Component	Material
Manifold/Header	Stainless steel, Type 304 L to ASTM A774 and ASTM A778, or PVC schedule 40.
Gaskets	Neoprene or natural rubber
Distribution Laterals	PVC SDR 26 to CSA B137.3
Piping Supports and Anchors	Stainless steel, Type 304 or 316 embedded in concrete with Sika injection gel or approved equal, use antiseize compound on all stainless steel bolts and nuts.
Fasteners	Stainless steel, Type 304 or 316

.1 Ensure materials conform to ASTM specifications where possible. State all deviations.

.2 All stainless steel components must be pickled and passivated in accordance with Sections 15050 and 05500.

.2 Flexible Membrane Diffusers

.1 Fabricate diffuser membranes of EPDM, protected against ultraviolet light, chemicals and weathering.

.2 Provide membranes constructed from EPDM base polymer having a minimum thickness of 2 mm after moulding and finishing. Provide EPDM membrane material having the following properties:

Minimum tensile strength:	7000 kPa
Minimum elongation:	300 percent
Testing in accordance with ASTM D412	
- Maximum durometer, Shore A, change allowed	10 points
- Maximum loss of tensile strength:	25 percent
- Maximum loss of elongation:	25 percent
Testing in accordance with ASTM D395	
- Maximum compression set:	50 percent

.3 Diffuser Holders

.1 Manufacture diffuser holders with additives as necessary to satisfy the requirements for strength, durability, and UV light resistance.

.4 Pipe, Supports and Fittings

.1 Provide PVC piping and fittings with a minimum SDR 26, conforming to CSA B137.3. All joints for PVC piping and fittings are joined either with integral anti-rotational fixed joints or full faced solvent welded using primer and solvent welding cement conforming to the requirements of ASTM D2564.

.2 Submerged air manifolds: ASTM D1784 and ASTM D1785 Schedule 40 PVC with 1.5 percent TiO_2 ultraviolet light inhibitor.

.3 Distribution laterals: ASTM D1784 and ASTM D1785 Schedule 40 PVC, or ASTM D224, or ASTM D3034 with minimum SDR 26 with 2 percent TiO_2 ultraviolet light inhibitor.

2.5 Equipment Components

.1 General

.1 Number of aeration diffuser grids per cell is as follows

Cell	No of Grids
Bioreactor 1	
Aerobic Cell 1	1
Aerobic Cell 2	1
Aerobic Cell 3	1
Bioreactor 2	
Aerobic Cell 1	1
Aerobic Cell 2	1
Aerobic Cell 3	1
TWAS Vault	1

.2 Design the diffuser grids as necessary to meet the requirements of this specification, within the floor coverage limitations shown.

.3 For each aeration system, install:

.1 The aeration diffusers.

.2 Connection devices between the diffusers and the distribution laterals.

.3 The distribution laterals.

.4 Manifold piping.

.5 The droplegs (to limits identified on the drawings).

.6 Reducers, if required, between the Contractor supplied piping and the droplegs provided by the Supplier.

.7 All structural piping supports for items .1 through .5 required to minimize deflection under installation and operating loads.

.8 The layout and distribution of diffusers shown are for illustration purposes only.

.2 Flexible Membrane Diffusers

.1 Provide diffusers of the non-clog flexible membrane type. Diffusers shall be of the circular disc configuration.

.2 Each diffuser to be mounted to a fixed piping grid fastened to the floor of the cells. Space the diffusers on the piping grid to provide uniform air distribution over the floor of the zones or cells.

.3 Incorporate an air flow orifice to ensure even air flow distribution among all diffuser units and to assure that airflow to any one device is plus or minus 5% of the average value at the minimum and maximum specified air flow rates.

.4 Ensure that all diffusers are of the same type.

.5 Fix the membrane to the membrane holder in a manner which does not introduce unbalanced stresses but which does increase pressures as the air flow rate to the diffuser rises.

