

SECTION 05601

CIRCULAR FLAT ALUMINUM COVERS

PART 1--GENERAL

1.01 DESCRIPTION

A. SCOPE:

This section specifies design, fabrication, and construction of aluminum covers for two of the four existing wastewater primary clarifiers. The work includes providing openings in and attachments to covers to accommodate hatches, piping, equipment, and other work as shown or specified.

B. TYPE:

1. The covers shall be all aluminum, comprised of superstructure framing supporting non-corrugated closure panels. Superstructure framing shall be matte finished. Closure panels shall be marked and provided with an assembly plan for installation purposes. Access to equipment and areas under the cover shall be accomplished by a combination of hatches and/or removal of one or more panels. Structural framing shall be supported from the perimeter of the reinforced concrete tanks. Framing members must clear-span over the full tank in the orientation shown on the drawings.
2. The aluminum closure panels shall be sealed continuously along their edges to the structural members and adjacent panel sections forming a system of interlocking joints with a substantially water-tight surface over the entire cover. The cover system shall be sealed to the existing center equipment, without applying any vertical load to the existing center equipment.
3. Each cover shall have inspection hatches as shown on the contract drawings. Each inspection hatch shall have provisions for supporting a fall protection grate below the inspection hatch cover plate as described on the contract drawings. Each inspection hatch cover plate shall be connected to the panel by 180-degree gear hinges on one side. Gear hinges shall be aluminum and shall have Type 316 stainless steel hardware. The inspection hatch cover plate shall be substantially watertight all around through the use of a continuous neoprene gasket. Each cover plate shall have a recessed handle opposite the hinges. Cover plates shall stay in the closed position through their own dead weight only.

Additional weight may be added to each cover plate if necessary to meet design pressures and watertightness criteria.

C. SERVICE CONDITIONS:

The covers specified in this section will enclose primary clarifiers used for processing screened wastewater. Ventilation air circulating through the enclosed tank will maintain conditions of 100 percent humidity with concentrations of 1 to 20 ppm of hydrogen sulfide under the cover. Temperature within the enclosure varies with wastewater temperature and is expected to be between 40 and 100 degrees Fahrenheit.

The contractor shall be responsible to remove/reuse the existing catwalks as shown on the drawings or store as required by the Owner.

D. PERFORMANCE AND DESIGN REQUIREMENTS:

1. DIMENSIONS:

- a. Tank covers shall be provided in accordance with the following dimensions:

Nominal tank inside diameter, feet (Field Verify) 148

Superstructure maximum height above cover, feet 14

- b. The cover shall be nominally flat with a camber/slope from center of tank to perimeter of 1/8 inch per foot. Structural framing members shall be cambered to provide a flat surface under uniform symmetrical design loads (dead + live loads).

2. STRUCTURAL REQUIREMENTS:

- a. Each cover shall be designed for full dead-load (including foul air duct work, equipment and appurtenances) plus the following live-load conditions:

1) Symmetrical loading of 40 pounds per square foot over the total enclosed area (except as noted below), in addition to an internal negative pressure of 0.4 inch water column.

2) 10'-0" long x bay width zone of cover panel shall be designed for 100 psf load (centered about centerwell).

3) Asymmetrical loading of 30 pounds per square foot over the projected area of one-half of the cover.

