1.1. PACKAGE SYSTEM

1.2. Fiberglass Basin

1.2.1.1. Basin – The diameters and depths shall be based on the system layout.

	Dia.	Depth	Invert Ht	Discharge HT	Volume	Qty

1.2.1.2. Basin shall be made from a fiberglass reinforced polyester resin. Resins used shall be of commercial grade polyester and shall be evaluated as a laminate test or determined by previous service to be acceptable for the intended environment. The reinforcing material shall be a commercial grade of glass fiber having a coupling agent to provide a suitable bond between the glass reinforcement and the resin. The manufacturer may supply either (continuous strand, chopped-strand, continuous mat and/or non-continuous mat) or (non-continuous glass strands having fiber lengths from 0.5 to 2.0 inches). The completed material shall be inert and acceptable to the environment. The basin shall be water-tight.

1.2.1.3. Inner Surface – The inner surface shall be smooth and resin rich, free of cracks, exposed fibers, porosity and crazing.

1.2.1.4. Exterior Surface – The exterior surface shall be relatively smooth with no exposed fibers or sharp projections. If a pigment is added, color should be relatively equal throughout. Foreign inclusions, dry spots, pinholes or pits, de-laminations, large dimples not meeting thickness requirements, and air bubbles are not acceptable.

1.2.1.5. Tank Wall – Wall thickness shall vary with the basin height to provide the aggregate strength necessary to meet the tensile and flexural physical properties requirements. The basin wall laminate must be designed to withstand wall collapse or buckling based on:

A. Wall thickness (see prior statement)
B. Hydrostatic pressure (62.4 lbs per square foot)
C. Saturated soil weight (120 lbs per cubic foot)
D. Soil Modulus (700 lbs per square foot)
E. Pipe stiffness values as specified (ASTM D3753)

Tank wall laminate must be constructed to withstand or exceed (2) two times the actual imposed loading on any depth of basin.

1.2.1.6. Tank Bottom – The basin bottom shall be of sufficient thickness to withstand applicable hydrostatic uplift pressure. In saturated conditions, the center deflection of the empty basin bottom shall be less than 3/8” (elastic deflection) and shall not interfere with bottom pump mounting requirements. Any mounting studs, plates, or cap screws in tank bottom shall be stainless steel and resin covered except for threads. Any inserts shall be stainless steel or brass and resin covered except for threads.

1.2.1.7. Tank Collar (Anti-Flotation) – A means to counteract buoyancy forces shall be provided on the tank bottom in the form of a ring, and shall extend a minimum of 2" beyond the O. D. of the basin wall. Wall and collar should be blended with a radius not to exceed 1 ½" beyond wall O.D.

1.2.1.8. Top Flange – The top flange shall be parallel to the tank bottom/collar and perpendicular to the tank wall. Corrosion resistant inserts shall be embedded in the top flange for securing the basin cover. The inserts shall be totally encapsulated to prevent turning (minimum turning torque shall not be less than 30 foot/lbs.) pullout.

1.2.1.9. **Basin Cover**

Alum access cover shall be provided for each installation. The cover shall be constructed with a minimum thickness of ¼ tread plate. The cover shall include access door. The cover surface shall have a non-skid design. Cover shall be bolted to the basin with stainless steel cap screws. All basin covers are designed for 300 psf loading. Design of cover allows for basin to be mounted flush with ground.

1.2.1.9.1. Optional steel covers with solid or access hatch design as required.

1.2.1.9.2. Optional 2" mushroom vent for cover shall be supplied. Note: If inlet pipe is connected to vent stack in house, vent on basin cover is not required.

1.2.2. **KL1-CV Rail Assemblies**

1.2.2.1. Each Keen Pump Co. lift-out system shall consist of a ductile iron discharge base, stainless steel pump guide plate and cast iron elbow/check valve. All exposed nuts, bolts, and fasteners shall be 300 series stainless steel.

1.2.2.2. Discharge elbow shall be 1 ¼" X 2" NPT and shall be integral to the base assembly.

1.2.2.3. The elbow/check valve shall attach to the pump with provided threaded adapter. A downward sliding motion of the pump and guide plate on the guide rails shall cause the unit to be automatically connected and sealed to the base. The discharge flange o-ring seal shall be leak proof at all operating pressures.

1.2.2.4. Two guide rail pipes shall be used to guide the pump from the top of basin to the discharge base connection. The guide rails shall be either 3/4" or 1" schedule 40 stainless steel pipe. The weight of the pump shall bear solely on the discharge base and not on the guide rails. Rail systems which require additional support directly below pump which might interfere with the flow of solids into the pump suction will not be considered equal. The guide rails shall be firmly attached to either a wall support or the access hatch frame. Systems deeper than 16 feet shall require an intermediate guide for each 16 feet of basin depth.