.6 Manufacture a back flow prevention device integrally with the diffuser. When air flow ceases, this device will allow the pressure of the water above the diffuser to close the main flow passage and prevent backflow into the diffuser and air piping.

.7 Ensure the maximum diffuser flux rate is such that the stress in the diffuser material is within elastic loading limits with a safety factory of at least 10.

.3 Manifold and Air Distribution Piping

.1 Design air distribution piping system for easy field installation and include provisions for level adjustment, for rotational adjustment of the distribution laterals, and for thermal expansion of all piping elements over the specified operating temperature range.

.2 Perform all solvent welding in the manufacturer's shop. Field welding will not be permitted.

.3 Fabricate the submerged air manifold in sections up to 6 m long.

.4 Design the manifold piping so that the top of all diffusers is held at a constant elevation throughout all cells. Accomplish changes in diameters with eccentric reducers.

.5 Provide a solvent end cap at the end of each manifold.

.6 Provide connections between sections of the submerged air manifold of fixed pipe couplings designed so that individual manifold sections can be rotated independently of adjacent sections for proper alignment.

.7 Provide fixed joints of the positive locking type with integral anti-rotational mechanism in conjunction with guide-type supports. A fixed joint shall be either a PVC threaded coupling with threaded ring, or 70 kg flanged joint. Slip on rubber sleeve couplings shall not be acceptable. Expansion will take place by the sliding of the lateral pipe through the non-gripping supports.

.8 In lieu of fixed joints with guide-type supports, a piping system utilizing fixed-type supports may be provided. Expansion will take place by the sliding of lateral pipe inside the expansion barrel. To insure no horizontal or rotational movement of the lateral and expansion joints, every lateral and expansion joint shall be secured to the tank floor by at least one pipe support.

.9 Support each manifold by floor-mounted stainless steel anchors and supports at maximum 2.5 m centres.

.10 Connect distribution laterals to the centerline of the manifold at the flanges or couplings provided.

.11 Provide coupled connections at the manifold bottom centreline for connection to the distribution laterals.

.12 Distribution laterals are to be connected to the centreline of the manifold at the couplings provided.

.13 Fabricate laterals for fine bubble diffuser systems in sections not to exceed 6 metres in length.

.14 Maximum spacing between diffuser laterals for the disc type membrane is 2.4 m. In any event, the lateral spacing shall be provided to meet performance requirements.

.4 Droplegs

.1 Provide separate drop legs for each diffuser grid

.2 The dropleg will be fixed with a fixed joint at the lower connection to the manifold piping.

.3 The dropleg will be fixed with a flanged connection at the upper limit of supply (refer to the drawings).

.4 The dropleg will be furnished with supports to prevent movement.

.5 A 12 mm PT test plug will be provided at the top of each dropleg. The test plug will be capable of receiving a probe 3 mm nominal outside diameter and rated for zero leakage at a pressure to 200 kPa. To be furnished by contractor with dropleg near top of concrete.

.6 Provide droplegs of diameter no less than indicated on the drawings.

.5 Anchors and Supports

.1 Provide support system to securely anchor the manifold and distribution laterals to the cell floor.

.2 Design supports to permit complete removal from the tank (less anchor bolt) to facilitate cleaning and maintenance of tank floor. Supports consisting of threaded rods anchored to tank floor are not permitted.

.3 Support rods shall have a minimum diameter of 12.5 mm and shall not extend above the top of the diffusers. Trimmed rods shall be ground down to eliminate sharp edges.

.4 Support plates shall have minimum thickness of 4.8 mm.

.5 Provide pipe clamps incorporated into supports with minimum thickness of 1.8 mm. Provide each support with a 38 mm wide bearing surface contoured to fit the pipe being supported. For the guide type supports, provide a 6 mm clearance around the pipe and have chamfered edges to prevent binding of the pipe. Worn gear clamps are not permitted for attaching pipe to supports.

.6 Supports shall have provision for angular alignment adjustment and for plus or minus 37 mm of vertical adjustment to allow level installation. Supports to be infinitely adjustable within its limits by raising and lowering of nuts on threaded support rods or by modifying angle of support struts.

