

SECTION 11000 - OWNER FURNISHED EQUIPMENT

PART 1 - GENERAL

1.01 GENERAL:

- A. The Owner has pre-purchased various pieces of equipment to be installed by the Contractor under this contract.
- B. The Owner will furnish technical manuals necessary to provide for proper installation.
- C. The Contractor is required to maintain a record for each piece of equipment.
- D. The Contractor is required to provide all additional items necessary to complete installation of functioning system.

1.02 RECEIVING OF OWNER SELECTED EQUIPMENT:

- A. The Contractor shall arrange storage and delivery of the equipment with the respective equipment manufacturer and shall transport the equipment to the location to which it is to be installed. Contractor shall uncrate equipment and visually inspect for defects and or damage. Contractor shall report immediately to the Owner any such conditions found.

1.03 HOISTING AND RIGGING:

- A. Contractor shall be responsible for the proper setting, hanging and mounting of Owner furnished equipment and devises. Contractor shall provide all hoisting, rigging, tools, labor, equipment, etc., for the setting and placing of all Owner furnished equipment (roof mounted, ceiling hung, pad mounted, etc.). Rigging and hoisting operations shall be done in such a manner to prevent damage to equipment, building and Owner's property.

1.04 ASSEMBLY OF OWNER SELECTED COMPONENT:

- A. Assembly of some Owner-furnished components is required to make a complete, functional installation and is the responsibility of Contractor. Follow manufacturer's instructions.

1.07 PRESTART-UP INSPECTION AND LUBRICATION:

- A. Contractor shall check all Owner furnished equipment and make adjustments to the equipment, which will allow for proper/ functional operation of the equipment, and then start-up the equipment. Pertinent items include, but are not necessarily limited to, the following:
 - 1. Removal of shipping stops.
 - 2. Vibration isolators properly aligned and adjusted.
 - 3. Flexible connections are properly aligned.
 - 4. Safety controls, safety valves and high or low limits are in operation.
- B. Provide initial lubrication to all Owner furnished equipment. Follow manufacturer's requirements.

1.08 START-UP:

- A. The Contractor will inform the Owner when each piece of equipment is ready for start-up. The Contractor shall coordinate all start-up procedures with respective equipment manufacturer representatives and the Owner.
- B. Any problems in start-up which are found to be as a result of improper installation shall be corrected by the Contractor at no cost to the Owner.
- C. After a successful start-up, the Owner will issue a written release to the Contractor for the piece of equipment.

1.09 OWNER SELECTED EQUIPMENT

The Owner selected equipment that the Contractor is to provide and install is listed in the equipment schedules located in the plans. Listed installation requirements are not necessarily limited to those described. Contacts for the Owner selected equipment are as follows:

- A. WesTech 120' diameter secondary clarifier mechanism
 - 1. Contact: Dave Ritter, Goble Sampson, 801-268-8790, cell 801-550-1613, DRitter@goblesampson.com
 - 2. Scope of supply:
 - a) Drive units w/ torque control device
 - b) 3'-0" wide walkway, 1¼" aluminum grating, truss main chord members
 - c) 1½" Aluminum handrail, 4" kick plate for walkway and platform.
 - d) 8'-3" x 6'-6" platform around the drive and connected to walkway
 - e) 3'-0" O.D. center influent column w/ influent ports and bottom spool
 - f) 21' I.D. x 5'-3" side depth feed well w/ 8 baffled scum ports
 - g) Feed well supports
 - h) 5' sq. drive cage
 - i) 2 5' x 5' rake arms w/ spiral blades, sludge scraper blades, outward raking blades, and adjustable 304SS squeegees
 - j) Weir plates
 - k) Baffles w/ supports
 - l) Skimmer blade w/ supports
 - m) Scum skimmer assembly w/ neoprene wipers
 - n) 10' scum box w/supports and 6" discharge pipe conn. w/ flex coupling
 - o) Scum flushing valve
 - p) 10' I.D. x 2'-6" side depth energy dissipating inlet well w/ multiple inlet gates
 - q) Sludge withdrawal ring w/ 1'-4" to 4½" ins. width taper w/ concrete dam
 - r) Field Service: Minimum 3 days.
 - s) Delivery to job site.
 - t) All anchor bolts to attach all the above equipment to the concrete structure.
 - a) All mild steal will come to job site hot dipped galvanized. Any disturbed surfaces during installation shall be repaired with Galvanox or equal by the Contractor.
- B. WesTech 2 – 75' diameter primary clarifier mechanisms
 - 1. Contact: Dave Ritter, Goble Sampson, 801-268-8790, cell 801-550-1613, DRitter@goblesampson.com
 - 2. Scope of work:
 - b) Drive units w/ torque control device
 - c) 3'-0" wide walkway, 1¼" aluminum grating, truss main chord members
 - d) 1½" Aluminum handrail, 4" kick plate for walkway and platform.

- e) 8'-3" x 6'-6" platform
- f) 3'-0" O.D. center influent column w/ influent ports and bottom spool
- g) 16' I.D. x 5' side depth feed well
- h) Feed well supports
- i) 3' x 0' rake arms w/ spiral blades, sludge scraper blades, outward raking blades, and adjustable 304SS squeegees
- j) Weir plates w/90° V-notches 3" deep @ 6" intervals
- k) Baffles w/ FRP supports
- l) Skimmer blade w/ supports
- m) Scum skimmer assembly w/ neoprene wipers
- n) 4' scum box w/supports and 6" discharge pipe conn. w/ flex coupling
- o) Scum flushing valve
- p) 8' I.D. x 2'-6" side depth energy dissipating inlet well w/ multiple inlet gates
- q) Field Service: Minimum 3 days.
- r) Delivery to job site
- s) All anchor bolts to attach all the above equipment to the concrete structure
- t) All mild steal will come to job site hot dipped galvanized. Any disturbed surfaces during installation shall be repaired with Galvanox or equal by the Contractor.

