit in writing that equipment proposed will meet all requirements to establish equivalence, with manufacturer's explanation of each deviation or substitution.

C. Units described shall be new, unused, and of the current year's production. The style of pump being bid must be in production for a minimum of five (5) years (include users list). Unit shall be of the latest design and in current production completely serviced, ready for work and shall include all standard and optional equipment as specified herein. All bidders must have demonstrated the unit they are bidding, prior to bid date.

D. Suppliers must have a fully stocked parts and service facility within 100 miles of the City of Galveston. The Owner shall have the right to inspect the office and shall be the sole judge of its adequacy to fulfill this requirement.

E. Suppliers, on request of the Owner, must be prepared to review their specifications with the City of Galveston and must, if requested, also be prepared to provide a unit for the convenience of the Owner. These services, if needed, are considered as part of the bidder's proposal and will be provided without cost or obligation to the Owner.

PART 2 P R O D U C T S

2.01 SYSTEM DESCRIPTION

A. The portable hydraulic submersible pump specified in this section will be used to pump raw sewage.

B. The pump and accessories shall be supplied by the pump manufacturer.

C. The hydraulic submersible pump shall be powered by a gear type hydraulic motor that is capable of being powered by any open center hydraulic oil circuit.

D. The diesel engine hydraulic power unit shall be capable of powering comparably sized hydraulic motors on a submersible pump on a continuous operation.

E. The diesel engine driven hydraulic power unit shall be mounted on skid with integral UL listed fuel tank and sound attenuated enclosure.

F. Equipment acceptance shall be contingent upon its ability to run in a completely dry condition for periods up to 24 continuous hours at full speed. A demonstration may be required by the Owner's Representative.

G. The pump offered shall be a manufacturer's standard production model. It shall have been in continuous use by municipal and industrial owners for a minimum of five (5) years. A list of five user contacts including contact names and telephone numbers shall be provided with the bid submittal. Failure to supply a verifiable users list will be cause for rejection of the bid.

H. The pump shall be equipped to slide mount for installation using a "FLYGT" type pipe rail system. The pump shall be fitted with adapter and mating flange to seat on a "FLYGT" type base elbow. Pump shall be removable, for inspection, from the wet well without disconnecting the hydraulic hose from the submersible pump.

2.01 DESIGN REQUIREMENTS

A. SUBMERSIBLE PUMP

OPERATING SPEED (MAXIMUM)	1,600 RPM
MINIMUM SOLIDS HANDLING SIZE	3 INCHES
IMPELLER DIAMETER	00 INCHES
INLET SIZE	00 INCHES
DISCHARGE SIZE	00 INCHES
MAXIMUM DUTY POINT	000 GPM AT 00' TDH

B. HYDRAULIC POWER UNIT

OPERATING SPEED (MAXIMUM)	2,400 RPM
MAXIMUM OIL FLOW	10 GPM
MAXIMUM HYDRAULIC PRESSURE	3,500 PSI
OIL RESEVOIR SIZE (MINIMUM)	40 GALLONS

2.02 ACCEPTABLE MANUFACTURERS

A. EQUIPMENT

1. CASTING / VOLUTE: Pump casting shall be cast iron. It shall be constructed so that the suction flow path is in axial alignment with the impeller eye. Pump casing shall be fitted with guide rail adapter for installation in wet well.

2. IMPELLERS: The pump impeller shall be of open non-clog type with pump out vanes on the back shroud. The impeller shall be Three-bladed of hardened cast chromium steel construction.

3. WEARPLATES: The pump shall have top and bottom wearplates. The wear

plates shall be fully adjustable and replaceable with a minimum hardness of 220 Brinnell, fabricated of cast iron.

4. BEARINGS AND SHAFTS: Pump shall be fitted with a heavy duty cast iron bearing bracket which contains the shaft and heavy duty ball or tapered roller bearings of adequate size to withstand imposed loads. Minimum I.S.O. L10 bearing life to be 100,000 hours. Impeller shafts shall be of 1½% chromium alloy.

