

SECTION 44 42 31
SEPTAGE RECEIVING SYSTEM

EQUIPMENT AND COMPONENT NUMBER(S)

SEPT-1801: Septage Receiving Unit.

LCP-1801: Septage Receiving Unit Vendor Control Panel.

PART 1 GENERAL

1.01 SUMMARY

- A. Contractor shall furnish one septage receiving unit. Septage receiving unit shall be an enclosed free-standing system with a receiving tank, inclined rotating drum screen for removing floating, particulate, and fibrous material from high strength septage. A shafted screw shall convey the screened material. Screened material shall be washed and dewatered and discharged from a bagger into a roll off container as shown on the Drawings.
- B. All equipment called for under this section shall be provided by a single supplier.
- C. Contractor shall coordinate all details of the equipment with other related parts of the Work. Contractor shall verify that all structures, piping, wiring, and equipment components are compatible. Contractor shall be responsible for all structural and other alterations required to accommodate equipment differing in dimensions or other characteristics from these Specifications and Drawings.
- D. Equipment and panel will be installed outdoors and exposed to temperatures and humidity per Section 01 67 00, Product Requirements.

1.02 SUBMITTALS

- A. Action Submittals:
 - 1. Manufacturer's catalog information including make, model, weight, and horsepower, descriptive literature, specifications, and identification of materials for construction.
 - 2. Detailed structural, mechanical, and electrical drawings showing equipment fabrications and interface with other items including dimensions, size, location of connections to other work, location of anchor bolts, and weights of associated equipment.
 - 3. Complete motor nameplate data, as defined by NEMA, motor manufacturer, and motor modifications. See Section 26 20 00, Low-Voltage AC Induction Motors, for motor submittal requirements.

4. Functional description of internal and external instrumentation and controls including list of parameters monitored, controlled, or alarmed.
5. Control panel elevation drawings showing fabrication and placement of operator interface devices and associated elements.
6. Power and control wiring diagrams, including terminals and numbers.
7. External utility requirements for water, power, and drainage.
8. Factory finish system.
9. Manufacturer's recommended list of spare parts.
10. List of 20 installations in the U.S.A. of similar type of equipment and size. Include name, location, contact information, installation month and year, brief description of equipment.
11. Data from three separate installations to demonstrate compliance with the "Paint Filter Test".
12. Sizing calculations for panel mounted air conditioner.

B. Informational Submittals:

1. Factory test report.
2. Special shipping, storage and protection, and handling instructions.
3. Manufacturer's installation instructions.
4. Manufacturer's Certificate of Proper Installation.
5. Operation and Maintenance Manual and Maintenance Summary: In conformance with the requirements of Section 01 78 23, Operation and Maintenance Data.
6. Field Testing Plan and Report.

1.03 EXTRA MATERIALS

A. Furnish, tag, and box the following spare parts and special tools:

Item	Quantity
Rollers	One complete set
Guide bars for wash press	Six complete units
Solenoid valve rebuild kit	One complete unit
Solenoid valve assembly	Six complete units
Brushes	One complete unit
Drive shaft end bearings	One complete set
Special tools required to maintain or dismantle unit	One complete set

1.04 QUALITY ASSURANCE

- A. Welding: Except as otherwise indicated, welding shall comply with ANSI/AWWA D100 and AWWA C206 and the following:
 - 1. Composite fabricated steel assemblies that are to be erected or installed inside a hydraulic structure, including any fixed or movable structural components of mechanical equipment, shall have continuous seal welds, and shall prevent entrance of air or moisture.
 - 2. Welding shall be by the metal-arc method or gas-shielded arc method described in the American Welding Society's "Welding Handbook" as supplemented by other AWS standards. Qualification of welders shall comply with AWS Standards.
 - 3. In assembly and during welding, the component parts shall be clamped, supported, and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall comply with the AWS code. Upon completion of welding, weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce an acceptable appearance with uniform weld contours and dimensions. Sharp corners of material that are to be painted or coated shall be ground to a minimum of 1/32 inch on the flat.
- B. Clean, pickle, and passivate stainless steel surfaces in accordance with ASTM A380 and ASTM A967. Welded stainless steel surfaces require complete removal of interior and exterior heat tint, followed by re-passivation. Spiral assembly, with exception to the machined drive shaft end, shall be coated with a rust inhibitive primer for protection during shipment.
- C. Wiring: The Drawings and Specifications indicate the anticipated wiring for the equipment. If additional wiring is required, or if required wiring does not match what is indicated, the Contractor shall make the necessary modifications to the electrical wiring and documentation as part of the lump sum price.