C. JDV anaerobic basin mixers

- 1. Contact: Dave Ritter, Goble Sampson, 801-268-8790, cell 801-550-1613, DRitter@goblesampson.com
- 2. Scope of work: 10 floor-mount mixer assemblies—4 per anaerobic basins 1 and 2 and 2 in basin 3.
 - a) Fabricated of 1/8" 304 stainless steel
 - b) 18" diameter by 12' tall w/ bubble generators
 - c) Mounting legs (w/o anchor bolt assemblies to be supplied by Contractor – 6 ss anchor bolts 3/4 inch by 10 length.)

D. JDV anoxic basin mixers

- 1. Contact: Dave Ritter, Goble Sampson, 801-268-8790, cell 801-550-1613, DRitter@goblesampson.com
- 2. Scope of work: 6 floor-mount mixer assemblies
 - a) Fabricated of 1/8" 304 stainless steel
 - b) 18" diameter by 12' tall w/ bubble generators
 - c) Mounting legs (w/o anchor bolt assemblies to be supplied by Contractor – 6 ss anchor bolts 3/4 inch by 10" length.)

E. WesTech 2 – 25 HP Landox Propulsion Drums, Model AEL2C3

- 1. Contact: Dave Ritter, Goble Sampson 801-268-8790, cell 801-550-1613 DRitter@goblesampson.com
- 2. Scope of work:
 - a) DRIVE UNIT: A 25 HP, TEFC, constant torque, inverter duty motor suitable for 460 volt, 3 phase, 60 hertz supply power. The motor will have a service factor of 1.15 based on the sine wave power. The motor will be rated at 40°C ambient with class H insulation and shall comply with the applicable provision of NEMA with a minimum of B-10 bearing life of 100,000 hours. The motor will include stainless steel condensate drains, a standard conduit box, suitably sized space heater operating on 120VAC, and a NC thermostatic heat protection device.
 - b) A high efficiency helical gear type reducer sized with a minimum service factor of 1.5 times the motor nameplate HP, equipped with a dry well, 480 VAC immersion heater, and low oil cutout switch. All bearings will have a minimum 8-10 bearing life of 100,000 hours.
 - c) COUPLINGS: The connection between the motor and gearbox is through a high speed elastomeric coupling.

- d) Attachment from the gearbox to the main support bearing is through a Pencoflex or equal type elastomeric coupling.
- e) SUPPORT BEARINGS: A main support bearing specially designed and developed by Landustrie Sneek 8V. This bearing construction absorbs the axial and radial forces caused by the weight and rotation of the LANDOX rotor to protect the secondary shaft of the gearbox.
- f) LANDOX DRUM: A mild steel vertically mounted drum rotor with a cone at the top of the drum. The drum will include sixteen vertical blades. The blades maybe continuously welded or bolted to the drum depending on the size and shipping requirements.
- g) MOUNTING: A steel base plate and four (4) 316 ss anchor bolts for mounting and leveling the unit.
- h) All non-stainless steel items will be shipped painted from the factory. The drive unit, including motor, reducer and Landox bearing will be supplied with the manufacturer's standard coating system.
- i) Minimum two (2) trips and four (4) days for factory inspection, startup, and instruction of plant personnel.

F. Aquarius Fine Bubble Diffusers

- 1. Contact: Mike Brown, Coombs Hopkins Company, (801) 990-3174, cell (801) 652-2632, mike@coombshopkins.com
- 2. Scope of work: 8 ceramic fine-bubble diffuser systems—2 system each in bioreactors 1 & 2, and 4 systems in Bioreactor 3
 - a) Bioreactors 1 & 2: 4 grids total with 2688 total diffuser, with 4, 10" 12 ga. 304 SS drop pipes
 - b) Bioreactor 3: 4 grids with 3,484 diffusers, with 4, 10" 12 ga. 304 SS drop pipe
 - c) 10" Sch. 40 PVC manifolds
 - d) 4" diameter SDR 33.5 PVC air distributors w/ connection to manifold
 - e) PVC pipe joint connections
 - f) 304 SS piping supports w/ vertical supports, clamps, adjusting mechanisms, and mechanical anchor bolts
 - g) Fine bubble diffuser assemblies
 - h) 304 SS bolts, nuts, and gaskets for field assembly
 - i) Condensate purge system
 - j) Field service: 3 days following installation by Contractor

G. KTurbo Turbo Blowers

- 1. Contact: Bill Peretti, Water Control Corp. (303) 956-8642, cell (303) 477-1970, b.peretti@watercontrolcorp.com
- 2. Scope of work: 6 high-speed turbo blowers
 - a) Bioreactor #3:
 - 1. 3, 250 HP model TB250-0.8T blowers
 - 2. 3 discharge silencers (400A/16 inch)
 - 3. 3 expansion joints (400A/16 inch)
 - 4. 3 check valves (400A/16 inch)
 - 5. 3 isolation valves (16 inch)
 - b) Bioreactors 1 & 2:
 - 1. 3, 250 HP model TB250-0.8T blowers
 - 2. 3 discharge silencers (400A/16 inch)
 - 3. 3 expansion joints (400A/16 inch)
 - 4. 3 check valves (400A/16 inch)
 - 5. 3 isolation valves (16 inch)
 - c) High-speed PM motor
 - d) VFD (built into enclosure)
 - e) LCP (MICOM control, touch screen)
 - f) Inlet filter/silencer

- g) Blow-off valve
- h) BOV silencer
- i) DC choke

- H. Siemens Forty-X Disc Filter
 - 1. Contact: Cory Firzloff, William. H. Reilly & Co, (801) 201-3121, cory@whreilly.com
 - 2. Scope of work: Disc filter system for reuse water
 - a) Completely framed and self-contained filter system.
 - b) 3.0 MGD capacity
 - c) Controls included
 - d) Filter drain
 - e) Start up minimum three days.
 - f) Does not include anchor bolts – see plans.