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- 4) 5000 lb safety retrieval point load (at locations indicated on the drawings).
 - 5) The minimum design wind speed is 110 mph (3-second gust), Exposure C, per OSSC 2007.
 - 6) An isolated load of 400 pounds applied to one square foot at any point on the cover.
 - 7) Seismic design criteria: $S_d = 0.57$ g, $S_{d1} = 0.39$ g, Seismic Use Group II, Seismic Design Category D, and $I_e = 1.25$.
 - 8) The full wind load (item 3) in combination with the asymmetrical load (item 2) and seismic load (item 6) acting on the leeward half of the cover.
- b. The above conditions are not to be considered as acting simultaneously except as noted in item 8.
 - c. Full provisions shall be made to allow for thermal expansion and contraction for a temperature differential of 100 degrees F. Aluminum covers shall be designed in accordance with AA30, ANSI 58.1, and the 2007 OSSC.
3. DESIGN CRITERIA:
- a. Maximum clear span deflection: $L/240$ of the span of one removable panel in both directions.
 - b. Maximum removable panel weight shall not exceed 150 pounds.
 - c. Each removable panel shall be easy to remove and the lifting force shall not exceed the dead weight of the panel. Access to any given covered area shall not require the removal of more than three other removable panels. Two recessed handles shall be provided at each end of each panel.
 - d. Type 316 stainless steel fasteners shall be designed with a 3.0 safety factor on shear stress and bolt tension.
 - e. The design and fabrication of welded aluminum parts shall be in accordance with the Aluminum Association's Specifications for Aluminum Structures, and the American Welding Society D1.2 Structural Welding Code for Aluminum.

- f. All structural welds and weld-affected structural components shall be inspected by the Dye Penetrant method of examination in accordance with AWS D1.2, Section 6, Part D. The inspector shall be an AWS Certified Welding Inspector (CWI) in accordance with AWS D1.2 Section 6.1.3.1. Personnel performing non-destructive testing shall be qualified as required by AWS D1.2 Section 6.7.6.
4. SEALING:
- a. Each entire removable panel covered surface shall be watertight under the specified loading conditions. Watertightness shall be as defined by paragraph 05601-3.02.
 - b. The entire covered surface shall be designed as an air-tight system defined as capable of retaining 0.4-inch W.C. negative pressure under the specified design loading conditions. Adjacent panels shall be interlocked continuously to prevent leakage of odor from the covered spaces. Panel bearing support edges shall be provided with continuous gaskets or soft bearing material to prevent leakage from the covered spaces. The odor control system is designed to maintain a continuous 0.2-inch W.C. minimum negative pressure beneath the covers at design air flow rates of 0.5 cfm/sq ft of cover.

1.02 QUALITY ASSURANCE

A. MANUFACTURER'S QUALIFICATIONS:

Manufacturer and installer shall be experienced in the production of substantially similar work and shall show evidence of satisfactory operation of at least five similar installations.

B. REFERENCES:

This section contains references to the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, reference to

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those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, has been discontinued or has been replaced.

Reference	Title
AA30	Specifications for Aluminum Structures
AISI	Stainless Steel Cold-Formed Structural Design Manual
ANSI A58.1	Minimum Design Loads for Buildings and Other Structures
ASCE 7	Minimum Design Loads for Buildings and Other Structures
ASTM A320/A320M	Alloy Steel Bolting Materials for Low-Temperature Service
ASTM B209	Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B308	Aluminum Alloy 6061-T6 Standard Structural Shapes, Rolled or Extruded
ASTM C509	Cellular Elastomeric Preformed Gasket and Sealing Material
ASTM F468	Nonferrous Bolts, Hex Cap Screws, and Studs for General Use
AWS B3.0	Welding Procedures and Performance Qualifications
AWS D1.2	Structural Welding Code--Aluminum
Fedspec TT-S-00230C	Sealants
OSSC	2007 Oregon Structural Specialty Code (Based on the 2006 International Building Code)
ADM	2005 Aluminum Design Manual

C. WARRANTY:

In addition to the guarantee requirements specified in Article VII of the General Conditions, a manufacturer's warranty shall be provided for each cover system. The aluminum cover manufacturer shall warrant that the work described herein shall be free from defects in workmanship and material. The manufacturer shall replace or repair any faulty workmanship or defective material furnished by it that is reported to it within one year from the date of completion.

D. INSPECTION AND TESTING

1 out of every 10 panels shall have all structural welds and weld-affected structural components inspected by the Dye Penetrant method of examination in accordance with AWS D1.2-83, Section 6, Part D. The inspector shall be an AWS Certified Welding Inspector (CWI) in accordance with AWS D1.2-83 Section 6.1.3.1. Personnel performing non-destructive testing shall be qualified as required by AWS D1.2-83 Section 6.7.6. All welds shall be visually inspected by an AWS Certified Welding Inspector.