PART 2 PRODUCTS

2.01 SUPPLIERS

- A. Qualifications: The Supplier shall have a minimum of 10 years of design and manufacturing experience with septage receiving units meeting specified requirements.
- B. Equipment and accessories specified in this section shall be products of:
 - 1. Huber Technology, Inc.; Sludge Acceptance Plant RoFAS 1.
 - 2. Or equal.

2.02 GENERAL

- A. General: See Section 01 67 00, Product Requirements, for specific requirements related to the equipment specified herein.
- B. Physical Characteristics:
 - 1. Number of Units: One.
 - 2. The system shall include the following components, as further detailed in this specification:
 - a. Rotating basket drum with screen.
 - b. Spray wash system.
 - c. Press zone.
 - 3. Safety Devices: The completed work shall include all necessary permanent safety devices, such as machinery guards, emergency stops and similar items required by OSHA, and other federal, state, and local health and safety regulations.
- C. Functional Characteristics: The septage receiving unit shall intermittently accept septage, separate solids from liquids, wash, dewater and remove organics from the solids. The washed and dewatered solids will be bagged and discharged through a chute into an appropriate screenings container.
- D. Performance Characteristics: The dewatered screenings produced shall be capable of passing the EPA Paint Filter Test as described in Method 9095 of EPA Publication SW-486.

2.03 ROTATING BASKET DRUM

- A. General:
 - 1. Physical Characteristics:
 - a. All structural and functional parts shall be sized for the loads encountered during the screening and conveying operations.
 - b. All components of the rotary perforated plate screen in contact with the septic sludge or screened solids shall be of stainless steel construction.
 - c. A 4-inch diameter magnetic flow meter shall be installed in the inlet piping system between the electrically actuated ball valve and the septage receiving drum screen. The flow meter shall be wired to the vendor control panel.
 - d. Rollers for the bearings for the drum shall be made of polyamide PA6.
 - 2. Functional Characteristics:
 - a. The drum screen shall be provided with one spray bar for drum surface cleaning. The control system shall be designed so that the

cleaning characteristics of the screen and spray wash systems can be changed via the programmable controller.

- b. The operation of the rotating basket perforated plate drum and spray bar shall be automatically initiated when the system is activated and a flow of septage is pumped to the unit. The spray bar, which is mounted outside the rotating basket/drum, shall flush solids from the screening basket and keep them in the base of the drum where flights welded to the interior surface of the drum shall convey the material to the discharge point.
 - c. Due to the high solids loadings in septage, the screen basket shall rotate continuously while septage is flowing to always present a clean screening surface to the flow to ensure minimum headloss and rapid cleaning of the screen.
 - d. The rotating basket assembly shall be cleaned by one stainless steel high pressure spray bar. The screen basket shall continuously rotate in one direction.
 - e. The Septage Receiving Drum Screen inlet flow shall be controlled by an electrically actuated ball valve, which shall be installed in the inlet piping.
 - f. The rotating basket shall be driven by a drive with pinion gear positively engaged in a chain which is fixed to the drive end basket flange. The chain shall be unable to move to ensure smooth operation of the screen drum.
3. Performance Characteristics: Screen designs utilizing a chain design that allows the chain to be slack or requires lubrication shall not be acceptable.

B. Drum Screen:

- 1. Physical Characteristics:
 - a. The screen basket shall be of a cylindrical shape. The perforations shall go around the entire basket drum.
 - b. The axis of the drum screen shall have an inclination of 10 degrees.
 - c. Nominal Drum Screen Basket Diameter: 35 inches (900 mm).
 - d. Drum Screen Perforation Opening: 3/8 inch (10 mm).
 - e. Drum Screen Inlet Flange Diameter Size: 4 inches.
 - f. Drum Screen Outlet Flange Diameter Size: 6 inches.
- 2. Functional Characteristics: The drum screen shall use a single drive for screening and conveying of the screening material.
- 3. Performance Characteristics:
 - a. Maximum Hydraulic Capacity per Drum Screen at 3 Percent Solids: 400 gpm.
 - b. Maximum Drum Screen Screenings Capacity: 140 ft³/hour.