5. SEALS: The pump seal will be a double mechanical seal arrangement. The lower mechanical seal shall be a mechanical self-adjusting type with silicon carbide faces. The upper mechanical seal shall also be a mechanical self-adjusting type with carbon ceramic faces. The mechanical seal shall be cooled and lubricated in an oil bath reservoir, requiring no maintenance or adjustment. Pump shall be capable of running dry, with no damage, for periods up to 24 hours. All metal parts shall be of stainless steel. Elastomers shall be Viton.

6. PUMPEND HYDRAULIC MOTOR: The pumpend hydraulic gear type motor shall be capable of receiving 33-GPM at 3,500-psi at 2100-RPM. It shall be designed to be able to stop immediately on braking of hydraulic flow due to automatic start & stop of hydraulic power unit without damage. This shall be accomplished through the use of an internal or external hydraulic assembly.

7. PUMP DISCHARGE CONNECTION: Shall be cast iron XXXX inch flange. Adapted to base elbow for floor mounting with pipe rails.

8. PUMP GASKETS: Shall be compressed fiber and/or Teflon

9. PUMP O-RINGS: Shall be Viton.

10. POWER UNIT: Hydraulic power unit shall have an open center hydraulic circuit capable of providing up to 10 GPM at 3,500 psi at 2,400 RPM engine speed on a continuous basis. The hydraulic circuit shall include a gear type hydraulic pump mounted to the engine flywheel, a minimum 40 gallon hydraulic reservoir with suction strainer, low oil and high temperature shutdowns, sight level gauge, in tank return line filter rated for 20 microns, pressure gauge, on/off detent control valve with integral adjustable relief valve, hydraulic oil cooler with thermo bypass valve, and quick disconnect fittings.

11. DRIVE UNIT: Diesel shall be water-cooled engine. Engine shall drive pump by use of direct connected intermediate drive plate. Starter shall be 12 volt electric. Safety shut down switches for low oil pressure and high temperature shall be

provided. Battery shall have 180 Amp hour rating, 100-minute reserve capacity with 500 cold cranking amp capacity. Unit shall include a tachometer and an hourmeter. Alternator shall be sized to 60 amp. Unit shall be a Yanmar or equal, for continues use at 2,100 RPM. A certified continuous duty engine curve shall be supplied to the owner/Owner's Representative.

12. GOVERNOR: Governor shall be mechanical type. Engine speed shall be adjustable to operate the hydraulic power unit between maximum and minimum design operation speeds.

13. FUEL TANK: Integral fuel tank capacity shall be sufficient to provide at least 168 hours (7days) of operating time at full load. The engine shall be capable of operating satisfactorily on a commercial grade of distilled No. 2 fuel oil. Fuel tank base shall be UL design as specified in 2.02, B. SKID BASE, and be of stainless steel construction.

14. EXHAUST: Exhaust system shall include a hospital grade muffler housed in a separate chamber within the enclosure. All exhaust piping and manifolds shall be encased in fitted acoustic blankets. They shall be constructed of high-density fiberglass material with waterproof jacketing.

15. HYDRAULIC HOSES: The submersible pump and hydraulic power unit shall come complete with two (2) 1" x 50' and one (1) ½" x 50' case drain hydraulic hoses with quick disconnect couplings. Suitable for use in sewage, submerged use.

16. SOUND ATTENUATED ENCLOSURE: The engine and pump shall be completely enclosed with fourteen-gauge sheet metal panels backed with one inch and two-inch layers of polydamp acoustical sound-deadening material. The acoustical enclosure shall reduce pump and engine noise to sixty-eight dBA or less at a distance of thirty feet. The enclosure shall be removable for easy access to the engine / pump for maintenance and repair. The enclosure doors shall all be equipped with latches that are keyed alike. For maintenance and service needs, the enclosure sides shall have hinged doors for quick access to the engine oil fill, fuel fill port, oil dipstick, and filters.

B. SKID BASE

1. The pump base tank shall be a UL-142 approved double wall design constructed in accordance with Flammable and Combustible Liquids Code, NFPA 30; The Standard for Installation and use of Stationary Combustible Engine and Gas Turbines, NFPA 37; and The Standard for Emergency and Standby Power Systems, NFPA 110.