1.2.2.5. An adequate length of 1/4", 300 series stainless steel lifting chain shall be supplied for removing the pump. The chain shall be of sufficient length and strength for easy removal.

1.2.3. **Piping**

1.2.3.1. Discharge piping shall be 1-1/4" PVC Schedule 80 and shall connect to the stationary discharge base assembly and terminate at a 1-1/2" NPT flange (with a reducing bushing) mounted on the basin at the height shown in the plans.

A. Standard flange: Manifold 1-1/2" NPT, stainless steel.
B. Optional flange: Dual 1-1/4" NPT, stainless steel flanges.

1.2.4. Check Valves

1.2.4.1. The lift-out check valve (typ 2) shall be of the ball type with a corrosion resistant neoprene ball. The ball shall be the only moving part and shall move automatically out of the path of flow, thus providing an unobstructed smooth flow through the valve body. Upon pump shut-off the ball shall automatically roll to the closed position to provide a positive seal against back pressure or back flow.

1.2.5. Shutoff Valves

1.2.5.1. The schedule 80 PVC true union ball type shutoff valve (typ 2) shall be furnished and installed as an integral part of the internal pipe assembly. If the discharge depth is more than 2 feet from the surface, a stainless steel handle extension shall be supplied. Handle is attached to the valve stem and is supported near the top of basin within reach for service personnel.

1.2.6. **Anti-Siphon Valves (Optional)**

1.2.6.1. The basin assembly shall include a PVC riser pipe for acceptance of an anti-siphon valve which may be factory installed or field installed.

1.2.6.2. The riser pipe shall extend from the pump discharge between the check valve and the ball valve to within two feet of the surface of the basin. The riser shall be capped.

1.2.6.3. An anti-siphon valve kit shall be supplied to easily assemble to the riser pipe. The valve assembly shall include all materials required to complete the assembly.

1.2.6.4. The anti-siphon valve shall mount horizontally, shall be made of PVC and will not interfere with pump removal and installation.

1.2.7. Inlet Flange

1.2.7.1. A one-piece, flexible basin inlet fitting for 4" SCH 40 plastic pipe shall be shipped loose for field installation. Optional fittings include:

A. 4" SDR35
B. 6" SCH40
C. 6" SDR35
D. 4",6" or 8" Cast iron Caulking Hub

Junction Box (As Req'd)

1.2.7.2. A U.L. listed, Type 6 junction box shall be provided. Junction box shall be formed from corrosion resistant, flame retardant thermoplastic. The enclosure shall be of adequate thickness and properly reinforced to provide good mechanical strength. The junction box shall have a fully gasketed, hinged cover that is held in place by four (4) stainless steel screws. The hinged cover shall prevent dropping the cover into the basin during service.

1.2.7.3. An adequate number of sealing-type cord grips shall be supplied for incoming pump and level control cords. The cord grips shall be made of non-corrosive material such as PVC or nylon, and shall make an effective seal around the wire jacket.

1.2.7.4. The junction box shall have a PVC solvent weld socket with an integral 2" NPT pipe for attaching basin conduit hub. The hub shall be made of a corrosion resistant material and shall be of adequate size to accommodate the number of wires required for pump and level control operation.

1.2.7.5. The incoming wires shall be sealed by external means, (supplied by others), so that condensation from the conduit or groundwater will not enter the enclosure. The interior of the enclosure shall be of adequate size to accommodate the wires and connections for pump and level control operation.

1.2.7.6. The wires (supplied by others) running between the control panel and the junction box shall be color-coded and fastened to the pump and level controls by means of adequately sized and insulated twist lock or crimp connectors.

1.3. ELECTRICAL CONTROL PANEL AND APPURTENANCES

1.3.1. Control Panel Model / General Construction

1.3.1.1.Control Panel specs as required.

1.3.2. Level Controls

1.3.2.1.**Float Switch Control Operation**

1.3.2.1.1. The control panel shall provide terminal strip inputs for: pumps off, lead pump on, lag pump on and alarm float controls.

1.3.2.2.**Float Controls**

1.3.2.2.1.1.Duplex control panel operation shall be automatically controlled by (4) mercury or non-mercury level controls. Float switches shall control off, on and alarm functions.

1.3.2.2.1.2.Float switch shall be capable of operating at temperatures between 32 and 170 degrees F. Float switches shall activate and deactivate between 5 degrees above horizontal and 5 degrees below horizontal. Float switch shall be constructed with a polypropylene outer shell for durability and resistance to wastewater environment. Outer shell shall be filled with polyurethane foamed interior to provide best buoyancy, water tight integrity and protect the mercury switch.

