SECTION 14520 - LIVE BOTTOM HOPPERS

City of San Diego, CWP Guidelines

PART 1 - GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing live bottom hoppers, live bottom screw conveyors [and collecting screw conveyors] to handle dewatered sludge containing [12 to 35] percent solids, including electric motors, drives, controls, instrumentation and all other appurtenances as indicated, required for a complete and operable system with no spillage of sludge.

B. The WORK also requires that one manufacturer be made responsible for furnishing the WORK of this Section, but without altering or modifying the CONTRACTOR'S responsibilities under the Contract Documents.

C. The WORK additionally requires that the one responsible manufacturer shall manufacture the shaftless screw conveyors and troughs and shall be responsible for the suitability of the equipment for the intended application.

D. The WORK also includes coordination of design, assembly, testing and installation.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 05521 Aluminum Railings
2. Section 11000 Equipment General Provisions
3. Section 13206 Pressurized Steel Tanks
4. Section 14510 Shaftless Screw Conveyors

1.3 CODES

A. The WORK of this Section shall comply with the current editions of the following codes as adopted by the City of San Diego Municipal Code:

1. Uniform Building Code

1.4 SHOP DRAWINGS AND SAMPLES

A. In addition to the requirements of Section 14510, the following shall be submitted in compliance with Section 01300:

1. Dimensional drawings indicating tank and live bottom hopper configuration, thickness of steel plate, locations and size of openings, detail of all connections, including connection of live bottom screw conveyors, trough and collecting conveyors, and design and location of hopper supports.

2. Welding procedures and location, type and size of all welds.

3. Design loadings to be transmitted to hopper supports.

4. Design calculations showing dead, live and dynamic loadings for normal and seismic conditions certified by a structural engineer registered in the State of California.

1.5 OWNER'S MANUAL

A. Owner's Manual shall include all documents and certifications complying with Sections 13206 and 14510.

1.6 SERVICES OF MANUFACTURER

A. The CONTRACTOR shall furnish the following service and instruction assistance by the manufacturer's engineering service representative, for [each] live bottom hopper, in accordance with Section 11000.

1. [Two] days during installation
2. [One] day during startup
3. [One] day to instruct OWNER'S operating personnel

PART 2 - PRODUCTS

2.1 MATERIALS

A. Unless otherwise indicated, the materials used in the fabrication of the equipment provided under this Section shall conform to Section 14510 and the following:

1.	Steel plate and shapes	ASTM A 36, A 283 Grade D
2.	Bolts, nuts, and washers for supports, and in contact with sludge	Type 304 stainless steel. All threads shall be coated with "Never Seeze," or equal

2.2 DESIGN CRITERIA

A. **Live Bottom Hopper**: Live bottom hopper shall be fabricated of not less than [1/4-inch] thick steel plate and shall be constructed in accordance with the dimensions indicated. The hopper shall be designed to withstand internal vacuum of [2 inches] water and positive pressure of [5] psig according the Section 13206.

The hopper shall be designed for direct attachment of the live bottom conveyors and the [twin] screw collector conveyors. The system shall be fully enclosed to contain sludge odor.

The hopper shall be rectangular with dimensions of [10 feet x 9 feet] and shall have at least [11 feet 0 inches] of vertical height from the live bottom attachment flange to the roof of the hopper. The roof of the hopper shall be fitted with [four] product inlet nozzles [21-inch by 21-inch square] [22-inch dia] with flanges and bolting patterns as indicated. [Two] blind flanges suitable to seal off the [two] unused connections shall be provided. The roof of the hopper shall be capable of acting as a platform for personnel and be provided with a handrail all around.

The hopper shall be self-supporting on a minimum of [four] support brackets as indicated. [Four] load cells shall be attached between the hopper support brackets and the structural steel. The supports and the live bottom attachment flange shall be capable of supporting both the hopper when 100 percent full of sludge, and the combined weight of the live bottom conveyors and the [twin] screw collector conveyors. Structural and support design shall be based on completely filled hopper and seismic forces for Zone 4 as required in the Uniform Building Code.

B. **Live Bottom Conveyor**: The live bottom conveyor shall consist of [seven], [14-inch] diameter shaftless screws of U-trough design. Each trough shall be welded together in the absence of flanges between the troughs. The trough assembly shall be flange connected to the hopper. The live bottom conveyor shall be designed with hopper 100 percent full of sludge. Each screw conveyor shall have individual drive and in group or bank of [3] and [4] screws, each bank shall have a single VFD. Each bank shall have a nominal capacity of [ ] lbs/hr per screw conveyor.

C. **[Twin]** Screw Collector Conveyors: The [twin] screw collector conveyor shall consist of [two, 14-inch] diameter shaftless screw conveyors of U-trough design. Each screw shall have a separate individual AC drive. [Each drive shall be reversible.] The trough shall have discharge spout at each end. The [twin] screw collector conveyors shall be designed with hopper 100 percent full of sludge. Each screw shall have a capacity of [ ] lbs/hr.

D. The design of all screw conveyors shall comply with the requirements of Section 145010.

2.3 FABRICATION

A. **Live Bottom Hopper**: The steel hopper shall be of welded construction. Welding shall comply with AWS D1.1 Structural Welding Code. All shell butt welds and shell to nozzle welds shall be complete penetration and complete fusion. The tank top shall be sloped sufficiently to drain off water without pooling.

B. **Screw Conveyors**: Fabricators of screw conveyors shall comply with Section 14510.

2.4 FACTORY TESTING

A. Factory testing shall be performed in compliance with Sections 13206 (for live bottom hopper) and Section 14510 (for screw conveyors).

PART 3 - EXECUTION

3.1 CONSTRUCTION

A. **Live Bottom Hopper**: The hopper shall be erected and supported as indicated.

B. **Screw Conveyors**: Live bottom screw conveyors' trough shall be attached to the hopper bottom by a flanged connection. [The collecting screw conveyors shall be connected to the live bottom screw conveyors as indicated.]

3.2 TESTING AND INSPECTION

A. All welded joints in the hopper shall be radiographically inspected.

B. The equipment (screw conveyors) shall be field tested in accordance with the provisions of Section 14510.

C. The hopper and the screw conveyors shall be field tested for the indicated design pressure by plugging all the openings, filling the tank with water under pressure and observing for leakage. In case of leakage, the equipment shall be repaired and retested until no leakage is detected.

** END OF SECTION **