2. The tank design shall be a Closed Top Dike Pump Base Tank. It shall be of double wall construction having a primary tank to contain the diesel fuel, held within another tank or dike, which is intended to collect and contain any accidental leakage from the primary fuel tank. The completed base tank assembly is to incorporate pump mounting locations and must be able to support four times the rated load.

3. The primary tank shall be designed to withstand normal and emergency internal pressures and external loads. It shall be capable of withstanding internal air pressures of 3 to 5 psig without showing signs of excessive or permanent distortion and 25 psig hydrostatic pressure without evidence of rupture or leakage.

4. The primary and secondary tanks or dike shall have venting provisions to prevent the development of vacuum or pressure capable of distorting them as a result of the atmospheric temperature changes or while emptying or filling. The vent shall also permit the relief of internal pressures caused by exposure to fires. The vent size shall be determined by using the calculated wetted surface area in square feet (the top is excluded) in conjunction with venting capacity table 10.1of UL-142. The tank's vent shall also be equipped with a coupling device and shall be located to facilitate connection to a vent piping system. The dike's vent may be an opening for venting directly to the atmosphere and protection from the entrance of natural elements or debris shall be provided.

5. The primary tank is to be constructed of 7 gauge hot rolled stainless steel. Internal baffles or reinforcement plates shall be located on a maximum of 24 inch centers in tanks up to 60 inch width and on a maximum of 19.5 inch centers in tanks over 60 inch width. At least one baffle shall separate the fuel suction pipe from the fuel return line

6. The outer tank is to be constructed in a manner to be able to support four times the wet load of the pump and housing. The entire load is to be carried by the outer tank so no load or vibration stress is placed on the primary tank. If the pump base tank is wider than the pump set to be supported, structural rails are to be incorporated to span the width of the base tank so that the load is transferred to the side rails of the tank. Vertical reinforcements shall be welded to the outer sides of the secondary tank or dike at a maximum of 45 inch centers on tanks up to 30 inches high and on 24 inch centers on tanks greater than 30 inches high. At least one vertical reinforcement shall be positioned adjacent to each mounting hole location.

7. Both primary and secondary tanks shall be fitted with the proper welded pipe

fittings to accommodate the requirements for the fill port and normal and emergency venting.

8. The completed assembly is to be cleaned with a heated pressure wash followed by a chromium free post treatment to ensure proper paint adhesion. The tank assembly is to be painted with an epoxy ester primer and high quality polyurethane enamel with total paint thickness of 3.5 mils. The painted tank assembly is to be baked at 180 degrees for 30 minutes to provide a hard durable finish.

9. Manufacturing and testing of this system shall be performed within the scope of Underwriters Laboratories, Inc. "Standard for Safety UL 142." A UL label shall be permanently attached to the tank system showing the following information:
   - The registered UL mark and the name: Underwriters Laboratories, Inc.
   - A control number and the word "listed"
   - The product's name as identified by Underwriters Laboratories Inc.
   - The serial number assigned by Underwriters Laboratories, Inc.
   - Other manufacturer's information may also be included.

10. HYDRAULIC HOSES: The submersible pump and hydraulic power unit shall come complete with two (2) 1" x 50' and one (1) ½" x 50' case drain hydraulic hoses with quick disconnect couplings. Body: Cast or ductile iron; flange together bonnet and stuffing box with ASTM A307 Grade B bolts. Cast in body manufacturer's initials, pressure rating, and year manufactured. Equipped with rollers, tracks, and scrapers.

11. FACTORY PAINTING: Pump, engine, base, and trailer shall be shop primed and finish painted at the place of manufacturer. Materials and thickness for priming shall be in accordance with manufacturer's standards.

C. AUTOMATIC STARTING CONTROL SYSTEM

1. The engine shall be equipped with a factory installed "PrimeGuard" microprocessor-based controller as supplied by Godwin Pumps of America, Inc. or equal and designed to start/stop the engine at a signal supplied by high and low level floats or a 4-20 mA transducer.

