SECTION 14500 - BELT CONVEYORS

City of San Diego, CWP Guidelines

PART 1 - GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing belt conveyors including all structural, mechanical, and electrical components.

B. The WORK also requires that one manufacturer accept responsibility for furnishing the WORK as indicated but without altering or modifying the CONTRACTOR'S responsibilities under the Contract Documents.

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 11000 Equipment General Provisions
2. Section 16040 Electric Motors

1.3 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1.	CEMA Standards	Conveyor Equipment Manufacturers Association Publication "Belt Conveyors for Bulk Materials"
2.	AGMA 6019-E	Standard for Gearmotors Using Spur, Helical, Herringbone, Straight Bevel, or Spiral Bevel Gears
3.	ASTM A36	Specification for Structural Steel
4.	ASTM B221	Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

1.4 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Shop drawings of all fabricated items, structural supports, and associated items.

2. Design calculations (structural and seismic) indicating design stresses in all structural members and connections. Calculations shall be signed by a registered structural engineer in California. These calculations will be checked by the CONSTRUCTION MANAGER for completeness only.

3. Design loadings to be transmitted to foundation or supports.

4. Size, length, and spacing of all anchor bolts or attachments to the foundation.

5. Detail drawings and specifications of all items and components of the conveyor system showing all dimensions, parts, construction details, and materials.

6. Information on at least one successfully performing installation of comparable size and complexity designed and fabricated in the recent past by the manufacturer responsible for this WORK, along with contact individuals, their addresses, and telephone numbers.

1.5 FACTORY TESTING

A. **Drive System**: The conveyor drive system shall be assembled and given no-load running tests at the manufacturer's plant before shipment. The CONSTRUCTION MANAGER shall be notified of the test date and location at least two weeks prior to the test date.

1.6 PRODUCT DELIVERY

A. All sections and loose items shall be match marked at the fabricator prior to shipping.

1.7 QUALIFICATIONS

A. **Manufacturer**: The manufacturer shall have experience in design and fabrication of belt conveyor systems and a minimum of one successfully performing installation of comparable size and complexity produced by the manufacturer and constructed in the recent past.

PART 2 - PRODUCTS

2.1 GENERAL

A. The belt conveyor system shall include all components listed herein, and any other components necessary for a complete and operable system suitable for transporting [dewatered sludge] [screenings] in a corrosive environment.

2.2 DESIGN CRITERIA

A. The belt conveyor shall be designed for the following conditions:

Equipment number	-	[ ]	[ ]
Material conveyed	-	[Dewatered municipal sludge]	[Screenings]
Bulk density of material, lb/cf	-	[65 to 70]	[50 to 60]
Solids density of material, % solids by weight	-	[16 to 35]	[ ]
Belt capacity, cy/hr	-	[125]	[ ]

Belt speed, fpm	- [75]	[75]
Duty -	Continuous	Continuous
Belt width, inches	- [ ]	[ ]
Conveyor length, at shortest adjustment, feet	- [ ]	[ ]
Head pulley diameter, inches	- [ ]	[ ]
Tail pulley diameter, inches	- [ ]	[ ]
Motor horsepower, minimum	- [ ]	[ ]
Carrying and impact roller inclination, degrees	- [35]	[35]
Idler spacing, feet		
Carrying	- [4]	[4]
Impact	- [1]	[1]

B. The arrangement, length, and height of the conveyor systems shall be as indicated on the drawings.

2.3 CONSTRUCTION

A. **Frame**: The conveyor framework shall be fabricated from [aluminum] [steel] plate and structural shapes as indicated. [Steel shall conform to ASTM A36 and shall be hot-dip galvanized after fabrication.] [Aluminum shall conform to ASTM B221, alloy 6061-T6.] The frame shall include supports for head and tail section machinery. Support legs for the frame shall be provided at [8] foot intervals.

B. **Head Section**: The head pulley shall be the welded steel drum type, complete with lagging, at least 2 inches wider than the belt. Lagging shall be 0.5-inch thick vulcanized rubber, 50 to 60 durometer in hardness, with 0.25-inch deep herringbone grooves. Lagging shall be field replaceable. Key-seated compression hubs shall be provided to hold. The pulley shall be keyed to the Type 304 stainless steel shaft with tapered lock-bushings. The shaft shall be supported in pillow block bearings having a minimum L-10 life of 50,000 hours at maximum speed. The bearings shall be sealed to prevent entry of contaminants and moisture, and shall have grease fittings located at the outside face of the bearing housing for easy inspection and maintenance.

[The top portion of the head section shall be covered by an expanded metal safety cage with a minimum [24-inch] square hinged access door. The lower half of each section shall be provided with an access door for maintenance of the belt cleaning system.]

[C. **Belt Cleaning System**: A belt cleaning system for the exterior of the belt shall be provided at the under side of the head pulley to remove adhering material. Two scraper systems shall be provided: a polyurethane doctor blade pre-cleaner and a urethane multi-blade secondary cleaner. The tension

of the scrapers against the belt shall be adjustable. Blades shall be removable from the side without removing their supports.]