- c. The rotary perforated plate drum screen shall be designed and built to withstand static and hydraulic forces exerted by the liquid to the screen.

C. Screen Drive:

- 1. Physical Characteristics:
 - a. The basket mechanism shall be driven by a geared motor.
 - b. The gear reducer shall be driven by a 1,760 rev/min, three-phase, 60-Hz, 230/460-volt, Class 1, Division 1, Group D, inverter duty, totally-enclosed, fan-cooled motor which leads to a conduit box for outdoor operation. Motor size shall be 0.25 hp. The gear reducer shall be bolted to the equipment.
 - c. Belt drives, hydraulic drives or a separate upper bearing for a transport screw will not be acceptable for this Project.
- 2. Functional Characteristics: None.
- 3. Performance Characteristics: The geared motor shall have a minimum service factor of 1.0 equivalent to an AGMA Class I rating.

2.04 PRESS ZONE DESIGN

A. Screenings Washer Body:

- 1. Physical Characteristics:
 - a. The screenings washer body shall be fabricated from 5/32-inch (4-mm) thick AISI Type 304L stainless steel. The 14-inch (358-mm) diameter screenings washer body shall include a nominal 47-1/4-inch by 15-3/4-inch (1,200-mm by 400-mm) trough opening for screenings deposit.
 - b. A level mounting flange shall be provided around the trough for the transitional hopper that directs the screenings into the trough of the screenings washer.
 - c. The hopper shall be fabricated from 3/32-inch (2.5-mm) thick stainless steel.
 - d. The screenings washer body shall house the shafted screw and shall include one 3/4-inch diameter wash water connections in the compaction zone, one 3/8-inch diameter connection in the screenings trough, and shall include one connection to the drain pan.
 - e. The screenings washer body shall include 3/16-inch (5-mm) diameter perforations spaced 13/32 inch (10 mm) center-to-center in a vertical alignment in the inlet, washing, and compaction zones.
 - f. The screenings washer body shall be equipped with not less than six guide bars made of abrasion resistant plate. The guide bars

shall be bolted from the outside of the tube for easy access and removal.

2. Functional Characteristics:
 - a. The perforations on the screenings washer body shall allow drainage of the excess wash water and filtrate water pressed from the screenings to the drain pan.
 - b. The wash water connections shall allow flushing of any debris to the drainage pan.
3. Performance Characteristics:
 - a. Washer Compactor Screenings Capacity: 140 ft³/hour.

B. Shafted Screw:

1. Physical Characteristics:
 - a. The shafted screw for the press zone shall be fabricated from 1/4-inch (6-mm) thick AISI Type 304L stainless steel.
 - b. The screw flights shall have a minimum thickness of 13/32 inch (10 mm) in the trough area, a thickness of 13/32 inch (10 mm) in the perforated washing zone, and a thickness of 25/32 inch (20 mm) in the compaction zone. The outside diameter of the screw shall be 13-7/16 inches (341 mm) and shall include an 8-inch (200-mm) flight pitch in the trough area and washing zone, and a 6-3/4-inch (170-mm) pitch in the compaction zone.
 - c. Screw flights in the compaction zone shall have abrasion resistant plate welded to the stainless steel flights. The last flight of the screw shall have hard metal seams welded around the external surface of the flight.
 - d. A stainless steel backed brush shall be attached to the shafted screw with set screws for the full length of the perforated washing zone. Brush segments fit in manufactured groove on the trailing edge of the flights.
2. Functional Characteristics: The shafted screw shall transport the screenings from the trough area (washing zone) into the compaction zone and shall force the compacted screenings out the discharge pipe.
3. Performance Characteristics: None.

