SECTION 14590 – HEADWORKS SCREENING & GRIT DUMPSTERS

PART 1 – GENERAL

1.1 SUMMARY

This section specifies the requirements for providing a self-contained, integral, totally enclosed load-out bin equipped with an internal shaftless screw conveyor with intermediate loading points, TEFC motor, and AGMA II drive for receiving, conveying, and distributing municipal wastewater screenings and grit. The bin shall be compatible with the OWNER's existing electrical connections, local hauler equipment and fully road-worthy and water tight.

1.2 REFERENCES

A. Manufacturer: American Bulk Conveying, Inc. (or approved equal)

Model: Model 20 Auger-Dumpster (or approved equal)

1.3 SUBMITTALS

A. The SUPPLIER shall furnish submittals in accordance with Section 01300 – SUPPLIER Submittals. Submittal shall include: Shop drawings, Control panel layout, Wiring diagrams Bill of materials, Manufacturer catalog data, Recommended spare parts, Motor data sheets, Gearbox data sheets, product data sheets, warranty information.

B. Product data sheets shall be provided for: Motors, Gearboxes, Liners, and electrical components.

1.4 QUALITY ASSURANCE

A. Equipment shall comply with:

Class I, Division 1, Group D hazardous location requirements

Ontario Electrical Safety Code (OESC) Section 18-100, 22nd Edition (1998)

CSA certification

1.5 SPARE PARTS

A. Provide the following with each bin:

Replacement liner for one complete container

One complete replacement screw

One motor

1.6 WARRANTY REQUIREMENTS

A. The SUPPLIER shall warranty equipment supplied under this specification for one year from the date of startup acceptance by the OWNER, or from 18 months following acceptable delivery to the OWNER.

PART 2 – PRODUCTS

2.1 GENERAL

All material used must be new and of the best commercial grade. Where materials are not specificed, the SUPPLIER shall use the most suitable selection for the given application and environment. Factory trained specialists and certified welders shall be used to carry out all fabrication, assembly, and welding.

2.2 CORROSION PROTECTION

A. Exterior ferrous metal surfaces: Ferrous metal surfaces, not including bearings, gear contact surfaces, parts protected by lubrication, or other surfaces not usually painted or coated, shall be blast cleaned (SSPC-SP5), and coated with a high build, amine cured, epoxy resin coating system (Sherwin Williams 646, Tnemec 135, or equal) that has a solids content of at least 80 percent by weight. Coating shall be applied in a minimum of 3 coats with a total dry film thickness not less than 16 mils. Coatings shall be allowed to dry hard before shipment. Color of finish coats shall be medium gray or manufacturer's standard. See Section 09800, System 100.

B. Interior Ferrous Metal Surfaces: Ferrous metal surfaces, not including bearings, gear contact surfaces, parts protected by lubrication, or other surfaces not usually painted or coated, shall be blast cleaned (SSPC-SP5), and coated with a highly cross linked phenolic epoxy coating system (Sherwin Williams Phenicon HS, Tnemec 446, or equal) that has a solids content of at least 63 percent by volume. Coating shall be applied in a minimum of 3 coats with a total dry film thickness not less than 16 mils. Coatings shall be allowed to dry hard before shipment. Color of finish coats shall be medium gray or manufacturer's standard. See Section 09800, System 101.

Nonferrous Parts: Nonferrous parts shall be protected against corrosion as necessary.
Dissimilar Metals: Dissimilar metals which may be subject to electrolysis upon contact shall be separated by electrolytically inactive material.

2.3 OPERATION

A. Screenings shall be loaded through a designated opening using a flexible chute directing material into the distribution screw.

B. The receiving screw shall discharge sequentially through four internal openings, then through an open-end fifth discharge point.

C. Receiving screw motor shall operate intermittently when called to run from the OWNER’s control system. Manufacturer shall integrate with existing controls and wiring.

D. Container will be loaded onto haul trucks currently operated by Republic Services.

2.4 DESIGN REQUIREMENTS

A. Container capacity: 20 cubic yards (15 m^3), road-worthy, leak-proof, with side-hinged lockable end door and capped drain.

B. Roof: 3/16" carbon steel, fully welded, with integral stainless steel trough lined with Ceram-P abrasion-resistant liners and a high-strength cold-formed shaftless screw.

C. Screw conveyor: American Bulk Conveying Model 320, with four intermediate discharge points and open-end discharge. Each opening shall be 1.5 pitch lengths.

D. The container components shall be manufactured from carbon steel from specifications listed in 2.2.F.1, sandblasted and coated after all welding and assembly is completed unless noted otherwise. All fasteners, bolts, nuts and washers shall be type 304 stainless steel coated with an approved anti-seize compound.

