



2017 Tri-β 5 Regional Bridge Building Specifications

These rules have been developed by the Chicago Regional Bridge Building Committee for the **2016 Tri-β 5 Regional Bridge Building Contest** to be held on **Friday, March 24, 2017** at Marquette College Preparatory School Michigan City IN 46360, USA.

Questions about these rules should be directed to Mr. Tom Deskovich, by email: tdeskovich@marquette-hs.org.

The object of this contest is to see who can design, construct and test the **most efficient** bridge within the specifications. Model bridges are intended to be simplified versions of real-world bridges, which are designed to permit a load to travel across the entire bridge. In order to simplify the model bridge design process, the number of loading positions is reduced, and to allow the contest to proceed in a reasonable amount of time, only one loading position is actually tested. These simplifications do not negate the requirement that the bridge must be designed to accept a load at any of the positions. Bridges determined by the judges to not meet this requirement will be disqualified and tested as unofficial bridges.

1. Materials

- The bridge must be constructed only from 3/32 inch square cross-section basswood and any commonly available adhesive, except hot melt.
- The basswood may be notched, cut, sanded or laminated in any manner.
- No other materials may be used. The bridge may not be stained, painted or coated in any fashion with any foreign substance.

2. Construction

- The bridge mass shall be no greater than 30.00 grams.
- The bridge (see Figure 1) must span a gap (S) of 300. mm, be no longer (L) than 400. mm, have a maximum width (W) of 80. mm, be no taller (H) than 150. mm above the support surfaces. The bridge must be constructed to permit a clearance (C) of 20. mm above the support surface at the midpoint of the span. No part of the bridge may extend below the support surface.
- The loading plane (P) shall be horizontal and shall lie between 30. mm and 40. mm above the support surfaces.
- The bridge must be constructed to provide for the placement of the loading plate (see section 3, below) at each of the two loading points. Any portion of the structure *above and below* the loading plane must provide clearance for the loading rod at the two loading point locations.

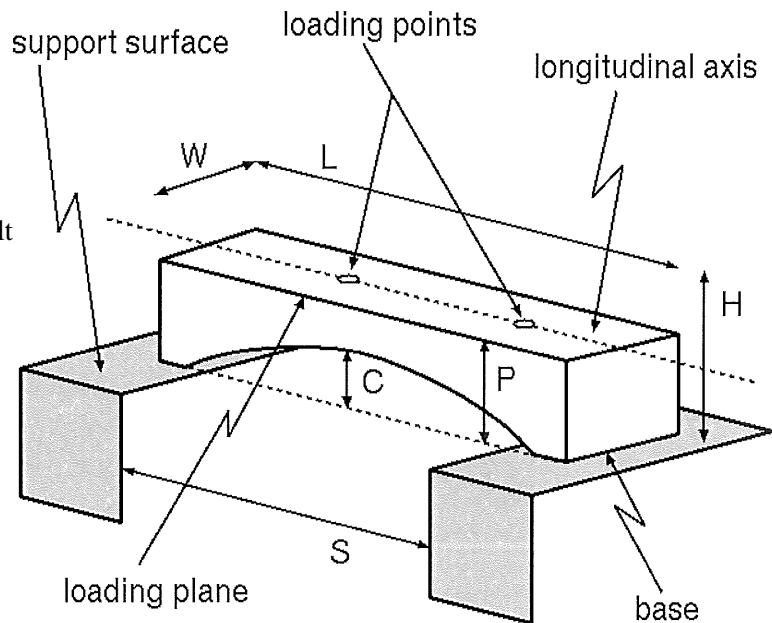


Figure 1. Bridge schematic (not to scale).

3. Loading

- a. The load will be applied downward, from below, by means of a 40.0 mm square plate (see Figure 2) resting on the loading plane of the bridge. The plate will be between 6. mm and 13. mm thick and will have a 9.53 mm (3/8 inch) diameter eyebolt attached from below at its center.
- b. The two edges of the loading plate will be parallel to the longitudinal axis of the bridge at the time of load application.
- c. The load will be applied on the longitudinal axis of the bridge at one of two loading points: 60. mm to one side, and 20. mm to the other side of the center of the 300. mm span.

4. Testing

- a. On the day of the contest, judges will decide the exact loading location to be used. It will be the same for all bridges.
- b. On the day of the contest, participants will center their bridge on the loading surfaces with the loading plate and 3/8 inch eye bolt at the selected loading position.
- c. The load will be applied by the participant until bridge failure. The maximum scoring load supported by any bridge will be 50 kg. Any amount over this quantity will not count in the calculation of the bridge's efficiency.
- d. Bridge failure is defined as the inability of the bridge to carry additional load, or a load deflection of 25. mm under the loading location, whichever occurs first.
- e. The bridge with the highest structural efficiency, E , will be declared the winner.

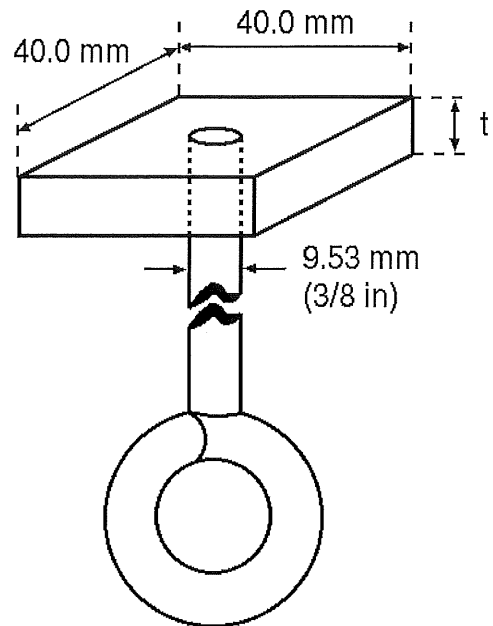


Figure 2. Loading Plate Detail

$$E = \text{Load supported in grams (50,000g maximum)} / \text{Mass of bridge in grams}$$

5. Qualification

- a. All construction and material requirements will be checked prior to testing. Bridges failing to meet these specifications at the conclusion of the allowable time for checking-in will be disqualified. Bridges disqualified prior to the start of the contest may be tested as unofficial bridges at the discretion of the builder and the contest directors.
- b. If, during testing, a condition becomes apparent (i.e., use of ineligible materials, inability to support the loading plate, bridge optimized for a single loading point, etc.) which is a violation of the rules or prevents testing as described above in Section 4, that bridge shall be disqualified. If the disqualified bridge can accommodate loading, it may still be tested as an exhibition bridge as stated above.
- c. Decisions of the judges are final; these rules may be revised as experience shows the need. Please check our web site, <http://bridgecontest.phys.iit.edu> after January 5, 2017, to learn whether any changes have been made.