C. Plant Water Manifold:

1. Physical Characteristics:
 - a. All washwater piping and the septage receiving unit shall be heat traced and insulated for outdoor exposure to prevent freezing at 0 degrees F. The heat tracing and thermostat shall be powered and monitored by the vendor control panel.
 - b. The screenings washer shall be equipped with a manifold to provide plant water to the different washing inlet locations. The screenings washer shall be provided with not less than two

separate connections for injecting wash water into the screenings and two connections to the drain pan underneath the wash and press body.

- c. Wash water connections shall be sized and positioned by the unit manufacturer.
 - d. The main wash water supply line to the unit shall be provided with two 1-inch diameter -solenoid valves.
 - e. A 2-inch brass body Y-strainer shall be provided for the incoming plant water supply. The strainer shall include a removable and washable stainless steel 20-mesh (800 micron) filter element.
2. Functional Characteristics:
- a. The unit shall be designed to accept wash water from the facility's nonpotable water system.
 - b. The solenoid valves on the main wash water supply line shall be independently controlled by the PLC in the control panel. One solenoid valve shall supply wash water directed against the rotation of the screw flights in the inlet hopper, and into the press zone of the unit. The second solenoid valve shall direct wash water to the drain pan beneath the screenings washer body.
3. Performance Characteristics:
- a. Maximum water consumption for the unit shall be 24 gallons per minute.
 - b. The water pressure range required at the connection to the unit for proper unit operation shall be 30 psi to 75 psi. If higher pressure is required, Supplier shall provide booster pump powered and controlled from vendor control panel.
 - c. The solenoid valves on the main wash water supply line shall have a maximum operating pressure of 140 psi.

D. Drain Pan:

1. Physical Characteristics:
- a. The drain pan shall be fabricated from 1/8-inch thick (3-mm) stainless steel and shall include several bolted inspection openings.
 - b. The drain pan shall include two 3/4-inch threaded inlet connections for wash water from the manifold to flush the trough for cleaning purposes.
 - c. A 4-inch (100-mm) diameter flanged drain connection shall be provided to discharge the drained water back into the piping on the downstream side of the screen.
2. Functional Characteristics: The drain pan shall be an integral part of the washer body and collect the spent wash water and filtrate water squeezed from the screenings.
3. Performance Characteristics: None.

E. Discharge Pipe:

1. Physical Characteristics:
 - a. The wash and press discharge pipe shall be made of stainless steel and shall be connected to the screenings washer body by a 14-inch (350-mm) diameter flange.
 - b. The diameter of the straight section of the discharge pipe shall increase in size to ease the transport of the screenings.
 - c. The diameter of the discharge pipe straight section shall increase from 14 inches to 17-3/4 inches.
 - d. The bend fittings on the unit's discharge pipe shall have a radius that is three times larger than the pipe diameter.
2. Functional Characteristics: None.
3. Performance Characteristics: None.

F. Gear Motor Drive Mechanism:

1. Physical Characteristics:
 - a. The drive unit shall be a gear motor rated for continuous duty and shall be selected to match the requirements of the particular screen.
 - b. The drive motor shall be a 5 hp, totally enclosed unit designed for application in a Class 1, Division 1 area. The motor shall be a constant speed unit rotating at 1,760 rpm, and shall be powered by 230/460V ac, 60 Hz, three-phase power.
 - c. The drive unit shall be direct coupled to the screening wash and press drive shaft through the gear box. The gear box housing shall be constructed from ASTM A48, Class 30 cast iron.
2. Functional Characteristics: None.
3. Performance Characteristics: The gear box shall be designed for AGMA Class II, 24-hour duty.

2.05 SCREENINGS BAGGER UNIT

A. Physical Characteristics:

1. The bagging system components shall be attached to the screenings discharge. An accordion-folded plastic cassette bag shall be fitted to the end of the bagging system and will collect any discharged material. The end of the cassette bag will be tied in a knot. When the operator decides that the cassette bag is full, the cassette bag shall be cut and the exposed ends tied in knots.
2. A stainless steel adapter flange and a ABS plastic cassette bag holder shall be utilized to mount for the screenings discharge. The adapter flange shall be fitted to the discharge chute such that it is positioned as

close to horizontal as possible. The plastic holder shall be attached to the stainless steel adapter and shall hold the continuous cassette bag.