.7 Design and fabricate the supports in such a manner that the elevation of the horizontal surfaces of all diffuser elements in each cell are within plus or minus 5 mm of a common horizontal plane.

.8 Provide sufficient supports to limit deflection of the laterals to ensure that the tolerance noted on the elevation of diffuser elements is not exceeded.

.9 Secure the supports to the floor with stainless steel expansion type anchor bolts designed with a pull-out strength safety factor of 10 or more.

.10 Supports shall be designed to withstand forces from mixers and mixed liquor recycle and flow from across cell partition wall draining holes during filling and draining of tanks.

.11 Provide bracing struts for supports in cells subject to horizontal forces from under/over baffles, mixers or flushing nozzles.

.12 For each anchor bolt provide double stainless steel nuts. Each anchor is to be double nutted to ensure that the connection does not loosen due to dynamic forces through its life.

.6 Purge System

.1 Design the purge system to drain the entire submerged aeration piping system and blow off moisture collected using aeration air. Provide one purge system per grid as a minimum.

.2 Design the purge system to prevent water infiltration in the event of an interruption in the air supply.

.3 At the end of each aeration grid, install the continuous moisture purging system. Ensure that the continuous moisture purging system is lower than the invert of the air distribution header and air distribution manifold.

.4 Provide a sump and airlift purge eductor at each purge point.

.5 Provide integral drain lines with each grid terminating at the sumps.

.6 Provide purge system eductor piping minimum 19 mm PVC Schedule 80 or 19 mm flexible tube encased in a minimum 38 mm Schedule 40 PVC pipe.

.7 Eductor piping is to be routed to the top of the tank and secured to edge of walkway. Provide a lever operated quarter turn stainless steel ball valve at each blow off.

.8 In addition to the normal clamp system, provide stainless steel clamps on each end of the 25 mm flexible hose, at the connection to the diffuser header and at the connection to the PVC pipe, on all purge lines in the bioreactor.

2.6 Spare Parts

.1 To be determined. The cost for any additional spare parts will be paid from the Equipment Allowance.

3. EXECUTION

3.1 Fabrication

.1 Prevent electrolytic action between dissimilar metals and materials.

.2 Where dissimilar metals are mated, isolate all mating surfaces and bolts, nuts and washers to prevent galvanic corrosion.

.3 Clean and coat surfaces that are to be assembled or bolted together for shipment.

.4 Provide match markings on sections for ease of field erection.

3.2 Manufacturer's Representative

.1 The Manufacturer's Representative shall be required to attend the site to train operating and maintenance staff, to witness installation and guaranteed performance testing to ensure the equipment is installed and operated as intended.

.2 The minimum periods of site attendance are identified in the following Table along with the Form to be completed on each of these trips. A "day" is defined as eight working hours on site.

Item	Description	No. of Trips	No. of Days per Item
1	Witnessing of Equipment Installation, Testing, Commissioning and Operator Training	1	4

.3 The total number of trips will depend on the Installation Contractors schedule. The cost of additional trips required by the Engineer will be born by the Installation Contractor.

3.3 Installation and Installation Training

.1 The Contractor shall ensure that all the air piping has been thoroughly cleaned and blown out before installing the fine bubble aeration devices.

.2 The Contractor shall ensure that all necessary precautions to ensure proper alignment and to prevent entry of any foreign matter into the air piping have been taken to install the fine bubble aeration devices.

.3 The fine bubble aeration devices shall be installed in such a manner that the horizontal surfaces of all diffuser elements are within plus or minus 5 mm of a common horizontal plane.

.4 All adjusting mechanisms shall be locked in place in place after the system has been installed and leveled.

.5 Conform to the requirements of Section 01650.

3.4 Installation Witnessing

.1 The Contractor shall ensure that equipment is installed plumb, square and true within tolerances specified by the Supplier and as indicated in the Contract Documents.

