

## **STANDARD FOR GLUED LAMINATED TIMBER BRIDGES**

### **1. SPECIFICATION SCOPE FOR GLUED LAMINATED TIMBER SUPERSTRUCTURES**

Provide a standard for production of glued laminated wood used in the bridge superstructure installation. This standard is intended to cover several types of glulam bridge structures. This standard is intended to augment, or support, design requirements that may be issued by the owner.

### **2. DEFINITIONS AND ABBREVIATIONS**

**STRUCTURAL GLUED LAMINATED TIMBER (WOOD):** An engineered stress-rated product of a timber laminating plant, comprised of wood laminations bonded together with adhesives. The grains of all laminations are approximately parallel longitudinally. See AITC 117 for a more detailed explanation.

**GLULAM:** Structural glued laminated timber (wood)

**AITC:** American Institute of Timber Construction

**APA/EWS:** Trademark appears on products manufactured by APA - The Engineered Wood Association members

**AWPA:** American Wood Protection Association

**AASHTO:** American Association of State Highway and Transportation Officials

**WWPI:** Western Wood Preservers Institute

### **3. QUALIFICATIONS OF FABRICATOR**

**3.1** The glulam manufacturer shall be a qualified licensee of the AITC or APA/EWS.

**3.2** All Glued laminated timber shall be factory fabricated (as far as practical). This shall include cutting drilling and other fabrication as shown on shop drawings.

### **4. CODES AND STANDARDS**

In addition to complying with all pertinent codes and regulations, material and installation procedures shall comply with the following:

**4.1** AASHTO. 2010. LRFD Standard Specifications for Highway Bridges, 5th edition.

**4.2** American National Standard for Wood Products-Structural Glued Laminated Timber ANSI A190. 1- (Latest edition)

**4.3** AITC 117-2010 Standard Specifications for Structural Glued Laminated Timber of Softwood Species.

**4.4** AWPA Book of Standards (Latest Edition)

**4.5** WWPI Best Management Practice for Treating Wood in Aquatic Environment

## **5. CERTIFICATIONS**

- 5.1** Certifications required by the laminator: The laminator shall provide an AITC or APA/EWS Certificate of Conformance to AITC/ANSI A190.1-2007
- 5.2** Preservative treatment certification required (if applicable). A Certificate of treatment shall be furnished by a certified AWPA treating facility. The treating certification shall list the identification of job, species of materials, type and retention preservative provided, as well as the AWPA standard used as the guide for treating. In the event treated timber originates from more than one treating facility then certification shall be furnished from each facility providing timber for this project.

## **6. STRUCTURAL DESIGN**

The bridge shall be designed in accordance with good engineering practices and in accordance with the standard specifications as adopted by the American Association of State Highway and Transportation Officials (AASHTO). The Bridge design shall be a glulam system comprised of either longitudinal decks, stringer systems or transverse deck systems.

- 6.1** The structure shall be designed for the following loads and dimensions:

- 6.1.1** Dead Load (timber 50 PCF / wearing surface 140 PCF)
- 6.1.2** Live Load HL93
- 6.1.3** Wet-Stress design values shall be used when applicable
- 6.1.4** Live Load deflection (L/425)
- 6.1.5** Overall length of span \_\_\_\_\_(ft)
- 6.1.6** Overall Roadway width \_\_\_\_\_(ft)
- 6.1.7** Skew \_\_\_\_\_(degrees)

## **7. TIMBER MATERIALS**

- 7.1** Lumber-intended for glulam production shall be visually or mechanically graded in conformance with accepted standards for LRFD unit stresses (See AASHTO Section 8) and with the National Design Specifications for Wood Construction.
- 7.2** Glulam members shall be finished to Industrial Appearance Grade as per AITC 110-2001
- 7.3** All lumber utilized in these standards shall be either Coastal Douglas Fir or Southern Pine.

## **8. PRESERVATIVE TREATMENT**

All timber to be treated with the following oil type preservatives in accordance with AASHTO Material Standards, M133 and M168 and shall conform to the AWPA Use Code Standards

- 8.1** Pentachlorophenol or Copper Naphthenate in Type A, heavy oil conforming to AWPA Standard UC4B, P-8 & P9. Retention level shall be 0.6 PCF
- 8.2** Coal Tar Creosote conforming to AWPA Standard UC4B & P-1/P-13. Retention level shall

be 12 PCF.

- 8.3** Incising shall be required for all Douglas Fir materials as per AWPA specifications.
- 8.5** Timber pedestrian deck, curb and railings may be treated with the water borne preservative, CCA, to a net retention of 0.4 PCF conforming to AWPA Standard UC4B & P-5 or Pentachlorophenol in Type C, light oil conforming to AWPA Standard UC4B, P-8 & P9. Retention level shall be 0.3 PCF. Either treatment shall be performed prior to gluing. These treatments are limited to SP only.
- 8.6** All preservative treatments shall be applied in accordance with Best Management Practices for Wood Preservatives in Aquatic Environments.
- 8.7** AWPA Treatment Spec References:
  - AWPA M2** Inspection of Treated Timber Products
  - AWPA M4** Care of Preservative Treated Timber Products
  - AWPA P1/13** Coal Tar Creosote for Land and, Fresh Water and Marine (Coastal Water Use)
  - AWPA P5** Waterborne Preservatives
  - AWPA P8** Oil-borne Preservatives
  - AWPA P9** Standards for Solvents
  - AWPA P5** Standard for Waterborne Preservatives

## **9. HARDWARE**

- 9.1** Fabricator shall provide all connection steel and hardware for joining wood members to each other and to their supports exclusive of anchoring embedded in concrete.
- 9.2** All fasteners, except prestressing bars, shall be galvanized (ASTM A-123) mild steel ASTM A307. Washers to be cast iron or malleable iron, timber type.
- 9.3** All steel plates and shapes to be galvanized (ASTM A-153) mild steel ASTM A-36
- 9.4** Aluminum deck brackets to be cast aluminum alloy 356
- 9.5** "C" Clips shall be galvanized (ASTM A-153) Cast iron Grade 30
- 9.6** Prestressing bars and nuts for stress-laminated decks shall be galvanized (ASTM-123) high strength steel ASTM A-722 Type II with an ultimate yield stress of 150 KSI
- 9.7** Hardware Specification References
  - AASHTO. 2011. Standard Specifications for Transportation Materials and Methods of Sampling and Testing. 31st Edition.
  - M111** Zinc (Hot-Dip Galvanized) Coatings for Iron and Steel Products
  - M232** Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  
  - ASTM. 2011. (American Society of Testing and Materials) Annual Book of Standards
    - ASTM A36** Standard Specification for Structural Steel
    - ASTM A722** Standard Specification for Uncoated, High-Strength Steel Bar for Prestressing Concrete
    - ANSI/ASME. B18.2.1** Square and Hex Bolts and Screws (Inch Series), American Society of Mechanical Engineers

## **10 BEARING PADS**

- 10.1** Fabricator shall provide neoprene or elastomeric bearing pads in areas where glulam

girder or longitudinal decking material rests on steel or concrete abutments. Width shall be sufficient to support bearing.

- 10.2** The durometer hardness shall be between 50 and 70, and shall have a minimum strength of 800 PSI.

## **11 MATERIAL: DELIVERY, STORAGE AND HANDLING**

- 11.1** Special care shall be taken for all materials required for the project. Shipping, storage and erection practices shall be in accordance with industry standards.