- I. Aquaray 3X “HO” VLS UV Disinfection System
 - 1. Contact: Brad Gwinnup, W-Cubed, Inc. , (801) 466-3819, cell (801) 232-8241, bradg@wcubedinc.com
 - 2. Scope of work: Ultraviolet disinfection system for plant effluent
 - a) 2 Channels
 - b) 8 3X lamp modules (4 per channel)
 - c) 1 power supply unit
 - d) 1 main PLC enclosure (UMCP)
 - e) 4 UV intensity sensors
 - f) 5 mounting rail/eye protection plates
 - g) 6 automatic level controls (finger weirs)
 - h) SS anchor bolts
 - i) Validation testing
 - j) Field Service: Two trips, total of five days.

- J. Aquaray 3X “HO” VLS UV Disinfection System for Reuse Water
 - 1. Contact: Brad Gwinnup, W-Cubed, Inc., (801) 466-3819, cell (801) 232-8241, bradg@wcubedinc.com
 - 2. Scope of work: Ultraviolet disinfection system for reuse water
 - a) 1 Channel
 - b) 4 3X lamp modules
 - c) 1 power supply unit
 - d) 1 main PLC enclosure (UMCP)
 - e) 4 UV intensity sensors
 - f) 5 mounting rail/eye protection plates
 - g) 6 automatic level controls (finger weirs).
 - h) 1 cable tray
 - i) SS anchor bolts
 - j) Validation testing.
 - k) Field Service: Two trips, total of five days.

- K. Mixed Flow Transfer Pumps
 - 1. Contact: Scott Roberts, Nickerson Company, Inc.
 - 2. Scope of work: Mixed flow pumps for Bioreactor Pump Station
 - a) 3 Cascade model 14MF-1 stage pumps, 1175 RPM
 - b) 50 HP motor
 - c) Vertical solid shaft
 - d) Flanged discharge
 - e) Water flush lubrication
 - f) Start up a minimum of three days.

- L. Used Backup Generator
1. Contact: Lawrence Burton, Orem City Water Reclamation Facility, (801) 229-7471, lgburton@orem.org
 2. Scope of work: Move and re-install old backup generator
 - a) Brand: Onan/Cummins
 - b) Power: 650 KW-480V
 - c) Current location – on site.
 - d) Does not have day tank nor a transfer switch which will be supplied by Contractor. Fuel lines to be connected by Contractor.
 - e) Generator in good condition. Certified mechanic or technician required to start-up engine after installation arranged and paid by Contractor.

END OF SECTION 11000

SECTION 11205 FRP WEIRS AND SCUM BAFFLES

PART 1 GENERAL

1.01 SUBMITTALS

A. Shop Drawings

1. Manufacturer's catalog information, descriptive literature, specifications and identification of materials of construction, including resins and glass fiber content and layout for FRP constructions.
2. Detailed drawings that show equipment fabrication dimensional layouts, bill of materials, bolt and anchor locations, method of attachment including number, locations and size of fasteners, and shall be based on field measurements by the Contractor to ensure proper installation.

B. Quality Control Submittals

1. Manufacturer's Certificate of Compliance.
2. Special shipping, storage and protection and handling instructions.
3. Manufacturer's written/printed installation instructions.
4. A list of three installations of comparable size in operation for at least three years.
5. Certified test reports of the physical and mechanical properties of the product. Each panel shall have the following minimum physical properties:

<u>Property</u>	<u>Test</u>	<u>Minimum Value</u>
Tensile Strength	ASTM D-638	14,000 psi
Flexural Strength	ASTM D-790	25,000 psi
Flexural Modulus	ASTM D-790	1.0 x 10 ⁶ psi
Barcol Hardness	ASTM D-2853	40
Water Absorption	ASTM D-570	0.2%

1.02 WARRANTY

- A. Manufacturer shall warrant the weirs and scum baffles to be free of defects in materials and workmanship for a period of one year after the date of Substantial Completion.

1.03 COORDINATION

- A. Manufacturer shall coordinate the weir and scum baffle design and installation requirements with the clarifier mechanism, scum box and launder effluent channel configurations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. The weirs and scum baffles in this section shall be the products of:
1. Warminster, or equal

