

## **1.0 TANK CONSTRUCTION**

- 1.1** The work covered in these specifications consist of furnishing all labor and materials, required to manufacture a factory fabricated sewage treatment plant; including all treatment components, piping, equipment, and appurtenances as shown on the drawings and/or as specified herein to provide a satisfactorily operating sewage treatment plant.
- 1.2** The treatment plant shall be an Aeromix Model \_\_\_\_\_ package as manufactured by Aeromix Systems, Inc., Minneapolis, Minnesota. The wastewater treatment system shall be of the activated sludge type, specifically know as "Complete Mix/ Extended Aeration Activated Sludge ", the system shall be designed for treating a total of \_\_\_\_\_ gallons per day of 240 mg/l-BOD<sub>5</sub>; 240 mg/l TSS domestic sewage based on composite sewage samples of the average daily flow. No substances shall be introduced in quantities, which are toxic to biological organisms. The plant shall be designed to handle average daily flows fluctuating over the range of 60% to 100% of design flow and peak hourly flow rates not to exceed 250% of design flow, with an effluent quality of 30 mg/l-BOD<sub>5</sub>; 30 mg/l TSS. The complete system shall include all necessary equipment for efficient plant operation.

## **2.0 GENERAL DESCRIPTION**

- 2.1** The plant shall be fabricated complete with all treatment components, equipment and appurtenances that may be required to accomplish screening, aeration and mixing, clarification, sludge activation, activated sludge recirculation and aerobic sludge digestion – all in one single steel structure having separate compartments.
- 2.2** The composite structure shall consist of two concentric steel tanks forming an inner chamber and an outer annulus. The inner chamber shall serve as a clarifier or settling basin. The outer annulus shall be divided into compartments or chambers to form a mixing chamber, a sludge activation chamber and an aerobic digester. The structure shall be fabricated and erected as shown on the drawings.
- 2.3** The principle items of equipment to be supplied as follows: A bar screen , complete aeration assemblies and facilities, complete clarification equipment and appurtenances, sludge airlifts , air blowers and accessories and all other items of equipment and accessories required to provide a complete installation as specified herein.

## **3.0 TANK CONSTRUCTION (STEEL)**

- 3.1** All structural plates associated with the outer and inner vertical tanks walls and all partitions walls shall be carbon steel plate not less than one-fourth inch thick inch ¼” structural grade steel plated; ASTM A-36 minimum thickness joined by arc welding with fillets of adequate section for the joint involved. All walls shall be continuous and watertight and shall be supported by structural reinforcing members where required. Fabrication and erection shall conform to the appropriate requirements of "AISC Specification for Buildings". Connection shall conform to the requirements of the American Welding Society's Code and shall develop the full strength of the member.
- 3.2** Steel base channels for outer circular walls and for each partition wall. An outer wall with a diameter up to 86'-7” requires an ASTM A36, 8" x 13.75 lbs. /ft. and shall be embedded 4" deep in the slab. The partition walls require an 8" x 13.75 lb. channel for all sizes when the plant is designed

for compartment dewatering.

- 3.3** A 45 degree steel or spiral staircase with handrails shall be provided to permit access to the top of the plant. The stairway is designed to support a live load of 500 pounds at any one point.
- 3.4** A steel bridge shall be provided. This bridge shall span the clarifier and shall extend to the outer tank wall meeting the access stairway. The bridge shall be designed to safely support all normal operating loads plus a 1000 pound concentrated live load. The walkway surfaces shall be as listed herein.

#### **4.0 SURFACE PREPARATION AND CORROSION PROTECTION**

##### **IN THE FIELD**

- 4.1** All steel surfaces shall receive a near white blast SSPC-SP10 to remove rust, mill scale and weld slag. All weld splatter and surface roughness shall be removed by chipping and grinding smooth.
- 4.2** All prepared surfaces shall be thoroughly dry and free from preparation dust and foreign matter prior to the application of any coating. Craftsmen applying protective coatings shall be thoroughly familiar with the application guidelines and preparation requirements of the product to be applied. All materials shall be evenly applied and shall be free from obvious defects.
- 4.3** Protective coatings shall not be applied to improperly prepared surfaces or during conditions considered to be not conducive to sound painting practices or in fog, rain, snow, mist or when the surface temperature is less than 40°F. or the humidity exceeds 85%.
- 4.4** Immediately after surface preparation, a rust inhibitive epoxy primer coat shall be applied. No discoloration of the cleaned areas shall occur prior to the application of the prime coat. All steel surfaces shall receive a 3-mil dry film thickness of this protective coating.
- 4.5** Field painting of the plant and any accessories mounted on or attached to the exterior of the tank and supplied by the manufacturer shall be performed by the equipment manufacturer and shall include masking of all galvanized and aluminum surfaces. Field painting may be subcontracted.
- 4.6** Below Grade installation shall require cathodic corrosion protection, and shall be provided using \_\_\_\_\_ magnesium anodes, weighing seventeen pounds each. These shall be buried by the contractor adjacent to the tank sides and provided with good electrical contact with the tank.
- 4.7** The anodes shall come packed in its own low resistant back fill material with the copper lead wire brazed to the core and insulated with coal tar at that point. The anodes shall be attached to the tank vessel with a similar connector. This connection will also be coated with coal tar insulation. The anodes shall be located at least 5 feet from the tank structure and be at least ½ the distance between the grade level and the bottom of the tank.
- 4.8** Each of the anodes shall be located equidistant from the other anode. Each anode is to be then doused with 5 gallons of water.

#### **5.0 FOUNDATION**

- 5.1** The plant shall be anchored to a reinforced concrete foundation slab as shown on the drawings. The poured foundation slab shall be provided and installed by the General Contractor. Structural design of the concrete foundation shall be the responsibility of the Project Engineer.
- 5.2** The General Contractor shall join the base channel sections supplied by Aeromix Systems, Inc. and locate those assembled channels in the concrete slab within the tolerances as listed on the contract drawings. All connecting points shall be seal welded watertight.
- 5.3** After production schedules have been reviewed, you will be advised of a shipping and delivery date. If this schedule does not meet with your project site plans, please contact Legacy Corporation immediately so we can reschedule shipment. Embedded base channels will be shipped two (2) to three (3) weeks after receipt of approved submittals, the field contractor will be responsible for installation and field welding of the base channels.
- 5.4** Base channels are to be installed to a tolerance of within  $\pm \frac{1}{2}$ " on the diameter of the ring measured at 20° intervals from the center point of the system, levelness must be within  $\pm .0625$ " measured at every ten (10) feet on the circumference of the base channels, Aeromix Suggest that these are measured with a laser site before and after the concrete is poured.
- 5.5** Improper installation of base channels will be the responsibility of the installing contractor. If adjustments need to be made for installation of the plant main wall structures, the installing contractor will be held responsible for any charges that may occur for improper installation.
- 5.6** The Project Engineer should check the foundation slab before the wastewater treatment system components arrive at the job site. Where flotation conditions exist, as in fluid soil, a foundation slab of adequate size & weight should be supplied to equal the bearing soil pressures.