.2 Structural Test:

.1 Test anchors and supports of PVC manifold and air distribution piping to ensure that they have a margin of safety of 10 against calculated buoyant forces. Test anchors and supports of stainless steel manifold and air distribution piping to ensure that they have a margin of safety of 2 against calculated buoyant forces.

.2 Upon installation of the anchors and supports and prior to the installation of piping, test all of the supports for the manifold piping and randomly test 10 percent of the supports for the air distribution piping. Test the anchors and supports in the presence of the Consultant.

.3 Test each support with a lever placed on a fulcrum. Apply the static load to the opposite end of the lever, producing a vertical extracting force on the support anchor equal to either 10 times or 4 times the calculated maximum buoyant force to which the support anchors will be subjected, depending on the pipe material as detailed above.

.4 Repair or replace supports not meeting the test requirements, and retest in the presence of the Consultant. Test an additional 10 supports for each deficient support.

.3 Leakage and Leveling Tests:

.1 Flood the tanks with clear water to the top of the diffusers. Check the level of the diffusers to ensure that they are at the same elevation to within ±5 mm.

.2 Flood the tanks with clear water to a depth 300mm above the top of the diffusers. (Note that filtered effluent water (FEW) is acceptable for use, however, batch chlorination may be required for worker safety reasons). Turn on a blower and supply air evenly to all manifolds. Visually inspect the surface of the water in the presence of the Consultant to ensure that the airflow is uniformly distributed across the tanks with no air leakage from the piping or diffuser connections.

.3 Repair any leaks in the element holders, elements, piping or the like. Repeat the test until the installation is void of any air leaks.

.4 Place each aeration tank in operation with clean water to the design operating depth. Set the blower air flows for maximum and minimum in accordance with the oxygen requirements specified herein.

.5 Measure and record the pressure at each dropleg. The maximum value to be accordance with the requirements specified herein. Provide all taps and pressure sensing devices necessary to perform this test.

.4 Conform to the requirements of Section 01650.

END OF SECTION

EFFLUENT WATER STRAINER

1. GENERAL

1.1 Work Included

.1 Supply, installation and testing of effluent water strainers described below.

1.2 Related Work

.1 General Process Provisions: Section 11005

.2 Process Equipment Installation: Section 11020

1.3 Submissions

.1 Shop drawings: Submit in accordance with Section 01300 and Section 11005.

2. PRODUCTS

2.1 General

.1 Provide new, unused equipment for installation.

.2 All materials shall be free from defects or flaws which would affect the product's operation.

2.2 Description

.1 Provide a motorized, automatic, self cleaning strainer for continuous debris removal from the effluent water system. The system provided should allow the effluent water system to provide full-time uninterrupted flow.

2.3 Acceptable Manufacturers

.1 Supply products, modified as necessary by the manufacturer to provide the specified features and to meet the specified operating conditions. Refer to Section 11005.

.2 Design Standard:

.1 Fluid Engineering Series 793.

.3 Acceptable manufacturers:

.1 Hayward Industrial Products and Tate Andale Inc.

2.4 Materials

.1 Fabricate the body and cover of carbon steel, designed, manufactured, and tested to ASME Section VIII Standards.

.2 Housing to be suitable for a design pressure of 1000kPa(g). Provide flanged inlet and outlet connections conforming to ANSI B16.5. Provide a single backwash connection on the side and large drain connections on the bottom of the housing. Provide unit complete with factory supplied steel support legs for bolting to concrete or steel base.

.3 Provide 50 mm connections. Size the strainer for a flow of 400 L/min.

.4 Manufacture the straining element of wedge shaped profile wire and rod. Weld each intersection to produce a rugged, one-piece element. Fabricate of 304 stainless steel. Provide 0.4 mm openings.

.5 Fabricate all other internal parts of 304 stainless steel. Provide drive shaft and hollow port assembly fitted with all necessary bearings and seals.

.6 Make the drive arm and hollow port assembly free running, with no direct contact with the screen surface. Make the port assembly factory- and field-adjustable for positive effective cleaning and shear capability.

