

**13342 – ALUMINUM CATWALKS****1. GENERAL**

## 1.1. Scope

- A. All engineering design and related detailing of the catwalks shall be provided by the supplier. The design and detailing shall conform to the Applicable Codes and Standards listed in the section 2 of this document and shall comply with structural drawings/plans prepared by Liberty Catwalks and this document.
- B. Catwalks and its attachments shall be fully fabricated by a qualified supplier as outlined in this document.
- C. Catwalk Manufacturer shall be responsible for the delivery of all catwalk materials except for anchor bolts and foundation requirements.
- D. These specifications are for fully engineered clear span catwalks of aluminum construction and shall be regarded as minimum standards for design and construction.
- E. Manufacturers other than Liberty Catwalks may be used provided they are approved by the Project Architect as per specification section 01600 prior to bid and meet or exceed all the following specifications.
- F. The catwalk manufacturer shall have been in the design and fabrications of catwalks for a minimum of five (5) years.
- G. Catwalks, landings and ships ladders are a part of the scope of this section. Landings shall be a minimum of 60 "x 60" and provided at the top and bottom of each ladder section. Ships ladders shall be 24" wide and designed for a 75 degree angle. Provide handrails on both sides. Landings and Ladders shall be of the same materials as catwalks and comply with the load and safety standards included in this section.

## 1.2. Suppliers

- A. All catwalks supplied are to be manufactured by:
  - Liberty Catwalks
  - Aluminum Catwalk Specifications
  - PO Box 316, Section, Alabama 35771
  - Phone: 256-474-4440 or 256-996-2342
  - Fax: 800-869-0617
- B. Documentation to ensure proposed substitution shall be in compliance with these specifications must be provided and shall include the following minimum criteria to be considered:
  - 1. Representative Design Calculations
  - 2. Representative Drawings
  - 3. Splicing and Erection Procedures
  - 4. Warranty Information
  - 5. Inspection and Maintenance Procedures
  - 6. Welder Qualifications

**2. APPLICABLE CODES AND STANDARDS**

## 2.1. Governing Codes and Standards

- A. Catwalks shall be designed in accordance with the Aluminum Design Manual

## 2.2. Reference Codes and Standards

- A. AASHTO, Guide Specification for Design of Pedestrian Bridges, August, latest edition
- B. The Aluminum Association, Specifications and Guidelines for Aluminum Structures, latest edition
- C. Aluminum Structures, A Guide to Their Specification and Design, latest edition
- D. American Welding Society, Structural Welding Code, D1.2, latest edition
- E. National Design Specification for Wood Construction, ANSI NDS, latest edition
- F. American Wood Preservers Association Standards, latest edition.
- G. OSHA Compliance Guidelines and IBC Codes

### 2.3. Truss Design Option: Liberty Series

## 3. GENERAL FEATURES OF DESIGN

### 3.1. Span

Catwalk and landing spans shall be field verified to span the existing roof structure. Exact lengths and locations will need be field verified and installed to accommodate the existing wood truss members.

### 3.2. Width

Inside clear width of the catwalk shall be 36 inches. Inside clear width of ladders shall be 24 inches. Clear inside width of the landing shall be 60 inches.

### 3.3. Deck

Catwalks shall be in accordance with section 5.2 of this document.

### 3.4. Bearing Pads

Catwalk shall include bearing pads, which shall allow the catwalk to expand and contract as needed without binding, in accordance with section 5.3 of this document.

### 3.5. Safety & Hand Rails

- A. Catwalk shall incorporate a Combination Rail system consisting of a toe plate and a Mid Rail to meet OSHA Compliance requirements or rails that are in compliance with AASHTO Guide to Pedestrian Bridges.
- B. Top of top rail shall not be less than 42" above the finished deck.
- C. Ends of handrails shall be returned smoothly to floor or posts.
- D. All geometry is to be smooth with no sharp corners.

## 4. ENGINEERING

### 4.1. Design Loads

#### A. Dead Load

The catwalk shall be designed considering its own dead load including structure and originally designed decking only. No additional loads shall be considered.

#### B. Pedestrian Live Load

1. Main supporting members, including trusses, primary beams, and arches shall be designed for a uniformly distributed load of 85 pounds per square foot.
2. Secondary members, including deck and supporting floor system shall be designed for a live load of 85 pounds per square foot, with no reduction allowed.

#### 4.2. Design Limitations

##### A. Deflection

1. The vertical deflection of the main truss due to any load combination shall not exceed  $L/400$ , where  $L$  is the length of the unsupported span.
2. The horizontal deflection of the structure due to any load combination shall not exceed  $L/500$ , where  $L$  is the length of the unsupported span.

##### B. Allowable Stresses

1. All allowable stresses for aluminum shall be determined in accordance with the Aluminum Association, Specifications and Guidelines for Aluminum Structures, supplemented by Aluminum Structures, A Guide to Their Specification and Design. Allowable stresses are to be reduced to account for effects due to welding and/or fatigue where applicable. Allowable stresses for Load Combinations which include wind loads may be increased by 25%.
2. All allowable stresses for pressure treated pine shall be determined in accordance with NDS, Design values for wood construction.

##### C. Frame Stability

1. The buckling load factor for the bridge structure shall be no less than 4 for any combination of applied loads, to ensure adequate overall stability and stiffness.

#### 4.3. Analysis

- ##### A. Full structural analyses for the primary catwalk structure shall be completed using a 3-D finite element analysis. All member end conditions are to be considered fixed. Other analysis methods may be used for secondary members. All analysis and results necessary to determine the structural adequacy of the catwalk shall be reported. The following analyses are required:

##### B. Stress and Deflection

Analysis shall be completed to determine that all catwalk members, critical connections, and catwalk configurations are sufficient to adequately resist the following load combinations and in accordance with section 4.2 of this specification:

1. Load Combination I – Dead Load + Pedestrian Live Load

##### C. Frame Stability

Buckling analysis shall be completed to determine that the bridge frame is adequately stable and sufficient to resist forces causing it to buckle for the following load combinations and in accordance with section 4.2 of this specification.