## **6.0 INLET CONNECTION**

- 6.1** The influent connection shall be one, \_\_\_" diameter 150# standard flange. The inlet shall be located at the \_\_\_\_\_ endwall of the system.

## **7.0 COMMINUTOR (OPTIONAL)**

- 7.1** The comminutor will be a Model P-\_\_\_-C unit as manufactured by Dynatech Machine, Inc., Florence, Kentucky and will be a motor driven comminuting mechanism that reduces the organic solids in sewage to 1/4" size or smaller. These solids pass through 1/4" slots in the rotating cylindrical sewage screen to the outlet. This comminutor is designed to pass maximum flow of \_\_\_\_\_ gallons per minute of clear water.
- 7.2** The comminutor is machined out of the finest grade cast aluminum and primarily composed of a gear motor, vertical aluminum shell rotating sewage screen cast in #535 alloy with four (4) hardened A2 tool steel cutter teeth, aluminum shell assembly cast in #535 alloy with drive shaft and bearings, a fixed hardened A2 tool steel stationary cutter bar mounted on shell and aluminum inlet flow trough cast in #319 alloy.
- 7.3** The rotating cutter teeth and stationary cutter bar are mounted on each web of the screen and the shell assembly so when the entire screen assembly revolves, the teeth on the screen pass through the

slots in the stationary cutter, creating a cutting and shearing action between the teeth and stationary bar.

- 7.4** The gear drive unit is a right angle gear motor integral type with single reduction worm gearing Class No. 3. This unit is designed and applied in complete accordance with applicable practices of the American Gear Manufacturers Association. The worm gear materials comply with all mechanical ratings allowed by the AGMA Rating Standard. The motor size is 1/2 horsepower, for operation on \_\_\_\_\_ volt, \_\_\_ phase service. All equipment is designed for outdoor service.
- 7.5** The flow through the comminutor is such that the influent enters the comminutor through a \_\_\_” diameter open top type where it passes through the rotating sewage screen and discharges out of the bottom of the trough. To prevent damage to the rotating sewage screen it will be required that the rotating sewage screen be located in the center of the sewage trough. Screens located off center will be disapproved.
- 7.6** The control circuitry for this unit is an integral part and includes a solid state current monitor and reversing motor starter to automatically reverse the cutting drum of the comminutor in a jam situation; stop and restart it in forward position. The unit will continue this mode until it either unclogs itself or until the overload relay device in the control panel stops this sequence. The controls are mounted in a NEMA \_\_\_ enclosure.

#### **ENGINEERING DATA:**

<b>7.7</b>	Model No.	P-___-C
<b>7.8</b>	Capacity	0 to ___ gallons per minute
<b>7.9</b>	Voltage Requirements	___ volts
<b>7.10</b>	Phase Requirements	___ Phase
<b>7.11</b>	Service Factor	1.00
<b>7.12</b>	Horsepower Rating	1/2 intermittent, 1/3 continuous duty
<b>7.13</b>	Torque	826 inch/pounds
<b>7.14</b>	Normal Ratio	___:1
<b>7.15</b>	Cutting Teeth	___
<b>7.16</b>	Tooth Width	3/16"
<b>7.17</b>	Shipping Weight	___ pounds

#### **8.0 COARSE BAR RACK/SCREENING BOX**

- 8.1** The field erect plant shall include a manually cleaned, coarse bar rack/screening box constructed of minimum ¼” inch thick, type A-36 painted carbon steel.
- 8.2** Clear opening between bars shall be a minimum of 1”. Bars shall be placed at a slope of 30-45 degrees from horizontal.
- 8.3** Bar cross sections shall be a minimum of ½” by 1” of type A-36 painted carbon steel.

#### **9.0 FLOW EQUALIZATION CHAMBER**

- 9.1** There shall be supplied, an aerated flow equalization chamber to work in conjunction with the secondary treatment system to enable the incoming sewage flow rate to be flow equalized so as to reduce the plant surges. The influent shall enter the flow equalization tank by connection of a 6" diameter 150# flanged pipe connection.
- 9.2** The flow equalization chamber shall be provided as an integral part of the wastewater treatment system. Volume of this chamber shall not be less than \_\_\_\_\_ gallons. A duplex set of pumps shall be furnished and installed in the chamber for pumping the influent to the flow control box.
- 9.3** The flow proportioning facilities shall be provided at the top inside of the flow equalization chamber at the flow equalization pump discharge to reduce the pumping rate proportional to the system design flow. The chamber shall be equipped with an adjustable flat weir so that the excess pump surges shall overflow this chamber directly to the flow equalization tank. The corrected pumping flow shall pass over the "V" notch weir into the aeration chamber.
- 9.4** A duplex set of flow equalization pumps shall be provided within the flow equalization chamber and attached by piping and valving to the flow-proportioning chamber. The pumps shall be of the 2" solids handling submersible type; Model \_\_\_\_\_ as manufactured by \_\_\_\_\_. Each pump shall be furnished with a slide rail system for ease of removal from the flow equalization chamber. The slide rail system shall be complete with rail base and upper guide assembly. The pump motor shall be \_\_\_\_\_ HP for operation on \_\_\_\_\_ Volt, \_\_\_\_\_ Phase, \_\_\_\_\_ Hz. service. The capacity of the flow equalization pumps shall be \_\_\_\_\_ GPM at a \_\_\_\_\_ TDH.

## **10.0 FLOW EQUALIZATION AIR SUPPLY BLOWER MOTOR UNIT**

- 10.1** For supplying the air requirement of the flow equalization chamber, \_\_\_\_\_ blower motor units shall be furnished and installed at the location shown on the drawings. The units shall be completely factory built and tested before shipping to the project site. The blower shall be of the two-lobe involute type design complete with the accessories described below.
- 10.2** The blower motor unit, Model \_\_\_\_\_, shall be furnished for supplying the air requirements of the flow equalization chamber.
- 10.3** The unit shall be capable of delivering \_\_\_\_\_ CFM when operating at 6 PSI. The blower shall be manufactured by Roots Division of Dresser Industries, Inc., Connerville, Indiana; or Sutorbilt Blower, Gardner-Denver, Peachtree City, Georgia; or approved equal. The model number of the blower shall be Sutorbilt size \_\_\_\_\_ Legend series.
- 10.4** Impeller case shall be strongly ribbed to prevent distortion when operating at rated pressure.
- 10.5** The unit shall be equipped with 4 heavy-duty anti-friction bearings. Impellers shall be close grain cast-iron. Impellers shall be machined on all exterior surfaces. Impellers shall be dynamically balanced. One piece machined steel shafts shall pass completely through the impellers for proper support.
- 10.6** The unit shall have 2 timing gears accurately machined to position the impellers in the impeller housing. Gears shall be enclosed in an oil tight housing and shall be lubricated by a splash oiling

system from oil maintained in the gear housing. Gear end bearings shall be splash lubricated from the same reservoir. Drive end bearings shall be grease lubricated through grease fittings located in each bearing housing. Grease vents shall be located in the bearing housing to prevent rupture of grease seals from over greasing.