1.03 SUBMITTALS

Submittals shall be made in accordance with Section 01300, and shall include the following specific information:

1. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. A check mark (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the CONTRACTOR, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The ENGINEER shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the CONTRACTOR with the specifications. *Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.*
2. A letter of certification signed and sealed by a registered professional engineer licensed by the State of Oregon for the Aluminum Cover System including written certification confirming required coating, film thickness, coating weight, sealing treatment and stain test.
3. Representative samples of covers, appurtenances and other finished products to the ENGINEER. ENGINEER'S review will be for type and finish only. Compliance with all other requirements shall be the exclusive responsibility of the CONTRACTOR.
4. Complete shop drawings for the fabrication and erection of all work. Include plans, elevations, and details of sections and connections. Show anchorage, rainwater drains, penetrations and accessory items.
5. Setting drawings and templates for location and installation of anchorage devices.
6. Manufacturer's warranty per Section 1.02-C and letter from manufacturer approving the subcontractor installing the covers.

7. Complete set of design calculations for the covers. The calculations shall be stamped and signed by a Professional Engineer registered in the State of Oregon. If computerized design is performed, the input and output, including computer structural models, shall be included.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS

The Owner and Engineer believe the following candidate manufacturers are capable of producing equipment and/or products that will satisfy the requirements of this section. This statement, however, shall not be construed as an endorsement of a particular manufacturer's products, nor shall it be construed that named manufacturers' standard equipment or products will comply with the requirements of this section. Candidate manufacturers include Conservatek, Hallsten, or Temcor.

2.02 MATERIAL

- A. Materials for components shall be as follows:

Component	Material
Structural framing	ASTM B308, 6061-T6 aluminum, 24-inch maximum depth
Cover panels	ASTM B289, 0.090-inch minimum thickness, 5052-H36, 5052-H32, or 5086-H34 aluminum sheet
Inspection hatch cover plates	ASTM B209, 6061-T6 aluminum
Fasteners	ASTM A320 series 316 stainless steel
Gaskets	Neoprene, ASTM C509, ozone and ultraviolet light resistant
Sealant	Dow 790 silicone, or equal, ozone and ultraviolet light resistant
Expansion anchor bolts	ASTM A320 Type 316 stainless steel

2.03 COMPONENTS

A. GENERAL:

No galvanized, painted, or zinc-plated steel shall be used anywhere in the cover construction or cover support system.

B. COVER PENETRATIONS:

The manufacturer shall design the cover panel penetrations as shown or as required to maintain watertightness. The manufacturer shall design the layout of removable panels to allow for removal without disturbing items penetrating covers. The manufacturer shall also ensure watertight seals or gaskets will not be damaged when removing covers at these locations. The manufacturer shall provide reinforcing members around openings as shown or required.

C. PANEL SURFACE FINISH:

The entire exposed upper surface of the cover shall be finished with a non-anodized, integral non-skid surface. This surface shall not be achieved by the use of paint.

D. CENTER COLUMN PORT:

A circular port shall be provided in the center of the cover to allow the equipment center column to penetrate through the cover. A circular ring shall be provided around the center port opening to seal the cover framing and closure panels to the center column equipment platform.

E. LIFTING INSERTS:

Contractor shall provide lifting inserts for all closure panels located over mechanical components inside the tanks requiring regular maintenance as shown on the drawings.

F. HOIST FRAMING

The manufacturer shall provide additional framing to support hoist and trolley as shown on the drawings. Design live load shall be per Section 1.01-D-2.4.

2.04 PRODUCT DATA

The following information shall be provided in accordance with Section 01300:

1. Written report of the testing performed under paragraph 05601-3.02.
2. Manufacturer's written recommendations for installation.

3. Installation Certification Form 11000-A as specified in paragraph 05601-3.01.

2.05 FABRICATION OF APPURTENANCES

A. GENERAL:

Rough weld beads and sharp metal edges on plates shall be ground smooth. Welds exposed to view shall be uniform and neat.

Holes shall be punched 1/16 inch larger than the nominal size of the bolts, unless otherwise specified. Whenever needed, because of the thickness of the metal, holes shall be subpunched and reamed or shall be drilled.