1.3.2.2.1.3.Float switches shall be of normally open type.

1.3.2.2.1.4.Float switch cables shall be made of chlorinated polyethylene, type SJOOW, 18 AWG, 2-wire type. Float switch contacts and shall be capable of handling 10 amps at 115 VAC or 3 amps at 240 VAC.

1.3.2.2.1.5. Float switch shall be third party safety listed by cUL,US and shall be capable of operating intrinsic safe relays.

1.3.2.2.1.6. Float switches shall have an external zinc plated cast iron weight. Weight shall be of the split design and shall be easily adjustable for tether length. Float switch weights made of heavy metals which may contaminate the waste flow stream shall not be acceptable.

1.3.2.3. **Redundant Off Circuitry (Optional)** The control panel shall provide terminal strip inputs for a redundant off float switch. Float switches shall be of the normally closed type for redundant off.

2. EXECUTION

2.1. START-UP INSTRUCTION SERVICES

2.1.1. The pump supplier and/or manufactures rep shall provide two (2) days of start-up instruction and training for the service personnel responsible for the long term maintenance and servicing of the grinder pumping system. The training shall address all aspects of installation, start-up, troubleshooting, operation, maintenance, and repair of the grinder units including all electrical components. The training sessions shall include complete review of installation, operation and maintenance manuals, as well as actual field instruction. The Training sessions shall be coordinated with the pump manufacturer, engineer and the authority's personnel. The training sessions shall be scheduled two (2) weeks in advance to allow for adequate notification to all parties involved in the start-up and training.

2.1.2. Extended training can be arranged for an additional fee.

2.1.3. The contractor shall make certain that all the grinder pumps systems are ready for start up/activation prior to the notification and scheduling of such.

2.1.4. Prior to the arrival of the manufacturer's representative, the contractor is required to have the cover to the grinder pump station unbolted and ready for removal. Contractor must provide a minimum of 70 gallons of water supplied into the basin for start-up procedures.

2.1.5. Power will be supplied to the control panel and grinder pump system.

2.1.6. Upon completion of start-up testing, the contractor shall replace the cover to the grinder pump system and fasten securely to prevent any water infiltration.

2.1.7. Contractor shall be responsible for any personnel and/or material necessary for the manufacturer's representative to complete the start-up and testing phase of the project, including, but not limited to, water source at each station, labor personnel to remove and replace cover, etc..

2.2. QUALITY ASSURANCE

2.2.1. The grinder pump shall have an industry standard commercial test which consists of a run test, Hi Pot test, Hermetic leak decay test.

2.2.2. Panel Test

2.2.3. Basin Test

2.2.4. Manufacture must have a Quality Assurance Manual

2.3. DELIVERY, STORAGE AND HANDLING

2.3.1. The manufacturer shall furnish and deliver assembled grinder pump stations to the contractor or owner. Simplex units, containing one grinder pump and all necessary parts and equipment, shall be installed in polyethylene or fiberglass reinforced polyester tanks for outside installations. All equipment shall be factory installed, except for externally mounted control panel, gravity sewer inlet hubs and pump assembly, which are to be installed in the field. Each simplex or duplex grinder pump unit shall be complete, consisting of a basin, basin cover, grinder pump, quick disconnect rail system, check valve, junction box, start-stop level controls, motor high temperature shutoff, motor seal leak alarm, high water alarm, pump motor failure, alarm loss of power, all internal wiring terminating into the junction box,

shutoff valve and discharge piping. In addition, an external alarm and pump control panel is to be provided for the unit.

2.3.2. The pump supplier shall provide six (6) (XX) copies of Installation, Operations and Maintenance Manuals to the Authority.

2.3.3. All tanks 96" tall and shorter shall ship vertically up right. The tanks shall ship with the covers bolted and attached. For shipping reasons, units taller than 96" shall ship horizontally and mounted to a skid.

2.3.4. All packaged tank assemblies will include all the necessary equipment to make a complete turnkey system ready for installation except the grinder pump and control panel.

2.3.5. For ease of handling and storage, grinder pump and control panel shall ship mounted on wooden pallet.

2.3.6. Upon receipt of packaged tank assemblies, the contractor or owner will visually inspect to make certain the freight carrier has successfully transported the equipment with no damage. It is the responsibility of the contractor or owner to reject any or all damaged equipment prior to signing the delivery slip. FOB factory.

2.3.7. Handling and unloading the basin assemblies shall be the responsibility of the contractor or owner. Lifting devices such as chain is prohibited.

2.3.8. The basin assemblies, grinder pumps and control panels will be stored in a controlled environment to prevent weather conditions from damaging equipment.