- 10.7** Air vents shall be located between the seals and the impeller chamber to relieve excessive pressure on the seals.
- 10.8** The motor shall be \_\_\_\_ HP for operation on \_\_\_\_ Volt, \_\_\_\_ Phase, 60 Cycle Service, 1750 RPM. It shall be of the open drip proof type.
- 10.9** The blower shall be mounted on a fiberglass base. The base structure shall be adequately reinforced to support the blower and motor unit.
- 10.10** For easy adjustment of the "V" belt drive connection between the blower and motor, the motor will be furnished with an adjustable motor mounting base.
- 10.11** The blower shall be fitted with a dry type wire mesh filter-silencer at the air intake. Furthermore, the blower discharge shall be fitted with a check valve when required, and a flexible rubber discharge coupling.
- 10.12** Each blower and motor shall be enclosed within a fiberglass weatherproof enclosure. The fiberglass hood is designed for easy access to service the unit. It shall be equipped with a latching handle.
- 10.13** To help reduce blower vibration and noise, the blower motor enclosure shall be mounted on vibration dampeners. For purposes of determining the blower performance, and/or diffuser condition, a pressure relief valve and pressure gauge shall be mounted in the air manifold.
- 10.14** (Optional) Belt Guard for the "V" belt drive unit shall be supplied attached to the blower-mounting base. The belt guard shall be designed for easy access to the sheaves of both the motor and blower. The belt guard shall be fabricated of metal and shall be painted OSHA yellow.
- 10.15** (Optional) An inlet silencer shall be installed on the inlet end of the blower. The silencer shall be a model \_\_\_\_ as manufactured by Universal Silencer.
- 10.16** (Optional) A discharge muffler shall be installed on the discharge end of the blower. The muffler shall be a model \_\_\_\_ as manufactured by Universal Silencer, Stoughton, Wisconsin; or approved equal.

## **11.0 FLOW EQUALIZATION ELECTRICAL CONTROL CONSOLE**

- 11.1** An electrical control panel shall be installed within a NEMA \_\_\_\_ weatherproof enclosure with a locking hasp. The control console shall be provided for mounting as indicated on the plans. Any exterior mounting hardware shall be stainless steel or other corrosion resistant material.
- 11.2** The control console shall be a Model \_\_\_\_ and shall be completely factory assembled and tested prior to shipment. The control console shall be furnished with all necessary controls for each pump and blower motor unit and associated plant equipment. Control voltage shall be 120 VAC, 1 Phase.

- 11.3** Controls shall be mounted to a removable sub-panel within the enclosure and shall be wired and spaced in accordance with the latest National Electrical Code. The control console shall be supplied with a properly sized magnetic-circuit breaker to act as the main disconnects for the control console. Magnetic starters with overload protection shall be supplied for all blower motor units. An electrical alternator shall be furnished to alternate the operation of each pump. The alternator shall be provided with a manual selector switch to allow manual selection of the lead pump if desired.
- 11.4** All wiring conductors within the control console shall be U.L. type THHN, stranded #14 AWG minimum, rated at 600 volts. Control wiring shall be numbered on each end.
- 11.5** Control panel and the electrical power service shall be furnished and installed by the purchaser. Wiring and conduit between the control panel and plant equipment shall be furnished by the manufacturer of the wastewater treatment plant. The panel may be detached for shipping. The main power supply shall be \_\_\_\_ Volt, \_\_\_\_ Phase, 60 Cycle, \_\_\_\_ Amps. The control voltage shall be 120 Volt, 1 Phase.
- 11.6** Pump controls shall be of the direct acting mercury float type for complete automatic operation as follows:
- 11.7** Turns off both pumps and activates the electrical alternator for the next cycle
- 11.8** Energizes the lead pump on.
- 11.9** Turns flow equalization blower on & off.
- 11.10** Activates the lag pump on.
- 11.11** Activates the high level alarm.
- 11.12** Provide Circuitry for Bi-Directional rotation of surge grinder pumps (Optional)
- 11.12** The mercury switch consists of a steel tube that houses mercury and contacts. Contact is through mercury to mercury. No mechanical contacts.
- 11.13** The power cord will consist of a type SJOW-A cord rated for 300 maximum capacity.
- 11.14** The mercury tube switch and cord are sealed in a vinyl ball with leak proof polyurethane resin.
- 12.0 SLUDGE HOLDING CHAMBER / AEROBIC DIGESTER**
- 12.1** An aerated aerobic digester chamber shall be provided as specified and shown on the plans. It shall be designed to hold a minimum of \_\_\_\_ gallons of sludge.
- 12.2** The digester chamber shall be constructed as an integral part of the wastewater treatment system and fabricated out of one-fourth inch steel plate. The chamber shall have the same protective coating as specified for the treatment plant. It shall also have the same structural requirements as the wastewater treatment plant.