2.02 FRP WEIRS AND SCUM BAFFLES

- A. Except for bolts and hardware specified herein, the weirs, scum baffles and supports shall be polyester plastic resin, reinforced with glass fiber. All weir plates, weir washers, weir splice plates, scum baffle panels, scum baffle splice plates and baffle support brackets shall be fiberglass reinforced plastic molded to produce uniform smooth surfaces. The surface shall be resin rich, free of voids and porosity, without dry spots, crazes or unreinforced areas and shall provide for increased corrosion resistance and UV protection. The weirs and scum baffles shall be green in color.
- B. The weir plates, splice plates and weir washers shall be 1/4" thick plastic laminate. Weir plates shall not exceed 12' in length and 9" in width unless otherwise noted. The weir plates shall consist of sections with 2 1/2" deep 90 degree v notches at 6" intervals. Oversized mounting holes in the weir plates shall be provided for vertical and horizontal alignment of at least 2" with 5" diameter FRP weir washers to cover the holes. The weirs shall be mounted with 1/2" x 4 1/4" stainless steel expansion anchors 2' on center. Cut ends of non-standard lengths shall be sealed with resin.
- C. Scum baffle panels and splice plates shall be 1/4" thick plastic laminate. The scum baffle panels shall be 12" high and shall not exceed 12' in length unless otherwise noted. Splice plates shall be 6" x 12". The scum baffle brackets shall be 6" x 6" x 3/8" FRP Angle with slotted holes to provide horizontal, vertical and radial adjustment of the baffle. The brackets shall be installed on 4' centers. Fastening holes in the scum baffle panel shall be countersunk to accommodate flat head fasteners. Cut ends of non-standard lengths shall be sealed with resin.
- D. Expansion anchors, nuts, bolts, washers and other hardware shall be Type 304 stainless steel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The installation contractor shall field verify existing dimensions and install the weir and scum baffle in accordance with the Contract Drawings, approved shop drawings and manufacturer's recommendations. Field cutting of panels will be allowed to complete the structure. All field cut or drilled edges shall be sealed per the manufacturer's recommendations. All of the fasteners required for installation shall be supplied by the weir and scum baffle manufacturer.
- B. Weirs and scum baffles shall be carefully aligned and leveled to the elevations shown on the drawings. In the completed installation, no variation greater than 1/8" shall exist between any two notches of the weir plate in any one tank. In addition, the average deviation from one quadrant of the weir to any other shall not exceed 1/16". The installation contractor shall apply a suitable sealant between the weir and the wall to prevent the flow of liquid between the weir and the tank wall.

END OF SECTION

SECTION 11386—LINEAR MOTION SLUDGE MIXERS

PART 1 GENERAL

1.1 SCOPE

- A. The Contractor shall furnish, install, adjust, paint and test one (1) 10 hp LM16™ Linear Motion sludge mixer for mounting on the 75-foot diameter thermophilic digestion tank. The LM sludge mixer shall be supported from the digester cover and shall be capable of mixing sludge within the tank as shown on the Contract Drawings.
- B. Fabricated assemblies shall be shipped in the largest sections permitted by carrier regulations and properly match-marked for ease of field erection.

1.2 DESCRIPTION

- A. The sludge digester mixer assemblies shall have the following characteristics:
 - 1. Hydro-disk diameter: 72 inches
 - 2. Stroke length: 12 inches
 - 3. Cycle time 30-40 per minutes
 - 4. Maximum motor name plate rating: 10hp

1.3 GENERAL INFORMATION

- A. All welding, both shop and field, shall be shielded arc welding and shall conform to the latest standards AWS D1.0 "Welding in Building Construction" of the American Welding Society (AWS) for gas-tight welding.
- B. The mixer welded parts are either epoxy-coated mild steel or stainless steel, conforming to the requirements of "Standard Specifications for Steel for Bridges and Buildings".

1.4 MANUFACTURERS

- A. The equipment covered by these specifications is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Contract Drawings. The new sludge digester mixer shall be EIMCO® Type LM16 and 10 hp motor as supplied by EIMCO Water Technologies., Salt Lake City, UT in accordance with the United States patents covering the linear motion mixer design.
 - 1. The Manufacturer shall provide a history of being regularly engaged in the design, manufacture, project management, execution, shipment, field inspection and startup services of digester sludge mixers, as defined in this specification.

1.5 SUBMITTALS

- A. In accordance with the procedures and requirements set forth in Section 01300 "Submittals" the Contractor shall submit to the Engineer for review, design data, supports details, and detailed shop drawings of the mixer.

- B. Fabrication of the sludge mixer shall not begin until the Engineer has accepted the design data, design calculations, and details.
- C. Submittal shall include at least one (1), full-scale field performance mixer tracer test reports using Lithium Chloride tracer. Each test will have been previously conducted on an installation using a single digester of at least 80' in diameter or greater. Lithium chloride shall be added in sufficient quantity to achieve a concentration of at least 2 mg/l as Lithium in each digester to initiate each tracer test. Analysis for Lithium shall be made on at least forty (40) separate samples taken over a thirty (30) consecutive day test period with a minimum of twelve (12) samples taken during the first twenty-four (24) hours of the tracer test. During the tracer test the general digester process shall be monitored and data recorded on qualitative parameters such as volatile acids, volatile solids destroyed, gas production and content, alkalinity, pH, flow rate, total suspended solids, temperature, etc. The results of these tests shall indicate high mixing efficiency with active volumes of 90% or greater.
- D. The mixer manufacturer shall include as an integral part of the submittal, a 3-D model computational mixing analysis for the specific configuration of the tank where the mixer will be installed. Any interference for the occurrence of the normal mixing patterns such as columns, and any other significant support structures shall be included in the 3-D model of the tank being analyzed. The mixing analysis shall simulate the addition of a known amount of tracer fluid that will be dispersed through the tank as an indication of adequate mixing. The values obtained by this analysis shall closely follow the recommended parameters for mixing of a digester tank. A submittal lacking this site-specific analysis will be considered non-conforming and will be rejected.
- E. In addition to the tests reports, the manufacturer must submit a list of not less than three (3) mixer installations using a linear motion mixer and meeting the requirements of these specifications. These installations will be provided with contacts and telephone numbers to determine suitability of equipment submitted.

