

STUDENT MODEL BRIDGE BUILDING RULES AND SPECIFICATIONS
2018 SOUTHERN NEVADA REGIONAL CONTEST
HIGH SCHOOL SPECIFICATIONS

The following rules and specifications will be followed for the **High School Division** of the Southern Nevada Regional Model Bridge Building Contest, to be held on **Saturday, March 3, 2018** at the campus of the University of Nevada Las Vegas, Thomas T. Beam Engineering Complex. Contact Casey Collins at casey.collins@snwa.com or Rich Eastland at reastland@usbr.gov if you have questions. For more information on the contest, visit our website at: <http://www.modelbridgecomp.com/>

Please read the specifications carefully! The specifications for the High School Division have changed from past years and they differ SIGNIFICANTLY from those of the Middle and Elementary School Divisions.

The objective of this contest is to see who can design and construct the **most efficient bridge** within the following specifications. The High School Division is open to all students in 9th through 12th grades.

1. Materials:

- a. The bridge must be constructed only from the 3/32 inch square cross-section basswood included in the kit, which may be notched, cut, or laminated in any manner.
- b. Any commonly available adhesive may be used.
- c. No other materials may be used. Do not paint or stain the bridge.



2. Construction:

- a. The bridge must weigh no more than 25.0 grams.
- b. The bridge must span a gap (**S**) of 300 mm (**hint: bridge must be longer than 300 mm**), be no longer (**L**) than 400 mm, be no taller (**H**) than 150 mm above the support surface, and no wider (**W**) than 80 mm. No part of the bridge may extend below the support surface (**see Figure 2**).
- c. The bridge must be constructed to provide a horizontal Loading Plane, for the loading plate at each of the loading locations on the longitudinal axis of the bridge; positioned 60 mm to the right of center, and 30 mm to the left of center (see Figure 1). The two loading locations must lie in the same horizontal plane. This loading plane must lie a distance (**P**) between 80 mm and 100 mm above the support surface of the bridge. The two loading locations must lie in the same horizontal plane (**hint: The Loading Plane is a minimum length of 130 mm; factoring half the width of the loading plate and the spacing from center = 80mm to the right and 50 mm to the left. Please refer to Figure 1**).

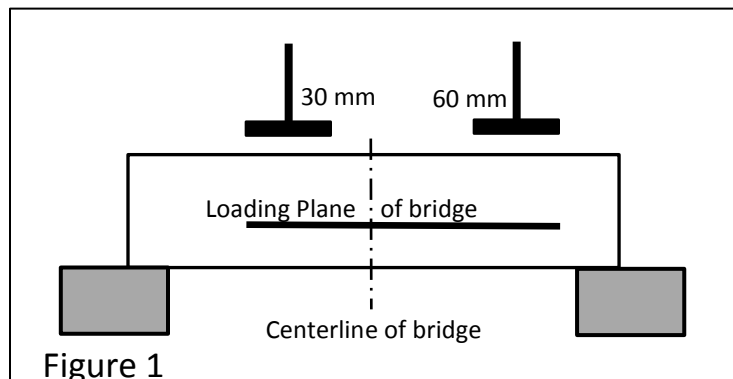


Figure 1

- d. The bridge must be constructed to allow a 48 mm diameter, 400 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 80 and 100 mm above the support surface of the bridge. This pipe must touch both loading locations simultaneously (see 3c).