- 12.3** Each diffuser drop assembly shall be equipped with an air regulating and/or shutoff valve, a disconnecting union and a diffuser bar with non-clog air diffuser nozzles mounted thereon at approximately 70" centers. With this spacing, the airflow per diffuser shall range from 1 to 30 SCFM. This minimum air velocity shall be maintained to insure sufficient velocity for self-cleaning. The diffusers shall be parallel to and near the base of the vessel sidewall and at an elevation, which will provide the optimum diffusion and mixing of the vessel contents.
- 12.4** The diffusers will be a Model CYCLONE™ as manufactured by AEROMIX Systems, Inc., Minneapolis, Minnesota. The diffusers will be manufactured to produce a double shear when air is released. The air is sheared as it discharges the air orifice of the air diffuser body and again as it crosses over the diaphragm baffle. The diffuser will be supplied with standard male pipe thread connections.
- 12.5** An airlift pump with vertically adjustable intake and air control valve shall be provided for the purpose of decanting supernatant from the aerobic digester. The airlift piping shall be schedule 40 painted steel piping, and neoprene bands shall isolate the piping from all steel surfaces. The pipe shall pivot on a swivel joint. A winch accessible from the walkway shall be provided to raise and lower the pipe by means of a 3/16" diameter stainless steel cable. The intake elevation adjustment shall allow the water level in the digester to be lowered a minimum of 48 inches.
- 12.6** The digester chamber shall be set on the same concrete foundation pad as the wastewater treatment plant and set at the location as shown on the plans.
- 13.0 AERATION CHAMBER**
- 13.1** There shall be supplied, an aeration chamber to work in conjunction with the clarifier chamber. The aeration chamber shall conform to the following specifications:
- 13.2** The aeration chamber shall be of sufficient capacity to provide a minimum of 24 hours retention of the average daily flow, and/or a minimum chamber volume of \_\_\_\_\_ gallons. The vessel shall be so shaped on each side to prevent sludge accumulation, to enhance rotation of the vessel contents, and to prevent scum and froth accumulation. To insure maximum retention and eliminate short circuiting of raw sewage particles, the aeration chamber shall be constructed with air diffusers, placed longitudinally along the inside of the chamber so as to, in conjunction with the flow control baffles, enhance the spiral rotation of the chamber contents. To ensure adequate circulation velocity, the proportion of the chamber width to depth, in the direction of rotation, shall not exceed 1.33 to 1. The velocity of rotation shall be sufficient to scour the bottom and prevent sludge filleting as well as to prevent the escape to the surface of minuscule air diffusion bubbles and by so causing their entrapment to provide maximum oxygenation efficiency.
- 13.3** An air distribution manifold shall be installed longitudinally on one side of the tank with diffuser drop assemblies connected thereto.
- 13.4** Each diffuser drop assembly shall be equipped with an air regulating and/or shutoff valve, a disconnecting union and a diffuser bar with non-clog air diffuser nozzles mounted thereon at approximately 70" centers. With this spacing, the airflow per diffuser shall range from 1 to 30 SCFM. This minimum air velocity shall be maintained to insure sufficient velocity for self-cleaning. The diffusers shall be parallel to and near the base of the vessel sidewall and at an elevation, which

will provide the optimum diffusion and mixing of the vessel contents. The oxygen transfer capacity of each diffuser shall be such that an adequate supply of oxygen will be maintained in the aeration chamber to meet treatment requirements of the design sewage load.

- 13.5** The diffusers will be a Model CYCLONE™ as manufactured by AEROMIX Systems, Inc., Minneapolis, Minnesota. The diffusers will be manufactured to produce a double shear when air is released. The air is sheared as it discharges the air orifice of the air diffuser body and again as it crosses over the diaphragm baffle. The diffuser will be supplied with standard male pipe thread connections.

#### **14.0 CIRCULAR MECHANICAL CLARIFIER**

- 14.1** There shall be furnished a clarifier chamber to work in conjunction with the aeration chamber of that system. The clarifier shall conform to the following specifications:

- 14.2** The clarifier chamber shall be of such size as to provide a minimum of four (4) hours retention, based upon the same design flow rate governing the aeration chamber, and shall have proper baffling to prevent short circuiting and to provide maximum uniform retention. The clarifier inlet shall be baffled to prevent short-circuiting and provide maximum uniform solids settling area. The slope of the clarifier grout shall not be less than 1 vertical to 12.0 horizontal. Settled sludge shall be returned from the clarifier sludge hopper to the aeration chamber by the positive sludge return system, consisting of an airlift pump. The clarifier effluent shall pass over the edge of the baffled adjustable effluent weir into the effluent trough and then out of the chamber. The weir plate will be constructed of 10 gauge galvanized steel and will be gasketed with 1/4" neoprene.

#### **15.0 SUPPORT BRIDGE**

- 15.1** The drive unit support and bridge shall consist of two beams spanning the top of the tank including cross-supporting members, handrails, and grating walkway. The 1-1/2" handrails shall be anchored to the structural beams.

#### **16.0 INLET STILLING WELL**

- 16.1** An influent well of \_\_\_ feet in diameter by 3'-0" feet depth shall be provided to cut down the influent velocity and prevent short circuiting. The stilling well shall be a rotating type supported off the torque tube.

- 16.2** The inlet stilling well shall be fabricated of 1/4" steel plate and painted the same as the main vessel.

#### **17.0 SLUDGE SCRAPER ASSEMBLY (RAKE ARMS)**

- 17.1** The sludge scraper assembly shall consist of two scraping arms fabricated of steel angles and a \_\_\_" diameter torque tube.

- 17.2** The scraper arm assembly shall be adjusted vertically and horizontally by means of threaded rods attached to the torque tube.

- 17.3** Each scraper arm shall be fabricated from steel angle and have a neoprene squeegee blade attached to each angle to allow for sufficient movement of sludge into the center sludge collector pit.
- 17.4** The bottom of the clarifier shall be grouted concrete which conforms to the dimensions shown on the manufacturer's plans. Design and installation of the concrete shall be the responsibility of the installing contractor. All concrete and reinforcing steel shall also be furnished by the field contractor.
- 17.5** There shall be installed within the clarifier chamber, a positive sludge recirculation system, consisting of \_\_\_\_\_, \_\_\_\_\_ diameter airlift sludge return assembly, meeting the following specifications: The airlift pump system shall have the recirculation capacity ranging from 0% to 100% of the design flow. The airline supplying air to the pump shall be equipped with a needle valve varying the capacity of the pump. The airlift pump shall be firmly supported and shall be equipped with a clean-out plug to allow for easy cleaning and maintenance.

#### **18.0 SURFACE SKIMMER ARM AND SCUM TROUGH**

- 18.1** A surface skimmer consisting of a steel angle with neoprene blade attached shall be provided to move the surface scum to the scum trough.
- 18.2** The surface skimmer shall be attached to the torque and shall rotate with the sludge scraper assembly.
- 18.3** A scum trough shall be fabricated of 1/4" steel plate and shall be provided to collect the scum from the surface skimmer and remove the scum by means of a \_\_\_" diameter scum discharge pipe.
- 18.4** There shall be installed within the clarifier chamber a positive scum and skimming recirculation system consisting of \_\_\_\_\_, \_\_\_\_\_ diameter airlift skimming device (s) meeting the following specifications: The skimming device shall be of the positive airlift pump type, located in a position to skim and return floating material to the aeration chamber. The airline supplying air to the skimming device shall be equipped with a needle valve to regulate the rate of return.

#### **19.0 EFFLUENT WEIR ASSEMBLY**

- 19.1** Aeromix Systems, Inc., shall furnish a steel weir trough with serrated weir plates fabricated from 10 gauge galvanized steel plate allowing up to an including 2 inches of adjustment. The weir trough shall be firmly fastened to the clarifier wall.