1.6 SHOP TESTS / OPERATION AND MAINTENANCE MANUAL

- A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in Section 01300 "Submittals".
- B. Two copies of a preliminary O&M or reference O&M manual shall be included in the shop drawing submittal. Without inclusion of these manuals, the submittal will be considered incomplete and will be returned without review.
- C. Final manuals shall include information regarding the shop testing of each mixer. The testing information shall include as a minimum the following:
 - 1. Run the mixer drive unit with the hydro-disk in dry or wet conditions in the shop for at least 2 hours.
 - 2. Check the shaft for straightness and plumbness.
 - 3. Check the cam system for operation without interference and friction.
 - 4. Complete check of the local button control station to ensure proper operation.
 - 5. Make all final adjustments as required prior to shipment.

1.7 SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. The Contractor shall provide the services of a qualified manufacturer's technical representative who shall adequately supervise the installation and testing of all equipment furnished under this Contract and instruct the Contractor's personnel and the Owner's operating personnel in its maintenance and operation as outlined in the General Conditions and Section 01650 "Facility Start up and Commissioning". The services of the

manufacturer's representative shall be provided for a period of not less than two (2) days as follows:

1. One trip of one (1) days to start-up and instruct operations personnel.
 2. One trip of one (1) day to inspect completed installation.
- B. Any additional time required to achieve successful installation and operation shall be at the expense of the Contractor. The manufacturer's representative shall sign in and out at the office of the Resident representative on the day he is at the project.

PART 2 PRODUCTS

2.1 GENERAL

- A. The equipment to be provided with the mixer shall include the hydro-disk, lubrication systems, seal tube, mounting base, cam drive system, local bottom station, and accessories. The mixer assembly shall be removable as a unit without varying the normal sludge level or gas pressure within the digesters.

2.2 MIXER DRIVE

- A. The motor drive assembly shall consist of an explosion-proof, reversible single-speed motor, and an helical bevel gear box driving a cam-scotch-yoke mechanism that moves the hydro-disk shaft vertically.
- B. There shall be provided a minimum 72 inches outside diameter hydro-disk mounted at the end of the vertical drive shaft. The design shall create a vertical "up and down" motion of the hydro-disk producing a turbulent "liquid-core" of micro and macro eddy currents that extend through its range of motion and the tank contents. The mixing hydro-disk shall be constructed of 304 Stainless steel.
- C. The motor for the mixer shall be designed, manufactured, and tested in accordance with the latest edition of NEMA MG 1. The motor shall conform to the following:
1. Type: Single-speed, reversible, explosion-proof, (Class I, Division 1, Group D).
 2. Horsepower: 10 hp
 3. Motor speed: 1800 RPM.
 4. Electrical: 230/460 volts, 3 phase, 60 hertz.
 5. Minimum motor efficiency at high speed: 88 %.
 6. NEC code T2A
 7. Inverter duty rated

2.3 SEAL TUBE

- A. The seal tube shall be welded to the mixer mounting flange in a gas-tight connection. The mounting base will be designed to support the entire weight of the linear motion mixer.

2.4 MOUNTING PORT

- A. The mixer manufacturer shall supply a structural fabricated steel mixer mounting port designed to be installed to the existing mounting ring. The mounting port shall be provided with the necessary flange bolts and gaskets. The port shall be designed to support and transfer all dynamic and dead loads imposed by the mixer to the cover.

2.5 MIXER CONTROLS

- A. The linear motion mixer shall be provided with a NEMA 7 local control station with forward/reverse switch and on/off/auto switch. Motor starter, disconnect, transformer, etc. shall be provided in the MCC and shall be as specified elsewhere in these specifications.

PART 3 EXECUTION

3.1 ANCHOR/ ASSEMBLY BOLTS

- A. All flange bolts shall be made of galvanized or 304 stainless steel with the exception of the high strength fasteners for the mixer which shall be in accordance with the manufacturer's recommendations.

3.2 FINISHES

- A. All fabricated surfaces requiring painting shall be cleaned by near white sand blast and shop painted with one coat Tnemec 66-1211, or equal. Any field painting and touch up of the mixer shall be as directed in DIVISION 9 of these specifications.

3.3 TESTING

- B. The Contractor shall inspect the mixer after installation in accordance with the manufacturer's "Field Service Check List".
- C. The Contractor, assisted by the manufacturer, shall field verify the following items as a minimum:
 - 1. Motor installed and appropriately mounted for operation.
 - 2. Mixer motion speed.
 - 3. Amperage measurements not exceeding nameplate rating.
 - 4. Assembly bolts tightened properly.

The Contractor shall correct any functional deficiencies. The Contractor shall provide all water and other materials necessary to complete the field verification. Completed inspection reports shall be submitted to the Engineer.

END OF SECTION 11386

SECTION 11500 – TROLLEY, HOIST, AND CRANE SYSTEMS

PART 1 - GENERAL

1.01 CONDITIONS OF OPERATION

- A. Each chain hoist system shall be capable of operating at the conditions shown in the mechanical schedule.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including installation.
- B. Shop Drawings: Submit manufacturer's assembly-type (exploded view) shop drawings for each type of chain hoist system, indicating dimensions, weights, materials, and methods of assembly of components in accordance with requirements of Section 01300.
- C. Maintenance Data: Submit maintenance data and spare parts list for each type of chain hoist system. Include this data, product data, and shop drawings in the maintenance manual in accordance with requirements of Section 01730.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following are acceptable:

Overhead Cranes International or equal

All products, whether named as "acceptable": or proposed as "equal" must fully comply with these specifications and the contract drawings. Standard product must be modified, if required, for compliance.

2.02 CHAIN HOIST

The chain hoists shall have the following characteristics:

- A. Frame and enclosure shall be High-Strength aluminum alloy.
- B. Load and hand chains shall be galvanized for corrosion protection.
- C. Hoist shall have a Load Limiter for automatic overload protection.
- D. Braking shall be achieved by a Weston-type automatic brake.