.7 Support the drive shaft at the top with roller bearings located in a double reduction gear reducer at the bottom with water lubricated guide.

2.5 Drive

.1 Motor to comply with the requirements of Section 11205.

2.6 Control Package.

.1 Provide a backwash control package for continuous or intermittent operation of the backwash cycle. Provide 120V 1 phase 60 hz power supply.

.2 Provide a NEMA 12 panel with an adjustable timer, relays, drive motor starter, HOA selector switch, and indicating lights for Power On, Backwash Operating, and High Differential.

.3 Provide a 50 mm backwash valve with electric actuator.

.4 Provide a single element differential pressure switch to override the timed backwash sequence while also providing an alarm.

2.7 Protective Coatings

.1 Shop prime and paint all components in accordance with Section 09905.

3. EXECUTION

3.1 Installation

.1 Ensure that the effluent water strainer is installed in accordance with Section 11020 as required to provide satisfactory service.

.2 Install strainers as per manufacturer's recommendations on the methods and precautions to be followed in the installation of the strainer.

.3 Installer shall certify the understanding of the installation of the pump by completing Form 101, illustrated in Section 01650.

.4 Installer to fulfill the requirements for a successful installation as documented by Form 102, illustrated in Section 01650.

3.2 Testing

.1 Ensure that the effluent water strainer, including all component parts, operates as intended.

.2 Installer to fulfill the requirements for satisfactory performance of the equipment as documented by Form 103, illustrated in Section 01650.

3.3 Commissioning

.1 Conform to the requirements of Section 01735

END OF SECTION

1. GENERAL

1.1 WORK INCLUDED

.1 This specification covers the supply, installation and testing of a complete functional chemical feed system for the dosing of sodium hypochlorite. The systems shall include all miscellaneous items required for complete and functional operation as shown on the drawings and described herein. A single manufacturer shall be responsible for supplying all components of the chemical feed system.

.2 Chemical feed equipment includes solution feed lines and associated fittings, and related appurtenances for complete and operable systems.

.3 To the extent possible, the existing sodium hypochlorite dosing system is to be re-used. In particular, the existing sodium hypochlorite pumps will be reused for this system as indicated on the drawings. In the event that the quantity of existing equipment is not sufficient or the existing equipment has been damaged and therefore not suitable for re-use, refer to Section 01601 for payment of additional items. The cost of installing any additional equipment, and any delays or other costs associated with supplying the additional equipment, will be included in the Contract Price.

.4 The piping and fittings associated with the sodium hypochlorite pumps will be specified in this section.

1.2 RELATED WORK

.1 Process Provisions: Division 11

.2 Electrical/Controls & Instrumentation: Division 16 & 17

1.3 SUBMITTALS

.1 General

.1 Submit Product Data and Shop Drawings in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data, Shop Drawings, and Miscellaneous Submittals in one complete submittal package. Partial submittals are unacceptable.

.2 Shop Drawings: Submit in accordance with Section 01300 and Section 11005. In addition to the requirements of Section 11005, include the following:

.1 Installation, fabrication, and assembly drawings including dimensions and cross sectional views of all equipment showing details of construction and specifically prepared technical data, including design capacities for equipment for each system.

.2 Manufacturer's data including materials of construction and equipment weight.

.2 Product Data:

.1 Catalog cuts and product specifications for products specified.

.3 Operation and Maintenance (O&M) Data:

.1 Submit in accordance with Section 01730.

2. QUALITY ASSURANCE

2.1 EQUIPMENT

.1 Assign unit responsibility to the sodium hypochlorite equipment manufacturer for providing a fully functioning sodium hypochlorite feed system in accordance with this Section.

.2 Manufacturer to be engaged in the business of supplying liquid chemical feed systems for wastewater treatment projects.

2.2 PERFORMANCE

.1 The existing sodium hypochlorite dosing pumps are to be reused as per Section 11025. Adjust the capacity of the existing sodium hypochlorite pumps to rated capacity 1.9 L/h (each) and verify that each pump is capable of delivering this flow against a maximum back pressure of 690 kPa (100 psi).