3. The adapter flange shall be stainless steel. The holder shall be of ABS plastic and shall consist of two parts, a tube and brim, which shall be held together by a stainless steel ring. The cassette bag shall be 230 feet (70m) long, nonporous, three-ply, co-extruded polyethylene with a minimum thickness of 1.8 mil and a dart drop of not less than 1.80 pounds (820 g).

B. Functional Characteristics: A continuous bagging system shall be provided to abate odors and to seal dewatered screenings to prevent any direct contact. The discharge bagging system shall provide a clean, odor-free means of collecting and containing the material discharged from the screenings equipment.

C. Performance Characteristics: None.

2.06 ACCESSORIES

A. Physical Characteristics:

1. Lifting Lugs: Equipment weighing over 100 pounds shall be provided with lifting lugs.
2. Anchor Bolts: Type 316 stainless steel, sized to secure equipment, minimum 1/2-inch diameter. See Section 05 50 00, Metal Fabrications, for requirements. Anchor bolts set by a template and protected from misalignment. Coordinate number and size with final Shop Drawings.
3. Nameplates: Equipment nameplates of stainless steel shall be engraved or stamped and fastened to the equipment in accessible locations with stainless steel screws or drive pins. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data describing the machine performance ratings.
4. Shaft Seals: Packing around rotating shafts (other than valve stems) shall be mechanical seals, as specified by the manufacturer. Interconnection water supply and drain piping shall be as shown on the Drawings.

B. Functional Characteristics: None.

C. Performance Characteristics:

1. Flanges and Pipe Threads: Flanges on equipment shall comply with ANSI B16.1, Class 125; or B16.5, Class 150, unless otherwise indicated. Threaded flanges and fittings shall have standard taper pipe threads complying with ANSI/ASME B1.20.1.
2. Bearings: Bearings shall conform to the standards of the Anti-Friction Bearing Manufacturers Association, Inc. (AFBMA). Except where

otherwise indicated, bearings of process equipment shall have a minimum L-10 life expectancy of 100,000 hours.

2.07 ELECTRICAL

- A. General: Provide all necessary electrical components, wiring, and motors for a complete, functional system in accordance with Division 26, Electrical, including Section 26 05 33, Raceway and Boxes, Section 26 05 05, Conductors, Section 26 20 00, Low-Voltage AC Induction Motors, Section 26 29 23, Low-Voltage Adjustable Frequency Drive System.
- B. Physical Characteristics:
 - 1. Electrical components shall be provided in accordance with the requirements of Division 26, Electrical.
 - 2. Instruments supplied in this section shall be wired by the system supplier to a common terminal junction box. Each conductor shall be terminated on a separate terminal point. Provide separation between analog signals and 120-volt power connections. Field wiring shall be provided between terminal junction box and vendor control panel.
 - 3. Electrical Raceways: All electrical wiring shall be installed in conduit meeting the requirements of Section 26 05 33, Raceway and Boxes.
 - 4. Wiring: All insulation shall be rated 600 volts, minimum. All low-voltage (24V) signals shall be run in twisted, shielded pair cable.
 - 5. Adjustable frequency drives shall meet the requirements of Section 26 29 23, Low-Voltage Adjustable Frequency Drive System.
- C. Functional Characteristics: None.
- D. Performance Characteristics:
 - 1. Wiring: All wiring shall meet the requirements of Section 26 05 05, Conductors, and NFPA 70.
 - 2. Electrical Raceways: All raceways shall be installed in accordance with Section 26 05 33, Raceway and Boxes, and NFPA 70.
 - 3. Motors and Speed Reducer:
 - a. Motors shall meet or exceed all applicable requirements of Section 26 20 00, Low-Voltage AC Induction Motors. Load on motor shall not exceed nameplate horsepower rating under any anticipated load condition.
 - b. The speed reducer shall have a minimum service factor of 1.5. The speed reducer shall be driven by a C-flanged, 1,800 rpm, ball-bearing, continuous-duty, fan-cooled motor.
 - c. Thermosensors in the motor windings rated T3C for cut-out at 160 degrees C.
 - d. The shaft-mounted parallel helical type gear reducer shall have a minimum service factor rating of 2 and a 16/8 rpm output.