B. ACCESS HATCHES

1. Provide 4" tall curbs – top of hatch shall be 4" minimum above top of covers.
2. All hatches shall have aluminum piano hinges and be enclosed.
3. 90° hold open mechanism.
4. Aluminum Hatch Cover: Minimum ¼-inch thick, reinforced mill finish checkered plate aluminum; spring assisted lift; automatic hold-open with grip. Cover shall be designed to support minimum 40 pound per square foot live load and a 400 lb. concentrated load located anywhere on the hatch cover, but not in conjunction with the uniform live load.
5. Maximum opening force 25 pounds.
6. Hardware: Stainless steel.
7. Anchorage Devices: SS Fasteners as recommended by manufacturer.
10. Air tight aluminum handholds.
11. Perimeter sealing gasket between hatch lid and frame.
12. Perimeter sealing gasket between hatch frame and aluminum cover support framing.
13. Provide a latch to secure hatch cover to frame in the closed position. Latch should not require a separate lock.

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14. Fabricate components free of visual distortion, sharp edges or defects. Weld corners and joints.
15. Manufacturers: Babcock-David Hatchways, Inc.; The Bilco Company; or Milcor Limited Partnership; and which meet these specifications.

PART 3 -- EXECUTION

3.01 ERECTION

A. FASTENING TO IN-PLACE CONSTRUCTION:

Contractor shall use anchorage devices and fasteners to secure covers to the concrete tank perimeter, as recommended by the manufacturer and approved by the ENGINEER.

B. CUTTING, FITTING AND PLACEMENT:

1. Contractor shall perform all cutting, drilling and fitting required for installation. Set the work accurately in location, alignment and elevation, plumb, level, true and free of rack. Wedges or skimming devices shall not be used.
2. Wherever covers are pierced by pipes, ducts, and structural members, Contractor shall cut openings neatly and accurately to size and provide structural members and closure panels to maintain support, air and watertightness.
3. Contractor shall divide the panels into sections only to the extent required for installation wherever covers are to be placed around previously installed pipe, ducts, concrete, and structural members.
4. Cover erection shall assure a nominally flat cover.
5. All structural welding of aluminum shall be performed prior to field erection.

C. PROTECTION OF ALUMINUM FROM DISSIMILAR MATERIALS:

Using paint as specified in Section 09900, Contractor shall provide two heavy coats of paint specified in Section 09900 on aluminum surfaces in contact with dissimilar materials such as concrete, carbon steel and other non-compatible metals.

D. DEFECTIVE WORK:

Contractor shall remove discolored or otherwise defective work and replace with material that meets specification requirements.

E. MANUFACTURER'S CERTIFICATION:

Installation shall be performed by craftsmen skilled in work of this kind. The cover shall be checked, aligned, and approved by the manufacturer's factory trained representative after completion. The installation of all components shall be certified on Form 11000-A specified in Section 01999.

3.02 TESTING

- A. Five areas of the cover system shall be tested for watertightness, each area being a minimum 48 square feet, locations to be as selected by the Engineer. Test shall be carried out by building a mud dam around the area to be tested and filling with water to a depth of minimum 3 inches. A simultaneous load of 250 pounds over one square foot shall be placed as directed by the Engineer. All test area rain water drains shall be plugged during this test, if applicable. After stabilization of the water, no measurable leakage shall be allowed over a 4-hour period. The leak test shall take place as soon as possible after the installation of the cover system. Contractor shall provide 24 hours notice of leak test to Engineer, and shall provide a written test procedure.
- B. Contractor shall perform an airtightness test of each tank. The installed odor control fans may be used for the test. Proof of airtightness shall be the ability of the covers after installation to maintain at design air flow rates for a four-hour period a 0.2-inch water column negative pressure. For the duration of the test, the rainwater drains and outside air inlets, as applicable, may be plugged. Contractor shall provide 24 hours' notice of test to Owner's Representative and shall provide a written test procedure.

3.03 CLEANING

- A. Contractor shall clean all surfaces of aluminum cover after installation and testing.

****END OF SECTION****