D. **Tail Section**: The tail section shall include a welded steel wing-type tail pulley with width to match the head pulley. Shafting, hubs and bearings for the tail pulley shall be as indicated for the head pulley. The take-up shall be a screw-type take-up mounted with the tail pulley. A minimum take-up of 3 percent of the total belt length shall be provided. The tail section shall be covered by an expanded metal safety cage with a minimum 24-inch square hinged access door.

E. **Idlers and Guide Rollers**: Extended grease fittings for all idlers and rollers shall be provided and shall all be located on one side of the belt conveyors. One grease fitting shall be provided for each idler. Each fitting shall be provided with a clear tubing for flow monitoring. Bearings shall have a minimum L-10 life of 50,000 hours.

Idlers shall meet CEMA C standards and shall be the same width as the belt. All idlers shall be provided with greaseable tapered roller bearings. Carrying idlers and carrying training idlers shall be equal length, steel with [5-inch] rolls. Carrying transition idlers shall be [20-degree]. Return idlers shall be flat, with [5-inch] rolls. Impact idlers shall be located at feed points as indicated. Impact idlers shall be equal length, [5-inch] rubber cushion rolls.

Guide rollers on the carrying and return side shall be installed as indicted and shall have greaseable roller bearings.

F. **Conveyor Belt**: The belt shall be multiple ply, with neoprene top and bottom covers. The top cover of the belt shall be 3/16-inches thick and the bottom cover shall be 1/6-inch thick. The carcass shall be two-ply polyester. The belt splice shall be normal vulcanized. Belt tension shall be as determined by the criteria indicated with a minimum of 225 lb per inch of width or 70 percent of CEMA standard, whichever is greater.

G. **Skirtboards**: Continuous skirtboards [and covers] shall be provided as indicated to direct the material onto the belts. The skirtboards [and covers] shall be [aluminum] [316 stainless steel] and shall be mounted to the conveyor frame. [Covers shall be connected to the top of the skirtboards with clips for ease of removal.] Each skirtboard shall have a full length, 0.5-inch thick by 6-inch wide neoprene edging bolted to it, with provisions for vertical adjustment.

[H. **Plow Belt Cleaner**: [V-plow] [Diagonal plow] belt cleaner shall be provided to remove liquid and solids from the inside surface of the belt. The belt cleaner shall be provided with replaceable blade(s) and shall be self-tensioning.]

I. **Gear Reducer**: Gear reducers shall be direct-coupled to the drive shaft and shall have a torque arm. The gear reducer output shaft shall be at a right angle to the drive shaft. Gears shall be manufactured in accordance with AGMA Standards and shall be rated for continuous Class II service per AGMA 460.05. Splash lubrication shall be provided as a minimum, with a capped oil filling inlet. The gear reducer and drive shall be designed to withstand an applied torque ten percent greater than what is required to start a fully loaded belt.

J. **Drive**: The conveyor drive shall be a heavy-duty [1750] rpm, explosion-proof motor suitable for 480 volt service in accordance with Section 16040.

K. **Tag Line**: A tag line shall be located on both sides of the conveyor for the entire length. The tag line switch shall be activated by pulling one of the tag lines, which shall run the full length of the conveyor. The tag line switch shall be housed in an enclosure, NEMA rated in accordance with the area designations of Section 16050, with manual reset flag arms. The tag lines shall be 3/32 7x7 galvanized aircraft cable with orange colored protective vinyl or mylar coating (3/16-inch OD). Tag line support eyebolts shall be provided at a maximum spacing of 10-foot centers.

L. **Drip Pan**: A 316 stainless steel drip pan shall be provided. The pan bottom shall slope to the [3-inch NPT] drain outlets as indicated.

M. **Zero Speed Switch**: A zero speed switch shall be provided on the tail pulley. The switch shall be housed in an enclosure, NEMA rated in accordance with the area designations of Section 16050, mounted off the side of the conveyor frame with a bolted bracket of the same material as the frame. The switch shall have [normally closed] contacts.

N. **Fasteners**: All fasteners, nuts, bolts, and miscellaneous hardware shall be Type 304 stainless steel.

2.4 SPARE PARTS

A. The WORK includes the following spare parts for each conveyor:

1. Two carrying idlers
2. Two return idlers
3. Two impact idlers
[4. One set scraper blades]

2.5 MANUFACTURERS

A. Products and equipment shall be manufactured by one of the following (or equal):

1. Idlers and guide rollers:

FMC Link-Belt, 3000 Series
Stephens-Adamson, 4200 Series

2. Belt cleaning system

Martin Engineering Co., Neoponset, Illinois
Munn-E-Wise, Inc., Rock Hill, South Carolina

3. Tag line switch

Crouse-Hinds, AFU Series
Material Control,Model PL

4. Zero Speed Switch

Conveyor Components Co.,Model MS
Material Control, Inc.,Model SRS-1

PART 3 - EXECUTION

3.1 INSTALLATION

A. **General**: The conveyor system shall be installed in accordance with the manufacturer's recommendations. No field notching or cutting shall be allowed without approval by the CONSTRUCTION MANAGER.

** END OF SECTION **