3. MATERIALS

.1 Each pump shall be provided complete with

.1 PTFE backpressure valve with 12.5 mm (½") FNPT. Provide external pressure relief valve set at 20 psi below maximum rated pressure of pump to prevent excessive pressure buildup in discharge line and internal damage to pump,

.2 Viton injection point with 12.5 mm (1/2") MNPT,

.3 pressure relief valve,

.4 pulsation dampener,

.5 PVC ball check valve,

.6 pressure gauge with isolator downstream of pump discharge

.7 single union 12.5 mm (1/2") MNPT foot valve with integral strainer (1/8" perforations) and Teflon coated viton seals and

.8 suction and discharge tubing (12mm).

.9 See Process and Instrumentation drawing for details and locations of the above equipment.

.2 Each pump shall be provided with a flow monitor switch (Digi-Pulse flow monitor) to verify chemical flow/or flow loss enabling stand-by pump to come into operation if required.

.3 Provide all wetted parts which are resistant to corrosion by materials being pumped. Wetted parts of Pump suitable for use with 12.5% sodium hypochlorite solution at ambient temperatures (T=18 Degrees Celsius).

.4 All exposed fasteners shall be stainless steel.

.5 Valve seats, fittings and connections at pump head shall be rigid, unplasticized, PVC, normal impact.

.6 The plumbing and valving will allow common or dual suction. Suction piping: PVC (refer to Section 15050) to allow feed directly from Sodium Hypochlorite Drum. Discharge piping: 12 mm PVC.

.7 Refer to Division 17 for Metering Pump Controls.

3.2 MANUFACTURERS

.1 Prominent Fluid Controls , Inc. shall supply the following chemical feed system equipment.

3.3 SPARE PARTS

.1 In addition to what is required in section 11005, provide the following:

.1 Diaphragm for pulsation dampener.

4. EXECUTION

4.1 INSTALLATION

.1 Install the equipment in accordance with the manufacturer's specifications and recommendations, and generally as shown on the drawings.

4.2 PIPING

.1 Make necessary piping connections to the point of dosing as directed on the drawings.

4.3 TESTING

.1 Ensure the equipment, including all new and existing component parts, operates as designed.

END OF SECTION

HYDRATED LIME FEED SYSTEM

1. GENERAL

1.0 Work Included

.1 Supply, design and supervise the installation, testing and commissioning of a skid mounted bulk bag hydrated lime feed system consisting of a receiving hopper, level sensors, flow promotion devices, vacuum conveyor system, volumetric feeder, lime slurry mixing tank, control system, all associated piping and valves, spare parts and other necessary accessories for the skid assembly. The bulk hydrated lime feed system shall handle feeding, mixing and pumping of hydrated lime chemical and its mixed solution.

1.1 Submittals

.1 Shop Drawings: Submit in accordance with Section 01300 and Section 11005. Inaddition t the requiremens of Section 11005, submit the following:

.1 Fabrication drawings for the custom built pieces of equipment.

.2 Single Line AC Control System Schematic

.3 Three Line AC Control System Schematic

.4 Field Wiring Diagram

.5 Description of Sequence of Operation

.6 Cut Sheets for Standard items

.2 Installation Requirements in accordance with Section 01650.

.3 Operating and Maintenance Data: Provide for incorporation in operation and maintenance manual as specified in Section 01730. Include complete description of operation together with general arrangement and detailed drawings, wiring diagrams for power and control schematics, parts catalogues with complete list of repair and replacement parts with section drawings illustrating the connections and identifying numbers.

1.2 Service Conditions

.1 The hydrated lime feed system will be located inside a building above the bioreactors. The bioreactors will be covered and ventilated such that the ambient environment should not be humid. The average temperature of the building will be 18 Degrees.

1.3 Coordination

.1 Coordinate with other divisions to ensure there are no conflicts in the work.

