

# **SPECIFICATIONS**

**GAINNEY**

**SEWAGE**

**Treatment Plants**

**2,000 G.P.D.**

As Manufactured By

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**HEAVY DUTY PRECAST CONCRETE**

## WASTE WATER TREATMENT PLANT

### SPECIFICATIONS

#### GENERAL

The contractor shall furnish and install one complete Extended Aeration waste water treatment facility with all necessary parts and equipment described in the following specifications. The Extended Aeration waste water treatment facility shall provide primary and secondary treatment of the waste water flow and shall be as manufactured by Gainey's Concrete Products and distributed by Delta Process Equipment – Ruston, LA.

Treatment of the daily waste water flow shall be accomplished by the Extended Aeration process. This plant will treat non-industrial sewage influent with a BOD concentration of 204 mg/l over 24 hours to provide an effluent quality of 30mg/l of BOD5 and 30mg/l TSS. The chlorine contact chamber will provide adequate disinfection (<400ppm fecal) through a hypochlorite concentration of 8mg/l to meet LA DEQ standards including a minimum retention of 30 minutes DAF and 15 minutes at PHF.

Primary treatment shall be accomplished in the aeration chamber of the facility. All incoming waste water shall enter and be retained in the aeration chamber for twenty-four hours. Air shall be introduced along one wall near the bottom to produce a mixing and rolling action in the tank. Two thousand one hundred cubic feet of air shall be pumped into the aeration chamber for each pound of BOD applied per day. The spiral rolling action created by the introduction of air shall insure thorough mixing of the incoming organic material with the activated sludge present in the chamber. In addition, the spiral flow pattern shall prevent short circuiting of the flow and assure adequate retention of all organic materials.

Secondary treatment of the waste water shall be accomplished in a clarification chamber. Mixed liquors shall flow from the aeration chamber into the clarification chamber by hydraulic displacement. The effective holding capacity of the clarifier shall be calculated after excluding the lower two-thirds, by height, of the hopper(s) and shall still be of sufficient volume to provide in excess of four hour retention of the daily flow. The chamber shall be designed so that the clarifier will successfully perform its function of solids separation without hydraulic upset even when the significant runoff period is eight hours.

Capability of a plant of this type to perform as outlined, when built by an approved manufacturer, shall be certified by an independent testing laboratory. The manufacturer shall make certified data available to the regulator agency, customer, consultant and contractor as required.

Principal items of equipment supplied with the system shall include concrete aeration and clarification tank(s), air distribution system, air diffused system, airlift sludge return pumping system, airlift surface skimming system, galvanized grating with bolted locking device for all tank openings, rotary blowers, motors, electrical controls, mechanical equipment housing, effluent weir trough and all necessary internal piping and mechanical equipment. The waste water treatment facility structure shall be reinforced to withstand normal pressures from external soil and internal hydrostatic loads.

#### OPERATING CONDITIONS

The waste water chamber shall be GAINNEY model **W.O 20**, as shown on drawing, capable of treating **2,000** gallons per day of sanitary sewage. This facility shall be designed and built to serve a population equivalent of **20** with a total loading and treatment capability of **3.40 pounds** of five BOD per day.

#### AERATION

The aeration chamber shall have a capacity of **2,035** gallons to provide twenty-four hour retention of daily waste water flow. The chamber shall be of sufficient size to provide a minimum of eighty cubic feet of

tank capacity per pound of applied BOD. Concrete fillets shall be installed in the bottom of the chamber parallel to the treatment flow to insure uniform tank roll and prevent deposition of solids. Overall design of the chamber shall be such that effective mixing shall be maintained to provide optimum treatment.

### **AIR DISTRIBUTION PIPING**

Galvanized schedule forty piping and galvanized malleable iron pipe fittings shall be used throughout the air distribution system. Individual galvanized pipe unions, dresser couplings and flexible couplings with stainless steel clamps shall be provided as necessary in the air distribution piping as required to allow individual adjustment of each separate element within the system.

Primary air distribution shall be provided through a galvanized air header. The air header shall have individual drop pipes connected to the header assembly for air supply to individual diffused assemblies. Each drop pipe shall be equipped with an air adjustment valve to control air flow individually to each diffused assembly. In addition, a quick release coupling or union shall be provided for each pipe diffuses assembly downstream from the air adjustment valve.