E. The flight, shaft and all drive components of the screw conveyors shall be designed for a conveyor capacity of 100 percent trough loading at maximum motor horsepower and screenings density of 70 lbs/cubic foot. The torque capacity of the drive unit shall be sufficient to start the conveyor with the trough 100 percent loaded.

F. The highest point of the container assembly including top cover shall be no more than 6.17-feet above ground level. The containers shall not exceed 8-feet in width. The container capacity shall be 20 cubic yards. The container end-door shall be full width and height and shall be side hinged. The door seal shall have wedge-latching devices and shall not leak or drip water when lifted and transported by the Hauler.

G. Containers shall have completely enclosed tops (roof) constructed of minimum 3/16-inch carbon steel plate and shapes continuously welded to the container to form a sturdy, road-worthy container. The roof structure shall contain an integral stainless steel trough (for the shaftless screw conveyor), with a minimum thickness ¼-inch. Liners for the screw conveyor trough shall be composed of an ultra high molecular weight polyethylene sintered with an anti-wear filler. The liner thickness shall be a minimum of 5/8-inch. The roof structure and trough shall be designed to allow removal of the screw conveyor and liners for maintenance and replacement. The trough shall have five discharge points, one at each end of the conveyor and three equally spaced between the end discharge points. Covers shall have two hinged inspection ports, one at the drive end of the conveyor to view conveyor operation and another port in the cover to view the inside of the container. The cover shall also have a 6-inch diameter by 6-inch long Sch. 40 steel pipe stub for connection to an odorous air collection system.

H. The integral shaftless screw shall be a cold-formed high strength alloy steel spiral. The spiral flighting shall be designed to convey material without a center shaft and designed with the stability to prevent distortion and jumping in the trough. SUPPLIER shall demonstrate by submission of calculations that, at its torsional rating, the stress in the spiral flighting does not exceed 30 percent of the Fy value in the extreme fiber of the flight material. The torque rating of the spiral flighting shall exceed the maximum torque output of the drive motor. SUPPLIER shall further demonstrate that at 250 percent of the motor nameplate horsepower rating the drive train cannot produce more torque than 250 percent of the spiral flighting's torsional rating, and that the "spring effect" of the spiral shall not exceed +0.1 inches per 1-foot of length at maximum load conditions. The spiral flighting shall consist of a dual spiral, cold formed in sections from continuous flat hot-rolled bars

of 2.5” x ¾” and 1.5” x 5/8” min cross section, 80,000 psi min yield strength, and 220 min Brinell hardness. Spirals shall be concentric to within 1/16 inch. Spirals from cut plate are not acceptable.

I. The spiral shall be rolled in such a way as to limit "neckdown" of the outside edge (thickness) of the cold rolled spiral to 10% of the thickness of the inside edge of the spiral. The spiral edges shall be smooth in the as-rolled condition and not show grinding marks.

J. The spiral flighting shall be connected to the drive shaft by welding the spirals to a 3/4" min. circular torque plate properly reinforced with a curved gusset plate for 180°. A separate connection plate shall be bored with a hole equal to the shaft and the drive shaft shall be concentrically welded to the plate to effectively transmit torque and bolted to the torque plate.

K. Container Materials:

1. Carbon steel plate, angles, and channels shall be ASTM A36. Structural tubing shall be A500 or approved equal. Wide flange shapes shall be A572-50, A992, or approved equal. Carbon steel sheet shall be A570 or approved equal.

2. Floor shall be one piece 3/16" steel minimum.

3. Sides, door and front shall be 10 gauge steel minimum.

4. Container shall be "tub" style with chamfered bottom and front edges. The walls shall taper to a 60-inch wide flat floor. There shall be a sump bottom with an upward slope towards the door. The floor shall be 6-inches higher at the door and the slope up shall start 2-feet before the door.

5. Top cap shall be 3.5 x 3.5 x 3/16 tube minimum.

6. Longitudinal undercarriage shall be 6 x 2 x 3/16 tube minimum. Rail span shall be
7. 36.5 inches or as required by local waste haulers.

8. Undercarriage cross members shall be 3 x 1.5 x 11ga tube minimum on 18-inch maximum centers.

9. Rear corner posts shall be 10.5 x 3 x 7ga minimum.

10. Uprights shall be 5 x 3 x 12ga minimum formed channels on 30-inch maximum spacing.

11. Containers shall have dual lift connections installed so container can be lifted by either universal cable or hook method.