1. Load Combination I – Dead Load + Pedestrian Live Load

##### D. Frequency

Frequency analysis shall be completed to determine that the catwalk frame is sufficient to avoid resonance due to frequencies likely encountered under normal use for the following load combinations and in accordance with section 4.2 of this specification.

## 1. Load Combination IV – Dead Load Only

## 5. MATERIALS

## A. Structural Members

1. All primary structural members are to be 6061-T6 or 6063-T6 aluminum for its high strength and corrosion resistance. Secondary members are to be 6000 series aluminum for corrosion resistance.

## B. Deck

1. Decking shall meet the following criteria in accordance with section 3.6 of this specification
  - A. Aluminum decking shall be aluminum alloy 6061-T6 extruded in accordance with the requirements of applicable sections of Federal Specifications QQ-A-200. Extruded aluminum slats shall have a raised ribbed surface integral to the extrusion. Ribs shall be mechanically knurled transversely to the ribbing to provide a non skid surface. The legs of each decking slat shall be welded to the side members and to any longitudinal with a minimum of 1-1/4 inches of weld per leg. The decking slats shall be placed transversely. Decking to be HD 1"x6" Planks.

## C. Bearing Pads

1. All bearing pads shall be 1/8" thick UHMW adequately dimensioned to provide support to the structure over the full travel resulting from expansion and contraction.

## D. Fasteners

1. All fasteners required for assembly shall be stainless steel type 304. Insulating washers shall be provided where stainless steel and aluminum contact is anticipated to minimize the potential for galvanic action.

## E. Fabrication &amp; Quality Assurance

1. Welding: All aluminum members shall be welded using 5356 aluminum filler wire in accordance with AWS D1.2.
2. CWI Welding Inspector Requirements
  - A. Each catwalk shall be inspected by a Certified Welding Inspector that is qualified under the AWS QC-1 program. This inspection shall include as a minimum requirement the following: review of shop drawings, weld procedures, welder qualifications, and weld testing reports, visual inspection of welds and verification of overall dimensions and geometry of the catwalk. A report shall be produced indicating the above items were reviewed and shall be signed and sealed by the CWI signifying compliance with AWS D1.1 codes.
3. Welder Qualifications
  - A. Welding operators shall be properly accredited experienced operators, each of whom shall submit satisfactory evidence of experience and skill in welding structural steel with the kind of welding to be used in the work, and who have demonstrated the ability to make uniform good welds

meeting the size and type of weld required. Each Shift Lead welders will be certified in accordance with AWS D1.5 3G Certification required and other welders will be D1.1 certified per AISC. (Bridge Welding Code)

## 6. Submittals and Warranty Information

### A. Fabrication drawings

1. Fabrication drawings and calculations shall be prepared and submitted for review after receipt of the order. Submittal drawings shall be unique drawings to this project, prepared to illustrate the specific portion of the catwalk(s) being fabricated. All relative design information such as member size, material specification, dimensions, and required critical welds shall be clearly shown on the drawings. Drawings shall have cross referenced details and sheet numbers. All drawings shall be stamped, and signed by a Professional Engineer registered in the state of project. 3 individually stamped sets shall be provided to be reviewed and approved exclusively by the Architect.

2. At minimum the following criteria must be included for approval:

- A. All Relevant Catwalk Dimensions
- B. Catwalk Cross sections
- C. Sufficient Detailing
- D. Member Cross sections
- E. General Notes indicating material specifications and design loads
- F. Weld Details
- G. Detail of Bolted Splices (if applicable)
- H. Signature and Seal of PE licensed in accordance with this specification

### B. Calculations & Results

1. Structural analysis results and calculations shall be prepared and submitted for review after receipt of the order. All analysis and results necessary to determine the structural adequacy of the bridge shall be shown. 3 individually stamped sets shall be provided to be reviewed and approved exclusively by the Architect.

### C. Warranty

1. The catwalk supplier shall warrant their structure(s) to be free of design, material and workmanship defects for a period of 5 years from the date of delivery. This warranty does not include decking, railing attachments on any other items not part of the Aluminum truss structure. This warranty shall not cover defects in the bridge caused by abuse, misuse, overloading, accident, improper maintenance, alteration or any other cause not the result of defective materials or workmanship. This warranty shall be void unless owner's records can be supplied which shall indicate compliance with the minimum guidelines specified in the inspection and maintenance procedures. Repair or replacements shall be the exclusive remedy for defects under this warranty. The catwalk supplier shall not be liable for any consequential or incidental damages for breach of any express or implied warranty on their structure(s).

## 7. Delivery and Erection

### A. Delivery

1. Delivery is made to a location nearest the site, which is easily accessible to normal, over the road tractor/ trailer equipment. All trucks delivering catwalk materials will need to be unloaded at the time of arrival. The manufacturer will provide detailed, written instruction n the proper lifting procedures and splicing procedure (if required). The method and sequence of erection shall be the responsibility of the Contractor.
  
2. Liberty Catwalks will notify the customer in advance of the expected arrival. Information regarding delays after the trucks depart the plant such as weather, delays in permits, re-routing by public agencies or other circumstances will be passed on to the customer or as soon as possible but the expense of such unavoidable delays will not be accepted by the manufacturer.
  
3. Liberty Catwalks will advise the customer of the actual lifting weights, attachment points and all necessary information to install the catwalk. Unloading, splicing, bolting, and proper lifting equipment is the responsibility of the contractors.

END OF SECTION