### **AIR DIFFUSION SYSTEM**

Diffusers shall be provided parallel to the treatment flow in the aeration chamber. Each diffuser assembly shall be installed no more than twelve inches off the floor of the chamber nor more than twelve inches away from the chamber sidewall. Diffusers shall be constructed of SCH40 polyvinyl chloride (PVC) plastic and shall be designed to insure uniform mixing within the aeration chamber. Fine air bubble distribution effected by the diffusers shall be adequate to provide all oxygen necessary for the Aerobic Digestion process while maintaining an acceptable dissolved oxygen level in the final plant effluent.

### **CLARIFICATION**

A final clarification chamber shall be provided for secondary treatment of the daily flow. It shall be provided for a capacity of **376** gallons. The effluent weir shall be of sufficient length to provide an overflow rate of **1,333** gallons per lineal foot per day at peak hourly flow and surface area of the tank shall provide a setting rate of **364** gallons per day per square foot at peak hourly flow.

The clarifier shall be constructed of properly reinforced five thousand PSI, twenty-eight day compression strength concrete. Each casting in the clarifier shall be monolithic unit with all four walls incorporated into the tank section. The clarifier shall consist of essentially four independent zones operating together to provide satisfactory solids separation. An inlet baffle zone shall be provided at the flow inlet to the clarification chamber. All transfer turbulence shall be dissipated upstream, of the inlet baffle and its performance shall be adequate to eliminate all turbulence downstream from the baffle. The area contained behind the baffle shall allow adequate capacity and retention for surfacing of all buoyant material entering the clarifier. The baffle shall extend above the surface and adequate distance to entrap all floating material and it shall extend below the transfer port a sufficient distance to eliminate passage of buoyant material or surface turbulence.

Flows shall be directed out of the inlet baffle zone into the hopper zone. All transfer shall be accomplished below the bottom of the inlet baffle into the upper one-third area of the hopper zone. In this zone, sludge shall settle by gravity to the bottom hopper(s). The hopper(s) shall have sloping sidewalls directing all sludge to the bottom near the airlift pump inlet(s). Maximum area at the base of the hopper (s) shall be one square foot. Here settled sludge shall be returned to the aeration chamber by continuous airlift pumping.

Clarified liquids shall be contained in the settling zone above the hopper area for additional gravity settling. From here they shall be hydraulically displaced to the outlet zone. The outlet zone shall consist of an adjustable side plate effluent weir trough and outlet baffle. The outlet baffle shall extend into the

surface of the liquid to a point not exceeding three inches and shall extend above the surface an equal distance. The baffle shall run the entire length of the outlet zone and shall totally separate the surface liquids of the settling and outlet zones. Centered in the outlet zone parallel to the outlet baffle shall be an effluent weir trough with two adjustable v-notched side plates. The trough shall be capable of being adjusted from end to end to provide adequate fall to the plant outlet and the side plates shall each be capable of being leveled from side to side and end to end to the level of the liquid surface in the chamber.

### **AIRLIFT SLUDGE RETURN**

A SCH40 P.V.C airlift sludge return pump shall be provided for the hopper(s) in the clarification chamber. Air shall be supplied to the airlift(s) through a secondary air distribution system connected to the main air header of the treatment plant. Individual air manifold piping shall be installed for each airlift and shall be equipped with a valve for fine adjustment or shut-off.

The airlift(s) proper shall be constructed of schedule forty galvanized steel pipe and fittings. A removable clean-out plug shall be installed at the top of the vertical airlift pipe. Piping shall be arranged so that returned sludge is deposited in the aeration chamber at a point which prevents short-circuiting and with positive visible return. The airlift pump(s) shall be designed and manufactured of adequate size pipe and with sufficient air supply to provide a pumping rate in excess of the total daily flow. Air required to achieve this shall be provided in excess of the necessary for aeration, mixing and treatment. The airlift pump inlet(s) shall be equipped to achieve this. Brackets shall be used to position the inlet correctly at the base of the hopper. Inlets will restrict sludge flow and shall not be considered.

### **AIRLIFT SURFACE SKIMMER**

An airlift surface skimming system shall be installed in the settling zone of the clarification chamber(s). The airlift skimmer(s) shall be constructed of schedule forty galvanized pipe and fittings.