2.03 PORTABLE/REMOVABLE HOIST

- A. The portable hoist shall be manufactured by Halliday Products or Equal
- B. The portable hoist shall be sized to facilitate equipment placement and removal.
- C. The portable hoist shall be all T-304 stainless steel construction with marine grade brake winch and 30 feet (9m) of 1/4" (7mm) T-304 stainless steel cable with galvanized safety hook.
- D. The portable hoist shall be guaranteed against defects in material and or workmanship for a period of 3 years.

2.04 TROLLEY

The trolleys shall be have the following characteristics:

- A. The trolley shall be manufactured to the extent possible with corrosive resistant materials, stainless steel, aluminum, and/or galvanized steel.
- B. Bearings shall be sealed and pre-packed with a lifetime lubricant.
- C. The trolley shall be sized to match the crane rail.

2.05 COMBINATION TROLLEY AND HOIST

The trolleys shall be have the following characteristics:

- A. The trolley shall be manufactured, by Yale or equal, with corrosive resistant materials, stainless steel, aluminum, and/or galvanized steel to the extent possible.
- B. Bearings shall be sealed and pre-packed with a lifetime lubricant.
- C. The trolley shall be sized to match the crane rail.

2.06 I-BEAM AND BRIDGE CRANE RAIL SYSTEM

- A. The I-beam crane rail shall be sized and designed by a qualified supplier. The crane rail system shall be designed using corrosion resistant materials to the extent possible. The crane rail system shall include design of all necessary mounting points on the overhead steel framework. All structural steel shall be epoxy coated suitable for use with the trolley rollers. All mounting hardware shall be stainless steel.

2.07 OVERHEAD BRIDGE SYSTEM

- A. The overhead bridge system shall be sized and designed by a qualified supplier. The bridge and rail system shall be designed using corrosion resistant materials to the extent possible. Rollers on the bridge shall have sealed bearings pre-packed with a lifetime lubricant. Overhead bridge system supplier shall design necessary mounting connections with stainless steel to the concrete sidewalls.
- B. The bridge system shall be equipped with variable speed motors and controls, providing gradual starting and stopping of motion in all directions.

2.08 JIB CRANE SYSTEM

- A. The jib crane system shall be sized and designed by a qualified supplier. The jib crane system shall be designed using corrosion resistant materials to the extent possible. Rollers on the bridge shall have sealed bearings pre-packed with a lifetime lubricant.
- B. The jib crane system shall be equipped with variable speed motors and controls, providing gradual starting and stopping of motion in all directions.
- C. The jib crane system shall be installed according to the manufacturer's instructions.

2.09 GANTRY CRANE SYSTEM

- A. The gantry crane shall be sized to lift 1000 lb to a height of 15 feet, across a 20-foot span.
- B. The gantry crane shall all steel "A" frame design with swivel lock casters and polyurethane wheels.
- C. The gantry crane shall be a T-series as manufactured by Spanco or approved equal.

PART 3 - EXECUTION

- A. Crane/Trolley system shall be void of any conflict with any existing or newly installed equipment and shall ensure the safe transport of pumps, motors, MBR cassettes, etc.

END OF SECTION 11500

SECTION 11610 FUME HOOD

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Laboratory fume hoods that shall meet the definition of a Laboratory Fume Hood as stated in the SEFA 1 – 2002 Recommended Practice. (Scientific Equipment & Furniture Association).
2. Standard airfoil bench hood superstructures shall be tested in accordance with the ASHRAE 110-1995 AM Test Procedure and perform well within the American Conference of Governmental Industrial Hygienists recommendations.

B. Related Sections:

1. Section 11602: Laboratory Casework and Furnishings.
2. Division 15: Furnishing and installation of plumbing utilities and final connections to fume hoods.
3. Division 15: Furnishing and installation of exhaust duct work and equipment, and final connection of fume hoods.
4. Division 15: Furnishing and installation of exhaust controls and final connections to hoods.
5. Division 16: Furnishing and installation of electrical utilities and final connections to fume hoods.

1.02 DESIGN REQUIREMENTS

- A. Fume hoods shall function as ventilated, enclosed work spaces, designed to capture, confine and exhaust fumes, vapors and particulate matter produced or generated within the enclosure.
- B. Design fume hoods for consistent and safe air flow through the hood face. Negative variations of face velocity shall not exceed 20 percent of the average face velocity at any designated measuring point as defined in this section.
- C. Average illumination of work area: Minimum 80 foot-candles. Work area shall be defined as the area inside the superstructure from side to side and from face of baffle to the inside face of the sash, and from the working surface to a height of 28 inches.
- D. Fume hood shall be designed to minimize static pressure loss with adequate slot area and rectangular shaped exhaust collar configuration. Average static pressure loss readings taken 3 diameters above the hood outlet from 4 points, 90 degrees apart, shall not exceed the following maximums:

Face Velocity	Measured Static Pressure Loss (W.G)
100 FPM	0.45 inches

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's data for each type of hood specified. Include component dimensions, configurations, construction details, joint details, and attachments. Indicate location, size, and service requirement for each utility connection.
- B. Shop Drawings:
 - 1. Provide 3/4 inch = 1'-0" scale elevations of individual and battery of hoods showing cross sections, rough-in and anchor placements, tolerances, and clearances. Indicate relation to other laboratory equipment, surrounding walls, windows, doors, and other building components.
 - 2. Provide 1/4 inch = 1'-0" rough-in plan drawings for coordination with trades.
 - 3. Provide 3 sets of prints.
- C. Top Samples: Submit product sample of each type of bench top.
- D. Finish Samples: Submit 3 inch by 5 inch samples of color of finish for fume hoods, work surfaces and for other pre-finished equipment and accessories for selection by the Owner's Representative.
- E. Test Reports: Submit test reports verifying conformance to specified performance tests.
- F. Maintenance Manuals: Provide written instruction manuals outlining operating and safety instructions and proper maintenance procedures.