1.4 Quality Assurance

.1 The equipment shall be the product of a systems supplier who is regularly engaged in hydrated lime feed system design and supply.

.2 The bulk hydrated lime system shall be furnished by a single supplier to ensure full coordination of all units and to establish a single source of responsibility and control the system.

.3 Structural Steel and Welds: Use all structural steel used for equipment fabrication which conforms to the requirements of the Standard Specifications for Steel for Bridges and Buildings and ASTM A36. Conform to the latest standards of the American Welding Society.

.4 Structural Design: Design all steel structural components so that the stresses developed under the specified conditions will not exceed the allowable stresses defined by the latest AISC Standards and the aforementioned standards.

.5 Gear Design: Design all drive unit components in accordance with AGMA 2001-B, 6010-E, and 6034-A as applicable.

.6 Bearing Design: Design main bearings in accordance with AFBMA

1.5 Shipment, Protection, and Storage

.1 Ship the equipment pre-assembled to the degree which is practicable.

.2 Provide storage instructions indicating specific requirements to ensure there is no uneven wear, distortion or weathering of components.

.3 Identify all special storage requirements.

2. PRODUCTS

2.0 Design Requirements

.1 The Skid Mounted Bulk Bag system shall be designed to receive, store, feed and prepare chemical solutions ready for use by the owner. The intent of this specification is to provide a complete operating system that will automatically respond to changes in process conditions. As a minimum the system shall be designed for the following:

Equipment Tag	LFS-207
Chemical Data	
Chemical	Hydrated Lime
Shipping container size	Bulk Bags
Bulk Density	400-560 kg/m^3
Capacities:	
Hopper Storage Capacity	2265 L
Feed Rate	
Slurry/Solution Concentration	<2%
Slurry/Solution Feed rate	40-80 L/min
Classification	
Electrical classification	Unclassified

.2 The system shall receive the bulk chemical in bulk bags with an average weight of 1 ton. The bulk bags shall be lifted into position by means of a motorized pallet jack/an integral overhead crane assembly as specified in Division 13 **WHERE DO WE SPECIFY THIS?.** Once the sealed connection is made to the receiving hopper the contents of the bulk bag shall be transferred to the hopper. Displaced air shall be vented through a vent sock/integral dust collector assembly.

.3 Flow of chemical from the hopper shall be assisted by means of flow promotion devices into a vacuum convey system, which will transport the chemical to the volumetric feeder hopper located above the Aerobic 1 Cell of the Bioreactors. The volumetric feeder shall meter the chemical at an adjustable rate into the lime slurry mixing tank. A constant water flow shall be added to the lime slurry mixing tank with the resultant slurry overflowing to the Aerobic 1 Cell in both the Bioreactors.

.4 Filtered and chlorinated effluent water shall be used for dilution water in the lime slurry mixing tank.

.5 A main control panel shall control and indicate the status of components in the system. With exception of hopper filling, all activities of the Skid Mounted Bulk Bag system shall be operable in an automatic mode without supervision.

2.1 Acceptable Manufacturers

.1 Stanco Projects Ltd.
.2 Or Approved Equal

2.2 System Components

.1 The Skid Mounted Bulk Bag system shall consist of, but not be limited to, the following components:

.1 Receiving Hopper

.2 Hopper Level Sensors

.3 Flow Promotion Devices

.4 Vacuum system

.5 Volumetric feeder

.6 Lime Slurry Mixing tank

.7 Piping and Valves

.8 Control System

.9 Skid Assembly

.10 Spare Parts

2.3 Receiving Hopper

.1 Receiving hopper shall be fabricated of material compatible with the chemical handled and shall be complete with a 60 degree sloped bottom section terminating in a 150 mm flanged outlet.

.2 The Receiving Hopper shall be fabricated of painted carbon steel, and be complete with hinged, gasketed cover, leg supports, access ladder.

.3 The Receiving Hopper shall be equipped with provision to vent the displaced air when filling. Supplier to provide a vent sock to vent the displaced air.