The skimmer inlet(s) shall be equipped with an adjustable cone. The inlet cone(s) shall be provided with attached flexible connector for installation and adjustment of the cone(s) on the airlift assembly. A removable galvanized clean-out plug shall be provided at the top of the skimmer airlift pipe where it joins the horizontal discharge line. The discharge line shall run on top of the plant and return back to the aeration chamber for final discharge. The skimmer air supply connected to the main air header of the treatment plant. Air adjustment/shut-off valves will be installed in the skimmer air manifold supply lines.

### **DISINFECTION - CHLORINE CONTACT CHAMBER**

Using a peaking factor of 4, the minimum volume would be **83** gallons to achieve 15 minutes retention at peak hourly flow. The contact chamber for this project shall have a retention volume of **150** gallons and a Norweco Model LF2000, in-line tablet chlorinator. The chamber shall be constructed of the same specified concrete material as the main plant and shall have galvanized grated opening(s) on top for maintenance and operation.

### **MECHANICAL EQUIPMENT**

Air required for the treatment process and operation of airlifts in the clarifier shall be provided by **two** ROOTS 22 -URAI blowers. The blowers shall be of the rotary positive displacement type and shall provide **30** CFM of free air at the rated operating pressure of **2.1** PSI. The blower units shall be provided with inlet air filter silencers, discharge flexible coupling connector to air header assembly. If more than one blower is provided, check calves shall be included in the discharge piping. Blower connection to the drive motor(s) shall be with conventional v-belts power transmission drive assembly.

**Two:** seventeen hundred fifty RPM **230** volt **single** phase, 60 hertz **1** horsepower, **8** amps for three phase, shielded, drip-proof electric motors shall be used to drive the blowers. When operation at the rated horsepower the motors shall reach maximum speed that shall exceed ninety-seven percent of the reference synchronous speed. The motors for the facility shall be designed and rated for continuous duty applications and shall not overload or exceed motor nameplate ratings when operating as outlined for this facility.

#### **WELDED ALUMINUM EQUIPMENT HOUSING**

Frame shall be 2" X 2" X 1/2" aluminum with brackets in front for electrical panel. Mounting plate shall be 1/4" reinforced aluminum with rubber mounts, to absorb shock and noise. Adjustment slide base for ease of motor alignment and belt tension adjustment shall be furnished. Cabinet shall be eighty thousands gauge aluminum, mounted to frame with heavy duty aluminum piano hinge. (3" Width - 1/8" thick with 3/8" Pin)

#### **ELECTRICAL CONTROLS**

Electrical controls shall be mounted in a separate weatherproof and dust proof PVC cabinet, attached to the front of the motor and blower unit housing. The cabinet shall be equipped with a locking device to restrict access to the controls to authorized persons. Controls shall include: **230** volt, **single** phase motor control center with across-the-line manual type motor starter, motor circuit breaker and thermal overload protection. The motor control center shall be factory-wired to the motor with a resilient power cable and tested under actual operating conditions prior to shipment to the jobsite.

#### **TIME CLOCK**

Electrical controls shall include a fifteen minute multiple, twenty-four hour time clock to permit cyclic automatic operation of the treatment facility throughout the day. A three-position "hand-off-auto" selector switch shall be installed to allow the treatment plant aeration unit to operate either on a continuous run basis or according to the cycle established on the time clock.

#### **GALVANIZED METAL GRATING**

Tank openings shall be protected with heavy duty 14 gauge galvanized metal grating bolted in position. Individual bolted bar assemblies shall be provided for each tank opening. The galvanized safety grating shall also be used as a leaf screen to prevent entry of leaves and discarded debris into the tankage. Therefore maximum width of individual openings within the grating proper shall not exceed one-half of an inch.

#### **WARRANTY**

The manufacture shall warrant the equipment being supplied to the owner against defects in workmanship and materials for a period of one year under normal use and service.

The warranty shall not cover any item which has been subjected to external damage, disassembled and/or repaired by unauthorized persons, flooded or otherwise mistreated. The manufacturer shall not be held liable for any consequential damages or contingent liabilities which are directly or indirectly a result of any failures in materials or equipment, or from delivery or installation delays. Items normally consumed in service such as grease, oil, v-belts, fuses, filters, seals, etc., shall not be warranted.