D. ENGINE/PUMP CONTROL SYSTEM

1. The engine shall be started, stopped, and controlled by a "PrimeGuard" high performance state of the art digital controller as supplied by Godwin Pumps of America, Inc. or equal. The controller shall be weather proof enclosed, and contain an external weatherproof 12-position keypad accessible without the need

to remove or open any protective cover or enclosure. It shall be designed to start/stop the engine at a signal supplied by high and low level floats or a 4-20 mA transducer. The "PrimeGuard" controller shall provide the following functions without modification, factory recalibration, or change of chips or boards, by simply accessing the keypad

2. The keypad shall be a capacitive touch sensing system. No mechanical switches will be acceptable. The keypad shall operate in extreme temperatures, with gloves, through ice, snow, mud, grease, etc. and maintain complete weather-tight sealing of the "PrimeGuard" controller.

3. In automatic mode, the unit shall conserve energy and go to "sleep".

4. The "PrimeGuard" controller shall function interchangeably from float switches, pressure switch, or transducer, as well as manual start/stop by selection at the keypad. No other equipment or hardware changes are required.

5. The "PrimeGuard" controller shall function interchangeably from float switches, pressure switch, or transducer, as well as manual start/stop by selection at the keypad. No other equipment or hardware changes are required.

6. The "PrimeGuard" controller shall be capable of varying the engine speed to maintain a constant level in a process without a change to the controller other than via the keypad.

7. The start function can be programmed to provide three separate functions each day for seven days (i.e. a start, warm up, exercise cycle on two separate days at different times and for a varying length of time all via the keypad).

8. Manual-Automatic Button:
   a. In Manual Mode, manual "Start" button starts engine and runs until "Stop" button is depressed or an emergency shutdown occurs.
   b. In Automatic Mode, start/stop sequencing is initiated by either two normally-open narrow angler float switches, pressure switch, transducer, or a signal from a digital input.

9. The controller shall integrate the engine safety shut-off for low and high oil temperature, and provide over-speed protection.

10. The controller shall include standard, field-adjustable parameters for engine cycle crank timer, shutdown time delay, warm-up time delay, and cool-down time delay.

11. The "PrimeGuard" controller shall have only one circuit board with eight built-in relays. Each relay can be named to provide any function, all via the keyboard without changing relays, chips, printed circuits, or any hardware or software.

12. Standard components, at a minimum, shall consist of (24) digital inputs, (7) analog inputs, (1) magnetic pick-up input, (8) 20-amp form "C" relays, (1) RS232 port, (1) RS485 port, (1) RS232/RS485 port, (1) J1939 port, and (1) 64X128 pixel full graphic LCD display with backlight.

13. The industrially-hardened "PrimeGuard" Controller shall withstand Vibration of 3 g, 3 axis, frequency swept 10-1000 Hz, in an operating temperature Range of 4° to 176°F (-20° to 80°C) and an operating humidity range of 0-95% Non-Condensing.

14. FLOATS: The unit shall be supplied with one (1) float assembly including two (2) N/O floats which shall integrate with the engine control panel via a single multi-pin plug.

15. FULLY AUTOMATIC TRICKLE CHARGER: The power unit shall include a fully automatic trickle charger powered by 115-VAC, 6-amps, job-site power.

PART 3 E X E C U T I O N

3.01 MANUFACTURERS SERVICES

A. The manufacturer shall furnish the services of a competent factory representative to do the following:

1. Inspect the system prior to delivery, supervise the start up and testing of the system, and certify the system has been properly furnished and is ready for operation.

2. Instruct the owner's operating personnel in the proper operation and maintenance of the system for a period of not less than one half day.

3.02 TOOLS AND SPARE PARTS

A. The manufacturer shall furnish the following with the Pump System:

1. A recommended list of spare parts.

3.03 WARRANTY

A. A copy of the engine manufacturer's parts and labor warranty.

1. A One year Parts and Labor Warranty issued by the manufacturer on the Pump System. This warranty must cover all pump parts, including the mechanical seal.

END OF SECTION