1.04 QUALITY ASSURANCE

- A. Single Source Responsibility: Fume hoods, casework, work surfaces, laboratory furnishings, and accessories shall be furnished by a single laboratory furniture company.
- B. Manufacturer's Qualifications: Modern plant with proper tools, dies, fixtures, and skilled production staff to produce high quality laboratory casework and equipment, and shall meet the following minimum requirements:
 - 1. Five years or more experience in manufacture of laboratory casework and equipment of type specified.
 - 2. Ten installations of equal or larger size and requirements.
- C. Installer's Qualifications: Factory trained and certified by the manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Schedule delivery of fume hoods and equipment so that spaces are sufficiently complete that material can be installed immediately following delivery.
- B. Handling: Protect finished surfaces from soiling or damage during handling and installation. Keep

covered with polyethylene film or other protective coating. Protect all work surfaces throughout construction period with 1/4 inch corrugated cardboard completely covering the top and securely taped to edges.

1.06PROJECT CONDITIONS

- A. Do not deliver or install equipment until the following conditions have been met:
 - 1. Building areas requiring the installation of laboratory casework shall be dry and unexposed to adverse weather conditions, which may damage finished materials.
 - 2. Interior building temperatures shall not register below 65 degrees Fahrenheit in areas of casework installation to permit the proper curing of epoxy sealants and adhesives.

1.07SEQUENCING AND SCHEDULING

- A. All overhead mechanical, electrical and plumbing rough-in work shall be complete prior to laboratory casework deliveries.
- B. All mechanical, electrical and plumbing rough-in work required along walls and service islands, where lab furnishings are to be installed, is to be complete prior to delivery of materials.
- C. Walls and partitions must be in place and finished with at least the primer coat of paint. If finish painting is to take place after lab furnishings, installation, protect the casework and furnishings by covering and masking prior to commencement.
- D. All necessary wood or metal blocking must be installed within partitions prior to delivery of casework and furnishings.
- E. Overhead soffits and ceiling grid must be in place prior to casework installation.
- F. Overhead lighting must be installed and connected prior to casework installation. All flooring required to be placed under lab casework and furnishings must be installed prior to material delivery.
- G. Concrete floors must be level within 1/8 inch of level per 10 foot run, non-accumulative, when tested with a straight edge in any one direction.
- H. Wet operations to be performed must be complete prior to material deliveries.

1.08WARRANTY

- A. Provide a 1-year warranty against defects in materials and workmanship.

PART 2PRODUCTS

2.01MANUFACTURER

- A. Casework, fume hood and equipment manufacturer: ALC-Collegedale 116 E. Old Settler's Blvd.,

Round Rock, Texas 78664 1-800-711-5227 or 512-246-8800.

2.02 FUME HOOD MATERIALS

- A. Steel: High quality, cold rolled, mild steel meeting requirements of ASTM A366; gauges U.S. Standard and galvanized.
- B. Stainless steel: Type 304; gauges U.S. Standard.
- C. Ceiling closure panels: Minimum 18 gauge; finish to match hood exterior.
- D. Downdraft bypass: Low resistant type, 18 gauge steel chamber, directional louvers – not acceptable. All bypass air shall enter top of bypass chamber and enter hood in a down flow direction. Chamber shall protect user from expelled particulate in the event of an adverse internal reaction.
- E. Safety glass: 7/32" thick laminated safety glass
- F. Sash chain: ANSI #35 steel, single strand. Average tensile strength of 2,400 pounds, maximum working load of 480 pounds.
- G. Sash guides: Extruded PVC.

2.03 FUME HOOD CONSTRUCTION

- A. Fume hood superstructures shall have a full frame construction with a double wall design consisting of an outer shell of wood or metal as specified and an inner liner of corrosion resistant material as specified. Attachment of the interior lining material to the steel framing members shall be made with non-metallic fasteners. The double wall shall house and conceal steel framing members, attaching brackets and remote service fixture valves.
- B. The exterior side panels of the superstructure shall be constructed of painted metal or other suitable material as specified. Panels shall be removable for access into the interior housing. Access shall also be gained through removable panels in the interior liner. These interior removable panels of the same material as the liner and shall be gasketed and held in place by non-metallic access clips.
- C. Each superstructure shall have an internal baffle system of the same material as the interior liner. This baffle system shall provide for safe efficient removal of fumes when the superstructure is connected to a properly installed exhaust system. All baffles shall be removable for cleaning.
- D. Unless specified for use in a variable air volume (VAV) system, the superstructures shall be provided with an air by pass feature. The bypass, located at the upper front interior of the hood, shall open as the sash is lowered, providing for a relatively constant exhaust volume of the fume hood superstructure.
- E. A two tube, rapid start, vapor sealed fluorescent light fixture of maximum length shall be provided

on each superstructure. Each fixture shall include two soft white tubes providing 100 candle powers at the work surface. Light fixtures shall be re-lamped from the top front of the superstructure.