#### **20.0 DRIVE UNIT**

- 20.1 Product:** Gear reducers or gear motors supplied shall be of such design that helical gears shall be the standard acceptable unit. Other types of gear reduction systems are acceptable provided the losses are not greater than helical gearing, which provides 98.5% efficiency up to a 200:1 gear ratio. Worm gearing, bevel gearing, and spur gearing are acceptable provided efficiencies are equal to helical gearing at the same gear ratios.
- 20.2** Gear motors are preferred and are to be manufactured by the same company and provided as an

integral unit completely assembled. If c-face type of reducers and motors are supplied, they are to be connected with an external three-piece flexible coupling. Hollow shafts or quill design input shafts are not acceptable. All materials is to be of the highest quality and shall meet the intended use as described within the complete project specifications, and meet or exceed current NEMA, AGMA, and IEEE standards for material, capacity ratings, and testing procedures.

### **20.3 Electrical Specifications:**

**20.4** The motors shall be squirrel cage design, NEMA design B or C, TEFC enclosures, Class F insulation 1.15 service factor suitable for 3/60/230/460 (200 or 575) operation, continuous duty. The motors shall be protected with the manufacturer's standard treatment for corrosive/moist environments and to include (a) weep holes in end brackets and conduit box for condensate drainage (b) stator bore, rotor o.d., and all interior metal surfaces are to be coated with polyurethane (c) stainless steel nameplates and attachment screw pins (d) plastic non-corrosive fan (e) cadmium plated fan cover.

### **20.5 Mechanical Specifications (Gear Reducer):**

**20.6** The gear unit shall be manufactured of cast iron equal to SAE Grade #27 for rigid support and high strength. The gear material shall be SAE 4140 drop forged steel and carbonized to a 58-62 Rc hardness with a finishing grinding to meet AGMA Quality Class 10 finish for low noise, minimum backlash, and maximum efficiency. The primary gear stage shall have a 30° helix angle for low noise operation. The interior of the reducer shall be painted with a non-corrosive material for protection from oil contaminates. Twin lipped oil seals shall be provided on input and output shafts to prevent oil leakage, with one lip spring loaded to assure contact. Maximum ambient is 40° c.

**20.7** Gears are to be pressed fit and secured with keys and snap rings or shaft steps. Shrink fit gears are not acceptable. The gear reducer or gear motors shall be suitable to be mounted in any position regardless of initial mounting position without adding special parts or modifications. The unit shall utilize either roller or ball bearings as manufactured and rated in according to current AFBMA standards and with a minimum of 125,000 hours. Bearings can be either splash or grease lubricated. Lubricating as with an oil pump are not acceptable. The thermal capacity of the reducer at rated load conditions shall exceed the mechanical capacity with relying upon auxiliary means for reducer. All reducers shall be supplied with an initial oil fill for the specified mounting position.

### **20.8 Service Factor:**

**20.9** All process drives shall be selected on the basis of AGMA application tables, reference AGMA 420.04 December, 1975 but with a minimum of class II or 1.41 service factor for drives operating 10 hours per day, AGMA Class III or 2.0 service factor shall be the minimum acceptable. The service factor or gear class shall be stamped on the nameplate and be based upon motor horsepower.

### **20.10 Torque Limiter:**

**20.11** Torque limiting device is to be factory set to specified torque limits for alarm and shutdown. The drive and torque unit will be designed and set for a torque of \_\_\_\_ inch pounds at the torque shaft, a torque of \_\_\_\_ inch pounds for alarm torque, and a torque of \_\_\_\_ inch pounds for motor cut-off. The torque control unit includes contacts for remote hook-up of an alarm light or bell for indication of an overload condition if one occurs.

- 20.12** System components for torque indication, shutdown and alarms shall operate from reactive mechanical torque. Devices which read motor load are not acceptable.
- 20.13** Torque indication is to be simple mechanical device, suitable for ambient conditions. Dial indicators, meters, etc. are not acceptable
- 20.14** Torque limiter must be able to operate bi-directionally as required.
- 20.15** The torque limiting system must be intrinsically safe (if specified) for environments where UL (or other specified body) requirements for “Explosion Proof” are necessary.
- 20.16** Torque monitoring or limiting shall be obtained from the reactive torque and motions on a freely rotating gear housing which will vary in direct proportion to the applied load torque. The reactive motion shall be restrained by an external torque arm with compression springs. Accuracy of the torque limiting system shall be  $\pm 10\%$  of the set points.
- 20.17** The torque limiting system shall be completely external to the gear reducers. Gear housings and internal parts shall be manufacture’s standard and readily available. To ensure proper performance, sizing, selections, and warranty responsibility, the torque limiting components shall be supplied and mounted by the manufacturer of the reducer.

## **21.0 MAIN AERATION AIR SUPPLY BLOWER MOTOR UNITS**

- 21.1** For supplying the air requirement of this wastewater treatment system, \_\_\_\_\_ blower motor units shall be furnished and installed at the location shown on the drawings. All units shall be completely factory built and tested before shipping to the project site. The blower shall be of the two-lobe involute type design complete with the accessories described below.
- 21.2** The blower motor unit, Model \_\_\_\_\_, shall be furnished for supplying the air requirements of the flow equalization chamber.
- 21.3** The unit shall be capable of delivering \_\_\_\_\_ CFM when operating at 7 PSI. The blower shall be manufactured by Roots Division of Dresser Industries, Inc., Connerville, Indiana; or Sutorbilt Blower, Gardner-Denver, Peachtree City, Georgia; or approved equal. The model number of the blower shall be Sutorbilt size \_\_\_\_\_ Legend series.
- 21.4** Impeller case shall be strongly ribbed to prevent distortion when operating at rated pressure.
- 21.5** The unit shall be equipped with 4 heavy-duty anti-friction bearings. Impellers shall be close grain cast-iron. Impellers shall be machined on all exterior surfaces. Impellers shall be dynamically balanced. One piece machined steel shafts shall pass completely through the impellers for proper support.
- 21.6** The unit shall have 2 timing gears accurately machined to position the impellers in the impeller housing. Gears shall be enclosed in an oil tight housing and shall be lubricated by a splash oiling system from oil maintained in the gear housing. Gear end bearings shall be splash lubricated from the same reservoir. Drive end bearings shall be grease lubricated through grease fittings located in

each bearing housing. Grease vents shall be located in the bearing housing to prevent rupture of grease seals from over greasing.

