University of South Alabama
Department of Civil Engineering

Rules and Regulations

For

The Model Balsa Wood Bridge Competition

Presented by the Student Chapter of the American Society of Civil Engineers at the University of South Alabama

Rules Updated October 2026

Rules revised based on National ASCE Basal Wood Competition Rules
Rules subject to change

Purpose

The primary objective of the Model Balsa Wood Bridge Competition, hosted by the University of South Alabama ASCE Student Chapter, is to provide high school students with practical, hands-on experience in structural design, analysis, and construction. The competition challenges participants to translate theoretical civil engineering concepts, such as member tension and compression, load path optimization, and material efficiency, into a physical balsa wood structure capable of bearing loads under geometric constraints.

Through this competition, student teams will:

- *Apply Structural Engineering Concepts:* Design, fabricate, and evaluate a scale model bridge using standardized balsa wood members and allowable joint connections to safely transfer applied forces.
- *Optimize Strength-to-Weight Performance:* Maximize overall structural efficiency by balancing load capacity while attempting to minimize mass and dimensions.
- *Develop Professional Engineering Documentation:* Prepare formal technical drawings that provide the documentation that articulates the design.

Deliverables for competition:

1. *Model Bridge*
   - To be constructed within the design constraints listed within these rules
2. *Technical Drawings*
   - Technical drawings of the bridge must be provided the day of testing.

Bridge Specifications:

1. Material Specifications:
   - Wood: The bridge members will be composed of balsa wood, with no member having dimensions greater than 3⁄16 inch by 3⁄16 inch, and 12 inches in length.
     - Exceptions are made at the joints (See below for details).
     - Note: A member is a single, individual piece of balsa wood cut to a specific length and shape that connects at joints to form the structural framework (such as a truss or arch) of the bridge.
   - Glue: Wood glue used for carpentry and residential use only.
     - No other material (e.g. varnish, epoxy, hairspray, string, etc.) may be used as a member or applied to the bridge to strengthen a member or the bridge.
   - Bridges may be painted to the students' liking.

2. Bridge Dimensions:
   - The span between the bridge supports will be 18 inches (measured from the center of each support). Therefore, the model bridges will need to be at least 18 inches in length to rest on the supports and can NOT be longer than 20 inches.

- The bridge will be simply supported to rest freely on two end supports without being glued, clamped, or fixed down at the contact points.
- The bridge can be anywhere between 5 inches and 7 inches wide (width is considered to be the length between the outermost edges of the bridge).
- The maximum height of the bridge can range between 5 inches and 7 inches (height is the vertical distance from the lowest point to the highest point on the bridge).
- Layering members on top of one another (laminating) is not allowed.
- The following are acceptable for joints:
  - Overlapping of members, no greater than 1⁄2 inch, will be allowed.
  - Gusset Plates with maximum dimensions of 1⁄2" x 1⁄2" x $^{1}/_{16}$" are allowed.
    - Diagrams of allowable joints can be found in Appendix A.

Testing of Bridge:
Bridges will be tested by applying weights to the bridge until the bridge fails. Loading specifications are outlined below:

- Failure will be defined as the point at which the structure can no longer support a load.
- The load will be applied within the one-third total length of the top span.

Hints:

- Joints are critical parts of any bridge design. Poor joint construction can greatly reduce the load carrying capacity of your bridge.
- For a truss design, some members will be in tension (pulled), and some will be in compression (squeezed). Decide which members are going to be in tension, and which are going to be in compression. Design these members accordingly.
- Reinforce the deck beams at the loading points so as to prevent premature failure of the bridge.
- Ensure that the bridge will rest appropriately on the supports given.

Balsa Wood Bridge Scoring Rubric

School Name: _____ Group Name/Number: _____

1. **Deductions:**
Dimensions (a weight of 20 grams penalty will be added per height, width, and/or length violation)

a. Height (5-7 in) _____ Weight penalty: _____
b. Width (5-7 in)_____ Weight penalty: _____
c. Length(18 - 20 in)_____ Weight penalty: _____
d. Joint/Gusset Plate Size (a weight of 5 grams will be added per joint/gusset plate size violation)

   _____ (# of Violations) x 5 grams = _____

e. Technical Drawings? _____ Weight penalty of 50 grams if not included _____

2. Scale weight of Bridge: _____

3. Total weight of Bridge with penalties: _____

4. Maximum Load Applied: _____

5. Structural Efficiency: (Max. Load Applied / Total Bridge Weight) _____

Appendix A: Diagrams of Acceptable Joints