.4 Receiving Hopper shall be designed for storage of hydrated lime at up to 560 kg/m^3, seismic zone, per UBC. Minimum working volume shall be 2265 L (80 cf).

2.4 Crane Assembly

.1 A crane assembly shall be provided to assist in loading the Receiving Hopper. The Crane Assembly shall be complete with pendant control.

.2 Refer to Structural drawings for details on monorail system.

2.5 Hopper Level Sensors

.1 Two only capacitance type point level sensor shall be provided for indication of high and low material level in the hopper, complete with a stainless steel probe, solid state integral sensing electronics, DPDT contact and NEMA 4 enclosure.

.2 Rotating paddle wheel type level sensors shall not be acceptable.

2.6 Flow Promotion Devices

.1 Flow promotion devices shall be provided to ensure positive flow of the contents from the hopper and prevent bridging, jamming, and segregation. Fluidized air pads shall be provided to be located in the cone section of the hopper in addition to an electromagnetic vibrator.

.2 All flow promotion devices shall be provided with adjustable timers with the timers located in the main control panel. Air control sets shall be provided to regulate and control the fluidization pads.

.3 Compressed air to operate the devices shall be provided by the existing air compressors on site.

2.7 Vacuum Conveying System

.1 A vacuum convey system shall be provided to transfer the chemical to the volumetric feeder hopper located above the Aerobic 1 Cell in the Bioreactors.

.2 The vacuum convey system shall be sized to feed up to 181 kg/hr chemical over a horizontal distance of ' and a vertical distance of ____' into the volumetric feeder hopper.

.3 The vacuum conveyance unit shall be a self contained unit fabricated of 316 stainless steel complete with integral 0.56 kW vacuum blower, cartridge filter, duckbill discharge valve. Unit will be supported above the volumetric feeder hopper by skid manufacturer.

.4 Conveyance piping shall be 38 mm (1.5") grounded PVC flexible tubing

.5 The vacuum conveyance system shall operate in response to level signals in the feed hopper.

2.8 Volumetric Feeder

.1 A volumetric screw feeder shall be provided to meter the chemical into the lime slurry mixing tank. The feeder shall be constructed of stainless steel complete with a solid flight screw and conditioning screw, 4-20 ma input module and a feed hopper.

.2 The feed hopper shall have a capacity of 140 L **OK?**and be equipped with capacitance type high and low level indicators, vent sock and electromagnetic vibrator.

2.9 Lime Slurry Mixing Tank

.1 A 400 L **(IS THIS OK?)** stainless steel or FRP lime slurry mixing tank shall be provided for mixing of the chemical and effluent water.

.2 Lime Slurry Mixing tank shall be complete with interior baffles, a hinged gasketed access manway, overflow, drain complete with valve.

.3 Tank design shall be for constant overflow operation and shall include provision for dust control.

.4 A 0.18 kW low speed centre mounted agitator shall be provided to ensure positive mixing of the tank contents under wetting conditions. Maximum agitator speed is 350 rpm. Agitator shall be supplied with stainless steel shaft and impellers.

.5 A high level ultrasonic level device shall be provided to alarm on high level condition in the tank.

.6 Effluent water system addition assembly shall be supplied consisting of an isolation gate valve, solenoid valve, pressure gauge and a flow meter with adjusting valve. Supply effluent water to be supplied by others at a constant regulated pressure (60 Psi).

2.10 Control System

.1 Electrical components, shop wiring and design shall be system suppliers standard with the following minimum requirement for control panels:

.1 Power supply to be 600 V, 3 phase, 60 Hz with a minimum 30 amperage service.

.2 Main System Control Panel

.1 For mounting adjacent to lime slurry mixing tank, provide one main control panel complete with the following features:

.1 Lamicoid graphic system representation

.2 Main Disconnect Switch

.3 Transformer

.4 Circuit breakers or fuses as required

.5 H/O/A and status indication lights for the following:

.6 Fluidization pads and vibrators

.7 Vacuum system