- F. Exhaust outlets shall be rectangular, 18 gauge type 304 stainless steel. Galvanized or painted outlets are not acceptable.
- G. Fume hoods shall have a full view, vertical rising, laminated safety glass sash framed with a solid black, PVC extrusion. The sash shall have a full width extruded PVC finger lift. The finger lift shall have a 16 gauge steel tube inserted the full width of the finger lift and shall be fully enclosed by PVC. Sashes with stainless steel or coated steel finger lifts are not acceptable. The sash shall not require the use of a center mullion. Sash guides shall be extruded, black PVC.
- H. Counter balance system: Single weight, sprocket and chain, counter balance system which prevents sash tilting and permits ease of operation at any point along full width pull. Maximum 7 pounds pull required to raise or lower sash throughout its full length of operating sash opening. Design system to hold sash at any position without creep and to prevent sash drop in the event of cable failure. Life cycle test sash and weight. Provide independent test data showing 500,000 cycles of operation. Open and close sash against rubber bumper stops. The sash shall have a counter balance system that uses a chain drive system of chain, sprockets, and axle to provide positive control of sash movement and be designed to permit one finger operation at any point along full width.
- I. A lower airfoil of 14 gauge stainless steel, shall provide flush entry to the hood (flush with the work surface) In addition, the airfoil shall have a containment trough to catch minor spills along the rim and not in the dish area. The other function to be provided by the airfoil is to provide a continuous sweep of air across the work surface to remove fumes and sweep them into the baffles.
- J. Service fixtures and fittings: Color coded washers at hose nozzle outlets and valves mounted inside the fume hood and controlled from the exterior with color coded index handles.
 - 1. Valves: Needle point type with self-centering cone tip and seat of hardened stainless steel. Tip and seat shall be removable and replaceable.
 - 2. Provide piping for all service fixtures from valve to outlet: Galvanized iron or copper for water, air and vacuum and black iron for gas services.
 - 3. Fixtures exposed to hood interior: Brass with chemically resistant color coded powder coating.
 - 4. Remote control handles: Black nylon four-arm handle with nylon color-coded index buttons.
 - 5. Services: As shown
 - 6. Fittings are to be constructed to operate with the following maximum working pressure without leak or failure:
 - i. Water Fittings: 145 PSI
 - ii. Non-Burning Gas: 145 PSI
 - iii. Burning Gases: 100 PSI
 - iv. Special Water Fittings: 145 PSI
 - v. Oxygen Fittings: 145 PSI
- K. Electrical services: Three wire grounding type receptacles rated at 120V.A.C. at 20 amperes. Provide 250 V.A.C. receptacles where specified. Flush plates: Black acid resistant thermoplastic.

- L. Work surfaces: 1-1/4" thick surface, dished a nominal 3/8" to contain spills.
 - 1. Molded resin work surfaces for hoods with Poly-resin liners.
- M. Safety Monitor/Alarm System: Where shown or specified provide Safety Monitor/Alarm System which monitors face velocity and provide audible and visual alarm if face velocity drops below safe levels.
 - 1. Calibration is the responsibility of the owner and is required once the hood is stationed and the hood exhaust and room supply systems are balanced. A secondary calibration has been factory set into the alarm's memory only to determine that the alarm is functional and ready for shipment. The primary calibration must be completed in the field.
 - 2. Alarm Signal: Audible signal and a visual, red large light emitting diode:
 - i. Silence pushbutton, which disables the audible alarm, shall be accessible on the front of the safety monitor.
 - ii. Provide alternate mode in which audible alarm is silenced indefinitely but visual alarm remains activated until the alarm condition is corrected.
 - iii. When alarm condition is corrected and faces velocity and volume return to specified levels, the Safety Monitor will automatically reset and begin routine monitoring.

2.04 RESTRICTED BYPASS FUME HOODS

- A. Bypass shall be sufficient in size to allow 25% flow with sash closed. Bypass must be achieved through low resistance opening at top of front lintel panel. Bypass shall be designed to provide a smooth down flow effect.
- B. Sash: Standard vertical-rising.
- C. Width: 48".

2.05 SOURCE QUALITY CONTROL TESTING OF FUME HOODS

- A. Evaluation of manufacturer's standard product shall take place in manufacturer's own test facility, with testing personnel, samples, apparatus, instruments, and test materials supplied by the manufacturer at no cost to the Owner.
- B. Submit test report consisting of the following test parameters and equipment for each hood width and configuration specified.
- C. Hood shall achieve a rating of 4.0 AM 0.05 PPM or better. Tested to ASHRAE-110-1995.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Installation:
 - 1. Install fume hoods and equipment in accordance with manufacturer's instructions.
 - 2. Install equipment plumb, square, and straight with no distortion and securely anchored as required.

3. Secure work surfaces to casework and equipment components with material and procedures recommended by the manufacturer.
- B. Accessory installation: Install accessories and fittings in accordance with manufacturer's recommendations.

3.02 FIELD QUALITY CONTROL TESTING OF FUME HOODS

- A. Field testing requirements:
1. Perform tests in field to verify proper operation of the fume hoods before they are put in use, using only qualified personnel.
 2. Perform tests after installation is complete, the building ventilation system has been balanced, all connections have been made, and written verification has been submitted that the above conditions have been met.
 3. Verify that the building make-up air system is in operation, the doors and windows are in normal operating position, and that all other hoods and exhaust devices are operating at designed conditions.
 4. Correct any unsafe conditions disclosed by these tests before request of test procedures.

3.03 ADJUSTING

- A. Repair or remove and replace defective work, as directed by Architect or Owner upon completion of installation.
- B. Adjust sash, fixtures, accessories and other moving or operating parts to function smoothly.

3.04 CLEANING

- A. Clean equipment, touch up as required.

3.05 PROTECTION OF FINISHED WORK

- A. Provide all necessary protective measures to prevent exposure of equipment from exposure to other construction activity.
- B. Advise contractor of procedures and precautions for protection of material and installed fume hoods from damage by work of other trades.

END OF SECTION 11610