- 21.7** Air vents shall be located between the seals and the impeller chamber to relieve excessive pressure on the seals.
- 21.8** The blower motor units, Model \_\_\_\_\_, shall be furnished for supplying the air requirements of the secondary treatment system.
- 21.9** The units shall be capable of delivering \_\_\_\_\_ CFM when operating at 7 PSI. The blower shall be manufactured by Roots Division of Dresser Industries, Inc., Connorsville, Indiana; or Sutorbilt Blower, Gardner Denver, Quincy, Illinois; or approved equal. The model number of the blower will be \_\_\_\_\_.
- 21.10** The motor shall be \_\_\_\_\_ HP for operation on \_\_\_\_\_ Volt, \_\_\_\_\_ Phase, 60 Cycle Service, 1750 RPM. It shall be of the open drip proof type.
- 21.11** The blower shall be mounted on a fiberglass base. The base structure shall be adequately reinforced to support the blower and motor unit.
- 21.12** For easy adjustment of the "V" belt drive connection between the blower and motor, the motor will be furnished with an adjustable motor mounting base.
- 21.13** The blower shall be fitted with a dry type wire mesh filter-silencer at the air intake. Furthermore, the blower discharge shall be fitted with a check valve when required, and a flexible rubber discharge coupling.
- 21.14** Each blower and motor shall be enclosed within a fiberglass weatherproof enclosure. The fiberglass hood is designed for easy access to service the unit. It shall be equipped with a latching handle.
- 21.15** To help reduce blower vibration and noise, the blower motor enclosure shall be mounted on vibration dampeners. For purposes of determining the blower performance, and/or diffuser condition, a pressure relief valve and pressure gauge shall be mounted in the air manifold.
- 21.16** (Optional) Belt Guard for the "V" belt drive unit shall be supplied attached to the blower-mounting base. The belt guard shall be designed for easy access to the sheaves of both the motor and blower. The belt guard shall be fabricated of metal and shall be painted OSHA yellow.
- 21.17** (Optional) An inlet silencer shall be installed on the inlet end of the blower. The silencer shall be a model \_\_\_\_\_ as manufactured by Universal Silencer.
- 21.18** (Optional) A discharge silencer shall be installed on the discharge end of the blower. The silencer shall be a model \_\_\_\_\_ as manufactured by Universal.

## **22.0 AERATION ELECTRICAL CONTROL CONSOLE**

- 22.1** An electrical control panel shall be installed within a NEMA \_\_\_\_ weatherproof enclosure with a locking hasp. The control console shall be provided for mounting as indicated on the plans. Any

exterior mounting hardware shall be stainless steel or other corrosion resistant material.

- 22.2** The control console shall be a Model \_\_\_\_\_ and shall be completely factory assembled and tested prior to shipment. The control console shall be furnished with all necessary controls for each blower motor unit and associated plant equipment. Control voltage shall be 120 VAC, 1 Phase.
- 22.3** Controls shall be mounted to a removable sub-panel within the enclosure and shall be wired and spaced in accordance with the latest National Electrical Code. The control console shall be supplied with a properly sized magnetic-circuit breaker to act as the main disconnects for the control console. Magnetic starters with overload protection shall be supplied for all blower motor units. To vary the air supply, a program timer shall be supplied. An electrical alternator shall be furnished to alternate the operation of each blower motor unit. An electrical alternator shall be provided with a manual selector switch to allow manual selection of the lead blower if desired.
- 22.4** The 24-hour, 7-day time clock shall be capable of being programmed to control the blower run cycle and to adjust both the start set point and the blower run time. The clock shall also include a skip-a-day feature which will allow a separate program for weekends (when required).
- 22.5** All wiring conductors within the control console shall be U.L. type THHN, stranded #14 AWG minimum, rated at 600 volts. Control wiring shall be numbered on each end.
- 22.6** All wire and conduit required between the control panel and the electrical power service should be furnished and installed by the purchaser. Wiring and conduit between the control panel and plant equipment shall be furnished by the manufacturer of the wastewater treatment plant. The panel may be detached for shipping. The main power supply shall be \_\_\_\_\_ Volt, \_\_\_\_\_ Phase, 60 Cycle. The control voltage shall be 120 Volt, 1 Phase.

### **23.0 FROTH CONTROL SYSTEM (OPTIONAL)**

- 23.1** There shall be installed within the wastewater treatment system all necessary equipment for controlling the froth in the aeration chamber. This shall include the froth pump, spray nozzles, piping, water manifold and all other necessary auxiliary equipment. The froth pump shall be a \_\_\_\_\_ horsepower, \_\_\_\_\_ Volt, \_\_\_\_\_ Phase, rated at \_\_\_\_\_ GPM at \_\_\_\_\_ TDH. The pump shall operate submerged with a positive suction head. It shall be installed in one corner of the clarifier chamber near the inlet, at least two (2) inches below water level. A screen of sufficient size will be located around the pump. Sufficient self-cleaning spray nozzles shall be attached to the water manifold to insure a uniform continuous sharp flat spray along the entire length of the aeration chamber, opposite the air diffusers.
- 23.2** The spray nozzles shall be that which will open automatically for self-cleaning with each pump start-up surge and then close. The spray nozzle will produce a flat spray pattern 60" wide at a distance of 18". Contaminated liquids may be used; simply lifting the cap will purge the nozzle of any blockage. The nozzle is constructed of a non-corrosive material with a 1/2" male threaded connection.
- 23.3** The froth pump piping shall have the provisions for connection of a garden hose for wash-down purposes.

## 24.0 DISINFECTION CHAMBER

- 24.1** A baffle type disinfection chamber shall be provided, constructed as an integral part of the wastewater treatment system. The chamber shall be installed immediately following the clarifier. The chamber shall be sized for a capacity of \_\_\_\_\_ gallons. Baffles shall be provided to eliminate short-circuiting and shall be designed to keep floating material from leaving the chamber.
- 24.2** The chamber shall have the same protective coating as specified for the wastewater treatment system. The chamber shall have the same structural requirements as the wastewater treatment plant. Sufficient flow baffles will be supplied to assure proper mixing of the chlorine solution with the plant effluent.
- 24.3** The chlorination equipment shall consist of solid chlorine tablet type feed, Model Sanuril-1000. The chlorinator shall have the capacity of disinfecting the effluent from the secondary treatment system. The chlorinator shall be mounted at the inlet end of the disinfection chamber at the location on the drawings.
- 24.4** The dechlorination equipment shall consist of solid chlorine tablet type feed, Model Sanuril-D1000. The dechlorinator shall have the capacity of dechlorinating the effluent from the disinfection chamber. The dechlorinator shall be mounted at the inlet end of the dechlorination chamber at the location on the drawings.
- 24.5** A ultra-violet type disinfection chamber shall be provided, constructed as an integral part of the tertiary treatment system. The contact chamber shall be installed immediately following the clearwell.
- 24.6** The disinfection chamber shall have the same protective coating as specified for the tertiary treatment system. The tank shall have the same structural requirements as the tertiary treatment plant.
- 24.7** The disinfection equipment shall consist of one (1) ultra-violet type disinfection unit, Model \_\_\_\_\_, as manufactured by \_\_\_\_\_. The UV unit shall have the capacity of disinfecting the effluent from the treatment system. The UV unit shall be mounted at the outlet end of the chambers at the location shown on the drawings.

