2019 International Bridge Building Specifications

These rules have been developed by the International Bridge Building Committee for the **Forty-Second International Bridge Building Challenge** to be held on **April 06, 2019** in Baltimore, Maryland, USA. If you have a question about these specifications that is not answered by our FAQ, please direct it to Chief Judge Ruth Akers, at rakers@bcps.org.

The object of this challenge 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 challenge 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.

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1. Materials

   a. The bridge must be constructed only from the **official** 3/32 inch square cross-section basswood **included in the kit** and any commonly available adhesive.
   b. The official basswood may be notched, cut, sanded or laminated in any manner but must still be identifiable as the original official basswood.
   c. No other materials may be used. The bridge may not be stained, painted or coated in any fashion with any foreign substance.

2. Construction

   a. The bridge mass shall be no greater than 25.00 grams.
   b. The bridge shall rest on two support surfaces separated in elevation (**E**) by 10. mm and horizontally by a gap (**S**) of 300. mm (see Figure 1).
   c. The bridge (see Figure 1) must span a gap (**S**) of 300. mm, be no longer (**L**) than 400. mm, be no taller (**H**) than 150. mm above the upper support surface, and no wider (**W**) than 80. mm at the loading surface.
   d. The bridge must be constructed to provide a horizontal support for the load (see **3b**) at each of the three possible loading locations. Any portion of the structure above the loading plane must allow clearance for the plate and the loading rod above as well as for the rod projecting below the loading plate (see Figure 2).
   e. The bridge must be constructed to allow a 48 mm diameter, 300. mm long pipe (1.5 inch schedule 40 PVC pipe) to be passed horizontally across the bridge with the pipe's lower surface on the loading plane (**P**) between 30. and 50. mm above the upper support surface. This pipe must touch all three loading locations simultaneously.

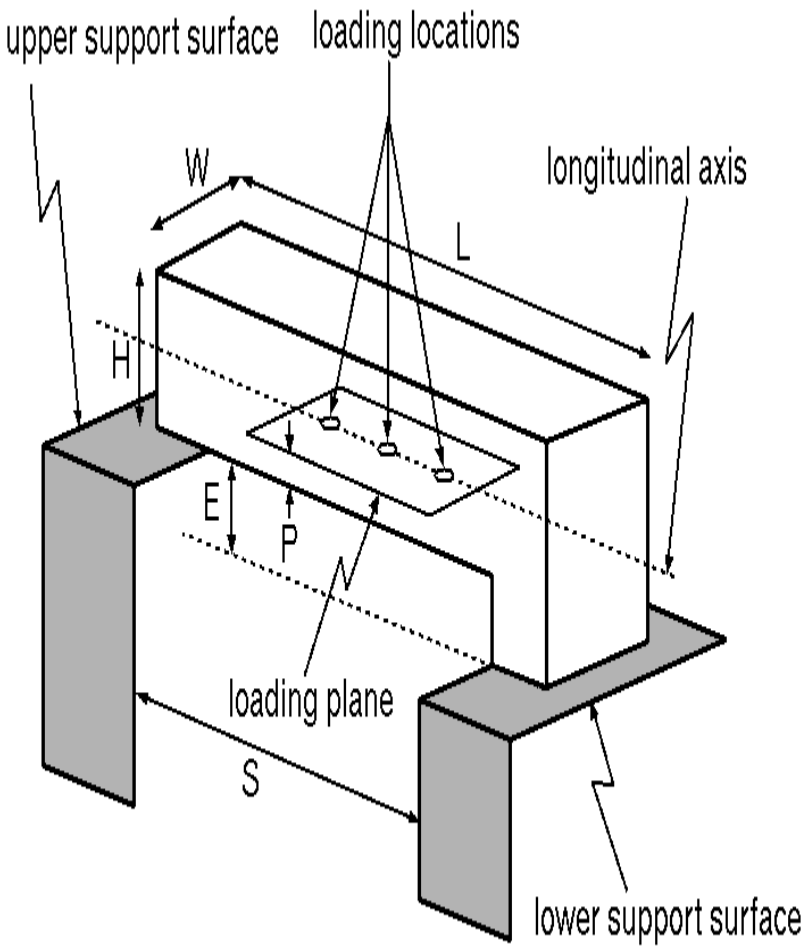

Figure 1. Bridge schematic (not to scale).

f. No part of the bridge may extend below the upper support surface within the span (see Figure 1).

3. Loading

a. Competition loading will stop at 50. kg, loading will continue until bridge failure (see **4d**)
b. The load will be applied from above by means of a 40.0 mm square plate with a thickness (**t**) of at least 6 mm but less than 13 mm. A 9.53 mm (3/8 inch) diameter rod is attached from above to the center of the plate and projects below the surface of the loading plate (see Figure 2). During loading, the edges of the plate will be parallel to the longitudinal axis of the bridge.
c. The load will be applied with the center of the plate at one of three (3) possible loading locations on the longitudinal axis of the bridge: The center and 30. mm to either side of the center of the bridge span (see Figure 1).
d. On the day of the competition, the judges will decide which one of the three loading locations will be used; it will be the same for all bridges.

4. Testing

a. On the day of the competition, the bridge will be centered on the support surfaces.
b. The loading plate will be lowered from above on the bridge at the selected loading location with the edges of the plate parallel to the longitudinal axis of the bridge.
c. The load will be applied from above, as described in section 3. Competition loading will stop at 50. kg. However, loading will continue until bridge failure (see **4d**).
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. If a bridge has leg(s) which fail, the bridge will have failed regardless of deflection.
e. The bridge with the highest structural efficiency, *E*, will be declared the winner. Bridges failing above 50. kg will be considered to have held 50. kg for efficiency calculation.

E = Load supported in grams (50,000g maximum) / Mass of bridge in grams

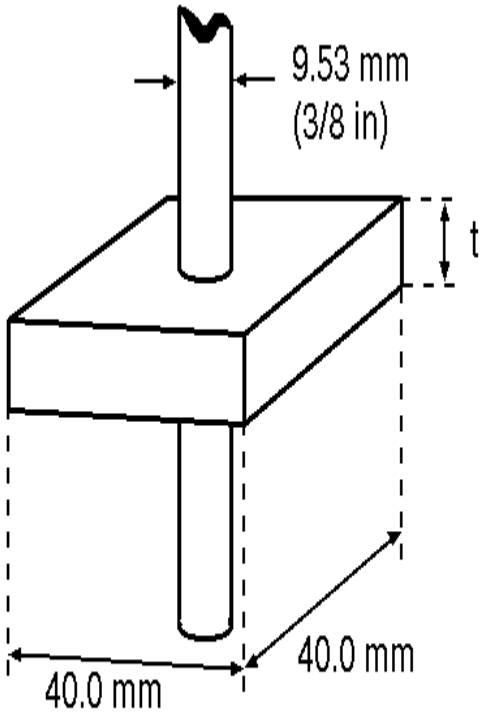

Figure 2. Loading Plate Detail

5. Qualification

a. All construction and material requirements will be checked prior to testing. Bridges failing to meet these requirements will be disqualified. If physically possible, disqualified bridges may be tested as exhibition bridges at the discretion of the builder and the challenge 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.
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 7, 2019, to learn whether any changes have been made.