STUDENT MODEL BRIDGE BUILDING RULES AND SPECIFICATIONS
2009
SOUTHERN NEVADA REGIONAL CONTEST

HIGH SCHOOL SPECIFICATIONS

The following rules have been adopted from the International Bridge Building Committee by the Southern Nevada Region. These rules and specifications will be followed for the **High School Division** of the Southern Nevada Regional Bridge Building Contest, to be held on **Saturday, February 28, 2009** at the campus of the University of Nevada Las Vegas, Thomas T. Beam Engineering Complex. Contact Paul Matuska at pmatuska@lc.usbr.gov if you have questions. For more information visit our website at: www.usbr.gov/lc/region/programs/bridgebuilding.htm

Please note: the specifications have changed significantly from last year, please read them carefully! This year, the specifications for the High School Division differ from those of the Elementary and Middle School Divisions. These specifications are for High School use only!

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 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 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.

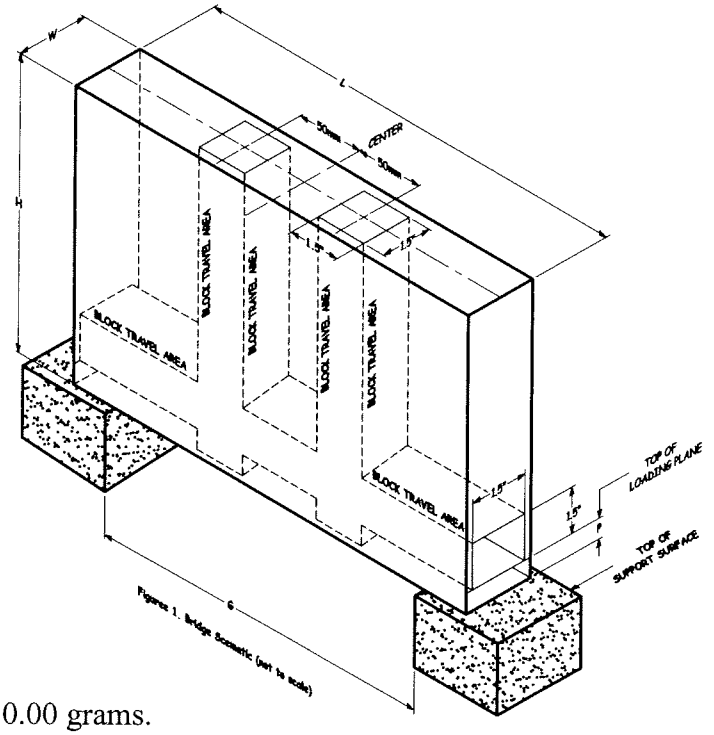

Figure 1. Bridge Schematic (not to scale)

2. Construction

   a. The bridge's mass shall be no greater than 30.00 grams.
   b. The bridge 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. No portion of the bridge shall extend below the top of the support surfaces.
   c. The top of the loading plane (P) shall be horizontal and shall be no more than 15 mm above the support surfaces. The bridge may extend above the loading plane.
   d. The bridge must provide support for the loading plate, 50mm to the right and 50mm left of center.
   e. The bridge must be constructed to allow a 1.5 inch by 1.5 inch by 12 inch long rectangular block* to pass 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 (a face of the block will rest on the load plane).

* A 2 x 2 piece of dimensional lumber can be used for general verification of clearances, (**CAUTION:** dimensional tolerances can vary from piece to piece).

3. Loading

a. The load will be applied from above, by means of a 1.25 inch (≈ 32 mm) wide by 100 mm long steel plate resting on the loading plane of the bridge. The plate will be .25 inch (≈ 6.3mm) thick and will have a 7/16 inch (11.1 mm) loading rod inserted into a depression at its center (see Figure 2 for loading plate details). The bottom surface of the plate will be flat and the plate will be able to pivot during loading.

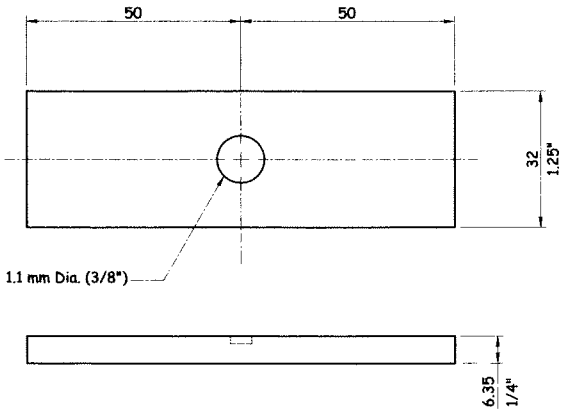

Figure 2. Loading Plate Detail

b. At the time of load application the two long edges of the loading plate will be set parallel to the longitudinal axis of the bridge.
c. The load will be applied on the longitudinal axis of the bridge with the loading plate centered 50 mm to the right or 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. The load will be applied from above, as described in section 3 above.
c. Competition loading will stop at 180 lbs (approx 82 kg). However, loading will continue until bridge failure.
d. Bridge failure is defined as the inability of the bridge to carry additional load, or a 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.

$$E = \frac{\textit{Supported Load (82 000 g maximum)}}{\textit{Bridge Mass (30 g maximum)}}$$

5. Qualification

a. All specifications will be checked prior to testing. Bridges which do not meet the specifications at the conclusion of the allowable time for check-in (5 minutes prior to your school's scheduled testing time) will be disqualified. If physically possible, disqualified bridges will be tested unofficially and scored for the builder.
b. If, during testing of a bridge, a condition becomes apparent which prevents testing as described in section 4 above, that bridge will be disqualified. If the disqualified bridge can accommodate loading, it may still be tested unofficially as stated above.
c. Decisions of the judges are final.

A **Teacher's Workshop** will be held in the Thomas Beam Engineering Complex, on January 14, 2008 from 4 – 6pm, in the B building of the Thomas Beam Engineering Complex of UNLV. Discussions will cover the specifications, bridge design, and ideas for presenting this program in the classroom. Directional signs will be posted on the day of the workshop.

The **School Competition** traveling trophy in the High School Division will be awarded to the school with the highest average efficiency for all 10 of its bridges.