

2009 CH2M HILL / Oregon State University High School Model Bridge Contest Rules

These rules have been developed for the **2009 CH2M HILL / Oregon State University High School Model Bridge Contest** to be held on Saturday, **February 21, 2009** at Oregon State University. Questions about these rules should be directed to [Preston Baxter](#) at 541.768-3164. The object of this contest is to see who can design, construct and test the **most efficient** bridge within the following specifications.

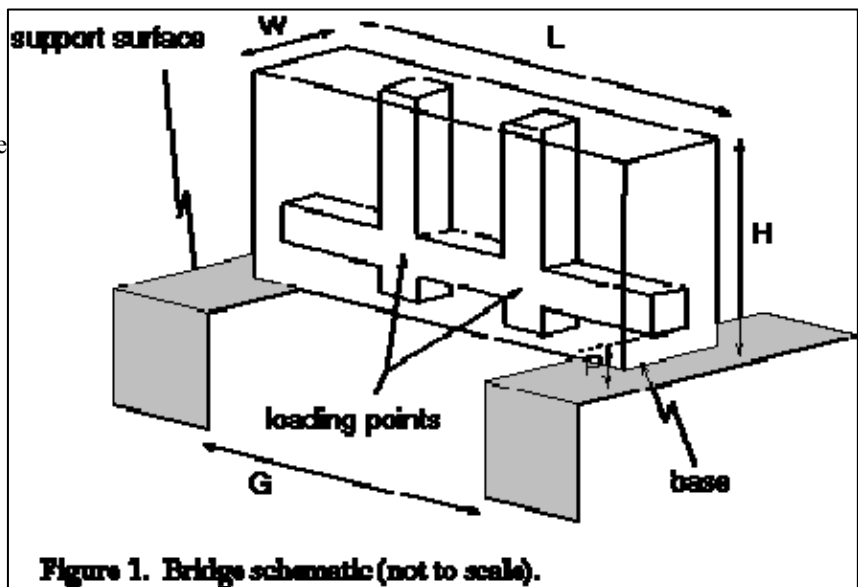
Model bridges are intended to be simplified versions of real-world bridges, which are designed to accept a load in any position and permit the load to travel across the entire bridge.

1. Materials

- a. The bridge must be constructed only from 2.38mm (3/32 inch) square cross-section basswood and any commonly available adhesive.
- b. The basswood may be notched, cut, sanded or laminated in any manner.
- 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

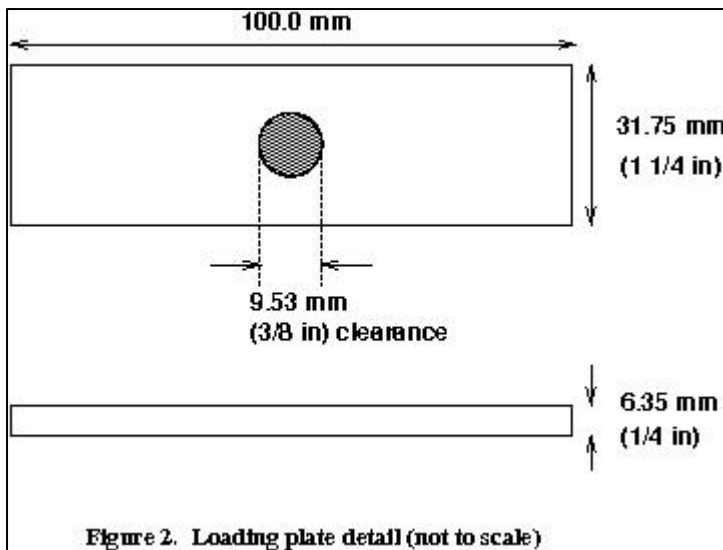
- a. The bridge mass shall be no greater than 30 grams.
- b. The bridge (see Figure 1) must span a gap (**G**) of 300 mm, be no longer (**L**) than 400 mm, have a maximum width (**W**) of 80 mm, be no taller (**H**) than 250 mm above the support surfaces.



- c. No portion of the bridge shall extend below the top of the support surfaces.
- d. The loading plane (**P**) shall be horizontal and shall lie no more than 15 mm above the support surfaces. The bridge may extend above the loading plane.
- e. The bridge must be constructed to allow for passage of a 38.1 mm by 38.1 mm by 457.2 mm long (1.5 inch by 1.5 inch by 18 inch long) rectangular block vertically through both load points (the block will be centered on the loading point as shown in Figure 1) and horizontally across the load plane (one face of the block will be in contact with the load plane).

3. Loading

- a. The load will be applied downward, from below, by means of a standard 3/8 inch rod and a steel loading plate with dimensions of 31.75 mm (1 1/4 inch) wide, 6.35 mm (1/4 inch) thick, and 100. mm long, resting on the load plane of the bridge (See Figure 2). Masses will be supported on a vertical loading rod suspended from the center of the loading plate. The rod will pass through the bridge and the center of the loading plate and will be secured with a standard hex nut.
- b. The two long 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 with the loading plate centered 50 mm to the right or the left of the center of the 300 mm gap.

4. Testing

- a. The competition loading location will be determined at random at the beginning of the contest, and will be the same location for all the bridges tested.
- b. The loading plate will be located on the bridge at the specified loading location and the load will be applied from below, as described in section 3 above.
- c. Competition loading will stop at 82 kg (180.8 lb). However, loading will continue until bridge failure.

- d. Bridge failure is defined as the inability of the bridge to carry additional load, or a load deflection of 25 mm (0.98 inch) under the loading location, whichever occurs first.
- e. The bridge with the highest structural efficiency, E , will be declared the winner.

$$E = \text{Load supported in grams (82,000g maximum)} / \text{Mass of bridge in grams}$$

5. Qualification

- a. All construction and material requirements will be checked prior to testing by the judges. Bridges that fail to meet these specifications at the conclusion of the allowable time for checking will be disqualified. Bridges disqualified prior to the start of the contest may be tested as exhibition 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.

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