12. The SUPPLIER shall coordinate undercarriage rail span with the standard used by the local hauling companies.

13. Door shall have a replaceable seal. Door when closed shall be water-tight.

14. Drainage: There shall be two 2 ½-inch half couplings welded to the floor of the container outside of the longitudinal rails. The floor shall be reinforced at the half couplings with an additional 1/4-inch plate ring, which will result in a floor thickness at the half couplings of 7/16-inches.

15. There shall be three heavy duty hinges with grease fittings.

16. The container shall have 8-inch diameter by 10-inch long heavy duty steel ground rollers with 2-inch shafts located on all four corners inset to the local waste hauler required location. Rollers shall have greasable four bolt flange bearings with KCB UCF 210 32 or equal bearings.

17. A latchable steel mechanism shall be provided on the forward portion of the container to firmly secure to the truck bed.

18. All joints shall be seal-welded between structural welds.

19. Manufacturer shall design the dumpster to the requirements of the AISC Manual of Steel Construction (ASD or LRFD). Stiffeners shall not deflect more than 1/240 of the length of the member. If a bending stress analysis is used for laterally load plates, deflections shall be less than ½" the plate thickness, otherwise the diaphragm action of the plate shall be considered. If diaphragm action of the plate is considered, the maximum deflection shall be 1/240 of the least span of the laterally loaded plate and the perimeter members of the stiffened plate section shall be designed to resist the diaphragm forces.

20. Supplier shall coordinate dimensions of container with dimensions of cover.

21. Acceptable Container Manufacturer: Rocky Mountain Welding (or approved equal)

L. Control:

The container/conveyor system shall be equipped with a control enclosure.

The power for the auger motor shall be routed in galvanized rigid conduit to a dumpster mounted junction box with modular plug type connector.

A 6-foot umbilical cable shall be provided with compatible modular connector suitable for exposed use to an explosion proof plug/receptacle. The receptacle shall contain an integral microswitch which shall advise the PLC when the plug has been inserted in the receptacle. A dummy receptacle shall be mounted at the control such that the cord and

plug, after being removed from the power receptacle, may be secured for temporary storage. Plugs and receptacles shall be 316SS and shall be rated for a C1D2 environment.

A signal received from the main control panel (elsewhere) will activate the distribution screw.

All wiring shall be enclosed in galvanized rigid conduit.

M. Power:
1. 600 VAC, NEMA 7 male receptacle with:
2. Three 20A pins (motor power)
3. Six 15A pins (120 VAC controls)
4. One 15A ground pin
5. 600 VAC NEMA 7 female plug, 5 m cable, 3#12 + 6#14 + ground
6. 3.4 HAZARDOUS LOCATION REQUIREMENTS
7. All equipment and wiring shall comply with:
8. Class I, Division 1, Group D requirements
9. OESC Section 18-100 (1998)
10. CSA certification

PART 3 – EXECUTION

3.1 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Containers shall be shipped and stored with temporary stiffeners and spacers in place to prevent distortion.

B. Containers shall be carefully stored in an area that is protected from the deleterious elements. Equipment in storage and during shipping shall be protected from the weather, humidity, and temperature variation, dirt and dust, or other contaminants. Storage and shipping shall be in a manner that will prevent damage or marring of finish so that when received at the site the container will be in new condition.

3.2 SERVICES OF MANUFACTURER

A. The manufacturer shall assemble and operate the dumpster, cover and shaftless screw conveyor assembly at the fabrication location and shall provide written certification addressed to the OWNER that the conveyor is fully functional prior to shipment to the job site. The certification shall state that the equipment has been properly assembled, lubricated, and adjusted.

B. An authorized representative of the Manufacturer shall visit the Site as needed to attend the unloading of, and to verify receipt of the equipment.

C. Inspection and Field Adjustment: An authorized factory representative of the manufacturer shall inspect the containers and integral conveyor system at the job site and certify in writing that the equipment is ready for operation.

D. Instruction of the OWNER's Personnel: An authorized training representative of the Manufacturer shall instruct the OWNER's personnel in the operation and maintenance of the containers and integral conveyor system. Training shall be scheduled at least 7 days in advance of the session. Training materials shall remain with the trainees. Training session shall last a minimum of 3-hours and may be video recorded by the OWNER for future reference.

3.3 INSTALLATION

A. Install equipment per manufacturer recommendations.

B. Containers and integral conveyor system and accessories shall operate easily and perform reliably. Unsatisfactory operation shall be corrected or adjusted until satisfactory performance is achieved and the installation is acceptable to the ENGINEER.

C. Ensure all penetrations are sealed and all wiring is in conduit.

D. Verify compatibility with hauler pickup equipment.

E. Verify SCADA signal functionality.

F. Confirm leak-proof performance during lifting and transport.

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