2.08 CONTROLS

A. General: In accordance with Section 40 99 90, Package Control Systems.

B. Physical Characteristics:

1. The local-mounted main control panel shall include the following items:
 - a. Fusible disconnect switch with door handle.
 - b. 480/120V ac control transformer with one set of spare fuses.
 - c. Programmable Logic Controller (PLC) with programmer or motor starter, relays and timers to monitor equipment mounted electrical devices to perform logic functions as required by equipment.
 - d. Supplier's standard door mounted controls, indicators and screen.
 - e. 600V ac terminal block.
 - f. Three-phase transient voltage surge suppressor.
 - g. UL 508 label.
 - h. Alarm horn and silencer-reset pushbutton.
 - i. NEMA 4X stainless steel wall-mounted enclosure.
2. All controls necessary for the fully automatic operation of the septage screen shall be provided in accordance with general control requirement specified in Section 40 99 90, Package Control Systems.
3. Instrumentation in accordance with Section 40 99 90, Package Control Systems.

C. Functional Characteristics:

1. Signal Interfaces:
 - a. Communications:
 - 1) Septage receiving system shall communicate status to plant SCADA system via Ethernet. At a minimum the following signals must be available:
 - a) FAIL.
 - b) ON.
 - c) REMOTE.
 - d) FLOW.
 - e) PRESSURE.
 - 2) Septage receiving system shall receive remote control commands from SCADA system via Ethernet. At a minimum the following commands must be available:
 - a) ENABLE UNIT OPERATIONS.
 - 3) Additional controls and communications to plant SCADA shall be coordinated during submittal review.

D. Performance Characteristics: None.

2.09 FACTORY TESTING

- A. General: Test all components to be provided prior to shipping to verify functionality including controls, instrumentation and safety features.
- B. Physical Characteristics: None.
- C. Functional Characteristics: None.
- D. Performance Characteristics: None.

2.10 FACTORY FINISHING

- A. Physical Requirements:
 - 1. For ferrous metal surfaces, prepare, prime, and finish coat in accordance with Section 09 90 00, Painting and Coating, System No. 4.
 - 2. Stainless steel shall be cleaned and passivated following fabrication in accordance with ASTM A380.
- B. Functional Characteristics: None.
- C. Performance Characteristics: None.

PART 3 EXECUTION

3.01 INSTALLATION

- A. In accordance with manufacturer's written instructions.
- B. Anchor Bolts: Accurately place using templates provided by manufacturer and as specified in Section 05 50 00, Metal Fabrications.

3.02 FIELD FINISHING

- A. Touchup damaged areas of painted ferrous metal in accordance with and as specified in Section 09 90 00, Painting and Coating.

3.03 FIELD TESTING AND FACILITY STARTUP

- A. Field Testing and Facility Startup shall be in accordance with the requirements of Section 01 91 14, Equipment Testing and Facility Startup.
- B. Facility startup specifies the order and prerequisites for the following tests of the equipment:
 - 1. Field functional testing.
 - 2. Software operational testing.

3. Performance testing.
 4. Demonstration testing.
- C. All Field Testing and Facility Startup shall be performed using a qualified representative provided by the Manufacturer as specified in Section 01 91 14, Equipment Testing and Facility Startup, Section 01 43 33, Manufacturers' Field Services, and as elaborated upon in this section.

3.04 FIELD QUALITY CONTROL

- A. Functional Test: Test shall include 1-hour operation of septage receiving unit to verify functionality of system and all controls and safety interlocks.
- B. Performance Test: Septage unit shall be operated while receiving septage from four 800-gallon septage receiving trucks. The septage unit shall operate in auto without malfunction during the performance test. The screenings discharged from unit shall pass the Paint Filter Test.

3.05 MANUFACTURER'S SERVICES

- A. Manufacturer's Representative:
1. Present at Site or classroom designated by Contracting Agent, for minimum person days listed below, travel time excluded:
 - a. 1 person-day for installation assistance and inspection.
 - b. 1 person-day for functional and performance testing and completion of Manufacturer's Certificate of Proper Installation.
 - c. 1 person-day for startup and field training. Training shall not commence until an accepted detailed lesson plan for each training activity has been reviewed by Contracting Agent.

END OF SECTION