## 25.0 GAS FEED CHLORINATION EQUIPMENT (Optional)

### *General:*

- 25.1** This section covers furnishing, installing, testing and placing in operation all gas feed, control and alarm equipment and accessories as specified herein and indicated on the plans.

### *References:*

- 25.2** The applicable provisions of the following standards shall apply as written here in their entirety:

UL                      Underwriters Laboratories

**Factory Field Erected Complete Mix  
Extended Aeration Activated Sludge  
Waste Water Treatment System For  
Project Name  
City, State**



NEMA	National Electric Manufacturers Association
NIOSH	National Institute for Occupational Safety and Health
MSHA	Mine Safety and Health Administration
CI	Chlorine Institute
ASTM	American Society for Testing and Materials

***Definitions:***

**25.3** System supplier. For the purpose of this specification, a system supplier is hereby defined as a company which is engaged in the business of providing and installing complete and operable chemical feed and control systems (which encompasses chlorine gas feed systems) including all necessary equipment, piping, valves and any necessary appurtenances.

***Systems Description:***

**25.4** This project will require installation of a chlorine system, including all piping and appurtenances, shall be provided by a single system supplier. A separate system supplier for the work being performed is hereby strictly prohibited.

**25.5** Performance requirements. Execution of the work specified under this section will be in accordance with, but not limited to, the following general performance specification.

1. An integrated system is to be supplied by a single system supplier to insure equipment compatibility.
2. Location and source of parts and service capabilities shall be included as part of the submittal documentation. Manufacturers recommended spare parts shall be supplied for all equipment and be included with the operation and maintenance manuals.
3. System design and layout is based on the equipment manufacturers specified herein. Proposals to install and alternate manufacturer's equipment such that the Engineer can adequately evaluate the suitability of the alternate system and equipment. Proposals which are submitted and do not satisfactorily detail and demonstrate the system will be deemed unacceptable by the Engineer.
4. Substitutions of functions specified are not allowed.

***Quality Assurance:***

**25.6** Warranty shall be included defective workmanship and labor found within twelve (12) months of substantial completion and/or initiation of daily usage of the gas feed and control equipment

***Products:***

**25.7** The following is a list of acceptable manufacturers for providing the equipment specified herein. No alternate manufacturer shall be acceptable.

Gas feeders:	Regal
Feeder Controllers:	Regal
Vacuum Regulators:	Regal
Cylinder Scales:	Scaleton
Gas Leak Detectors:	Analytical Technology
Fiberglass Building:	Tracom

**Materials and/or equipment:**

- 25.8** Gas feeders: Regal model 216 chlorinator or approved equal  
Feeder Controllers: Regal model 7001 smatvalve or approved equal. Controller shall be flow proportional and utilize a 4-20 mA DC input signal from effluent flowmeter to pace chlorine feed rate.  
Vacuum Regulators: Regal or approved equal. Regulators with automatic switchover for use with gas feeder unit and two (2) 150 lb. cylinders  
Cylinder Scales: Scaleton model 2330 two-cylinder scale  
Gas Leak Detectors: Analytical Technology model A14/11-11-0010-1-1 chlorine gas detector or approved equal.  
1. Provide one (1) channel chlorine gas detector with components housed in NEMA 4X polystyrene enclosure. Gas detector shall be provided as follows: a. provide one (1) control unit and one (1) sensor/transmitter  
2. Each system provided shall include a central control unit with separate, remote sensor/transmitters which are capable of being separated of up to 1,000 feet.  
3. Provide sensors which are electrochemical gas diffuser type.  
4. Control units provided shall have 4 digit LED, sunlight readable display, which indicates ppm gas present.  
5. Control units provided shall have concentration output signals of 4-20 mA DC (isolated)  
6. Units provided shall have detection ranges of 0 to 10 ppm with the low-level alarm set at 2 ppm and the high level alarm set at 8 ppm. Control units to include a high density LED visual alarm indicator as well as a self contained piezo-electric horn alarm with an output of 85 dB.  
7. Units provided shall include three (3) assignable alarm relays: 10A @ 120 VAC, 5A @ 240 VAC, resistive, SPDT configurable for normal/fail-safe, latching/non-latching and fast/slow operation. Alarm relay and indicator reset shall be activated from the front panel of the unit.  
8. Units provided shall have sensor alarm to indicate loss sensor/transmitter input.  
Fiberglass Building: Provide one (1) 6' x 6' prefabricated one piece molded fiberglass building Tracom or approved equal.  
a. Sloping roof with peak at center.  
b. Designed to with stand 135 mph wind load.  
c. Wall to be 1 inch polyisocyanurate in solution encapsulated between two 1/8 inch white fiberglass laminates. Outside surface to have smooth gelcoat finish.  
d. Provide removable lifting eyes in the roof.  
e. Provide 36 inch x 78 inch door typical to fiberglass construction. Door gasket to be neoprene rubber.  
f. Provide stainless steel hinges  
g. Provide "DANGER" sign on door indicating type of gas present.

- h. Provide stainless steel door knob.
- i. Provide intake fan, 10inch, 520 cfm, 120 volt with fiberglass canopy for mounting at top of wall. Louvers and stainless steel insect screen.
- j. Provide 12" vent, fiberglass louvered, with stainless steel insect screen mounted at bottom of wall.
- k. Provide incandescent lamp, vaportite.
- l. Provide duplex switch box, 2 toggle exterior mounted at door weatherproof.
- m. Provide 750 watt, 120 volt floor mounted thermostat controlled heater, plug in type.
- n. Provide duplex outlet.
- o. Provide stainless steel anchor bolts.
- p. Provide electrical conduit; Rigid schedule 40 PVC.
- q. Gel coat shall be chlorine resistant
- r. Building shall not have floor. Floor mount on concrete slab.

## **26.0 ACCESS BRIDGE/STAIRWAY**

- 26.1** The main Access Bridge with a 36" wide access platform shall be made of structural steel shapes 1/4" minimum thickness and shall be supported on the plant walls. The bridge shall extend across the tanks as shown on the drawings.
- 26.2** Access to the Plant Bridge shall be provided by a 45° stairway as located on the drawings. The 36" wide 45°-access stairway shall be provided with 1-1/2" diameter schedule 40 painted steel or anodized aluminum handrails with intermediate handrail. The steps shall be installed on an 8" rise and shall be fabricated of galvanized or aluminum stair treads.
- 26.3** The bridge shall have a 36" wide deck made of, 1"x 3/16" galvanized or aluminum bar grating and shall be designed to withstand a uniform live load of 75 lbs. per square foot plus the dead load of the structure. The deflection shall not exceed L/360 of the unsupported span when the design loads are applied. The bridge shall be provided with handrails on both sides consisting of an upper and intermediate rail and vertical posts fabricated of 1-1/2" diameter anodized aluminum pipe. 4" x 1/4" painted steel or aluminum toe plates shall also be provided.
- 26.4** Walkways shall be provided for access to and maintenance of the clarifier weir and all air diffuser drop pipes and regulating valves. Additional walkways shall be provided in locations as shown on the drawings or as needed to service the equipment.
- 26.5** All other walkways shall be a minimum of 24 inches wide and shall be of 1" x 3/16" galvanized or aluminum bar grating adequately supported to withstand a live load of 75 lbs. per square foot. All walkways shall be provided with handrails on both sides consisting of an upper, intermediate rail, and vertical posts fabricated from 1-1/2" diameter schedule 40, painted steel or anodized aluminum pipe. 4 x 1/4" painted steel or aluminum toe plates shall also be provided.

## **27.0 FLOW MEASUREMENTS**

- 27.1** For measuring the flow rate through the wastewater treatment system, a flow-measuring weir shall

be supplied. The weir shall be a \_\_\_\_\_ degree "V" notch weir located at the outlet end of the disinfection tank.

**27.2** For measuring the flow rate, an ultrasonic flowmeter with a circular chart recorder shall be installed. The unit shall record, indicate, and totalize the flow through the wastewater treatment system.

#### **28.0 FLOWMETER (OPTIONAL)**

**28.1** The proposed ultra-sonic flowmeter will have a range and blanking distance to 10<sup>1</sup>-0".

**28.2** Outputs will consist of 3 relay-SPDT contacts rated 8A/250V ac; function programmable current-isolated 0 to 20 or 4 to 20mA into 1000 ohms max.

**28.3** The display will be a two line alphanumeric LCD type with LED backlighting.

**28.4** User interface is via detachable IR keypad programmer.

**28.5** Dual back-up systems memory-super capacitor and Ultralife lithium power cell.

**28.6** The polycarbonate enclosure is type 4 IP65 rated.

#### **29.0 CIRCULAR CHART RECORDER (OPTIONAL)**

**29.1** The recorder incorporates a 10" circular chart. One box of standard charts is provided. The instrument is provided with one red disposable fiber-tip pen.

**29.2** Chart drive will be by an AC synchronous motor; the chart rotation is counter clockwise.

**29.3** Set-point is selected/observed by using a 3 digit pushbutton thumb-wheel potentiometer

#### **30.0 EFFLUENT CONNECTION**

**30.1** The effluent connection of the wastewater treatment system shall be located as shown on the plans and shall consist of one, \_\_\_" diameter 150# standard flange.

#### **31.0 PLANT START-UP**

**31.1** At the time the wastewater treatment system is filled with water or sewage, and all power connections have been completed, and all equipment is approved for service, the contractor shall provide the services of a representative of the manufacturer who shall instruct the owner's representative in the proper operation and maintenance of the wastewater treatment system, including instructions in conducting all required operational tests. The manufacturer's representative shall furnish at this time, a service manual on the equipment installed within the wastewater treatment system.

## **32.0 FIELD CONTRACTOR RESPONSIBILITY**

- 32.1** Interconnection of piping between each process train and all wiring connections.
- 32.2** Tie-in of all piping, power and wiring connections to site utilities and electrical cable entries into control panels. The power required at power block or main circuit breaker is 480 Volt, 3 Phase, 60 Hz.
- 32.3** Supply of drain valves outside of plant walls.
- 32.4** Piping, blower and process piping manifolds.
- 32.5** Concrete base slabs & outer walls & grouting of base slope in the clarifier, including the supply of grout.
- 32.6** Embedding of the base channels in the foundation pad.
- 32.7** Install the magnesium anode packages as shown on the plans.

## **33.0 EQUIPMENT WARRANTY**

- 33.1** Aeromix Systems, Inc. warrants to the original purchaser all new equipment manufactured by it to be free of defects in material and workmanship; and at the election of Aeromix Systems, Inc. will repair or replace, f.o.b. it's factories or other locations designated and as determined by Aeromix Systems, Inc. any part or parts returned to it, transportation/freight prepaid, which examination shall show to have failed under normal use and service by the original user within two (2) years following initial shipment by Aeromix Systems, Inc. Such repair or replacement shall be free of charge except for freight and those parts such as media, chemicals, oil, grease, belts and like that are consumable under normal use. Aeromix Systems, Inc. obligation under this warranty is conditioned upon it receiving prompt written notice within 30 days of claimed defects during the two year warranty period is limited to repair or replacement as aforesaid. No allowance will be made for labor, transportation, or other charges incurred in the replacement of repaired defective parts and/or equipment furnished.
- 33.2** THIS WARRANTY, INCLUDING THE STATED REMEDIES, IS EXPRESSLY MADE BY AEROMIX SYSTEMS, INC. AND IS ACCEPTED BY ORIGINAL PURCHASER IN LIEU OF ALL OTHER WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE, WHETHER WRITTEN, ORAL, EXPRESS, IMPLIED OR STATUTORY. AEROMIX SYSTEMS, INC. NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME IT FOR ANY OTHER LIABILITIES WITH RESPECT TO IT'S EQUIPMENT. AEROMIX SYSTEMS, INC. SHALL NOT BE LIABLE FOR NORMAL WEAR AND TEAR, NOR FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGE DUE TO IN-OPERABILITY OF ITS EQUIPMENT FOR ANY REASON NOR ON ANY CLAIM THAT ITS EQUIPMENT WAS NEGLIGENTLY DESIGNED OR MANUFACTURED.
- 33.3** This warranty shall not apply to equipment or parts thereof which have been altered or repaired outside of an Aeromix Systems, Inc. factory or damaged by improper installation, storage,

**Factory Field Erected Complete Mix  
Extended Aeration Activated Sludge  
Waste Water Treatment System For  
Project Name  
City, State**



application, erosion, or corrosion of any sort, or subjected to misuse, abuse, neglect or accident. This warranty is null and void if payment is delayed, not made, or if not in accordance with the terms and conditions of Aeromix Systems, Inc. equipment proposal.

**33.4** Aeromix Systems, Inc. makes no warranty with respect to parts, accessories, or components manufactured by others. The warranty applicable to such items that is offered by their respective manufactures.