1.5 inch Schedule 40 PVC Pipe

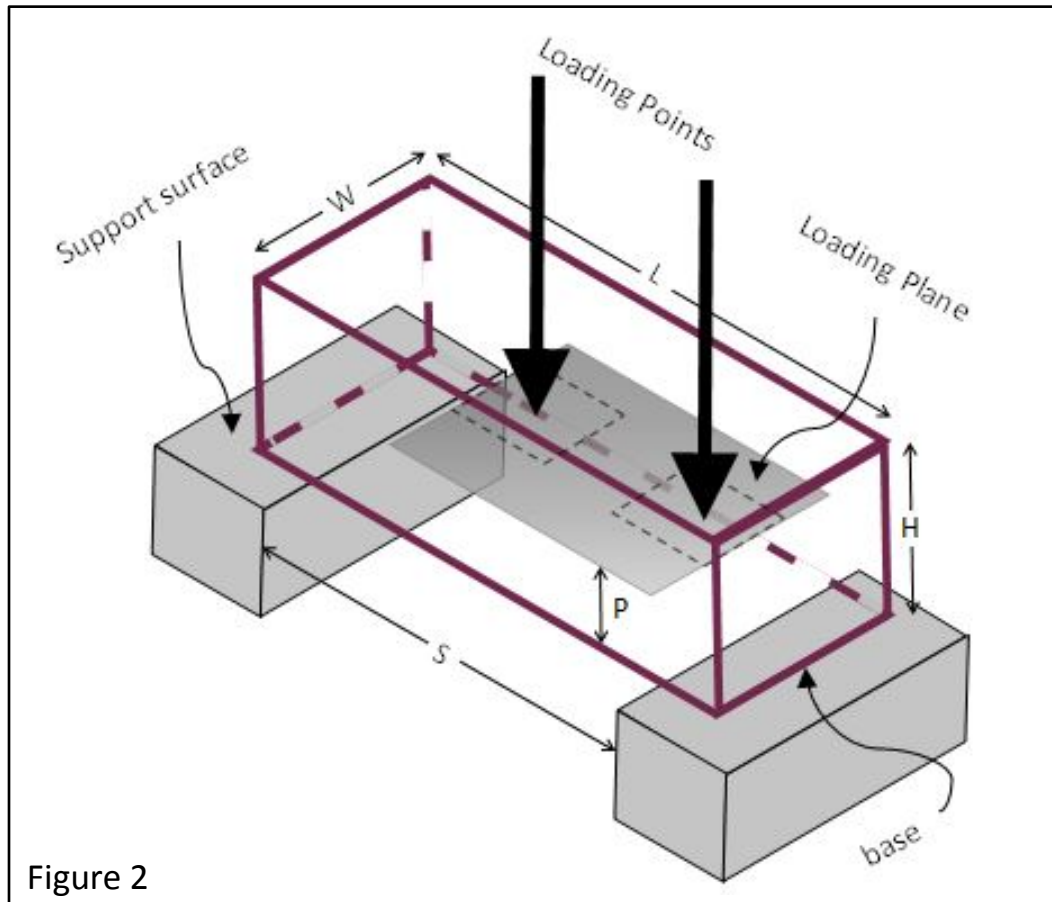


Figure 2

2. Loading:

- The load will be applied to the Loading Plane **from above** with the loading plate (**Figure 3**) centered over one of the loading locations.
- The load will be applied from above by means of a 40 mm square by 6 mm - 13 mm thick plate. A 10 mm - 15 mm diameter loading rod will be attached to the center of the plate (see **Figure 3**). The plate will be horizontal, have a flat bottom and will not pivot on the loading rod.
- The load will be applied with the center of the plate at one of two possible locations on the longitudinal axis of the bridge: 30 mm to the left and 60 mm to the right of the center of the bridge span (see Figure

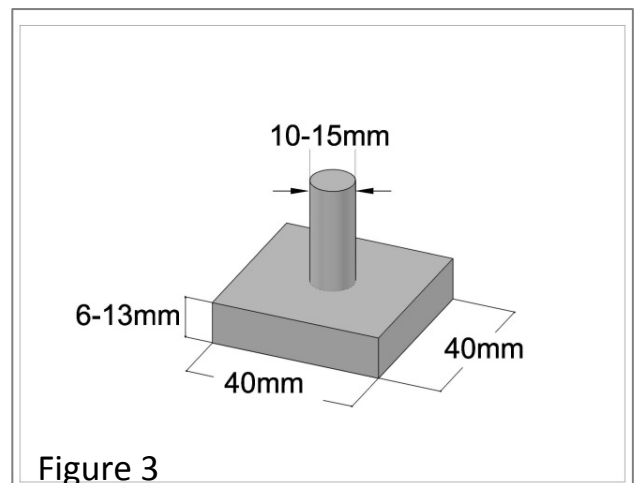


Figure 3

- 1). Competition loading will stop at 50 kilograms. However, loading will continue until bridge failure.
- d. On the day of the competition, the judges will randomly select one of the loading positions to be used; it will be the same for all bridges tested.

4. Testing:

- a. The bridge will be centered on the support surfaces.
- b. The loading plate will be placed on the bridge at one of the two specified loading locations (see 3c).
- c. The load will be steadily applied from above, as described in section 3a. (**hint: the loading plate must be able to extend down from above onto the loading plane, be sure to provide a minimum of 40 mm clearance**)
- d. Bridge failure is defined as the inability of the bridge to carry additional load, or a deflection of 25.4 mm (1 inch) under the loading point, whichever occurs first.
- e. The bridge with the **highest structural efficiency, E** , will be the winner.

$$E = \text{Load supported in grams} / \text{weight of bridge in grams}$$

5. Qualification:

- a. All specifications will be checked prior to testing. Bridges that 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. For the purposes of individual scoring, only one bridge is allowed per student. No exceptions. For the team scoring competition, a maximum of ten bridges are allowed to be tested from each school. If a school has less than five bridges, (constructed from five different students and representing five different designs) at the time of testing, then one additional bridge from one of the students may be tested and accepted for the team's average score provided that this additional bridge is of a different design than the student's first bridge.
- d. ALL BRIDGES SUBMITTED MUST APPEAR TO HAVE A UNIQUE DESIGN. Schools submitting bridges designed from a template will face disqualification.
- e. **Decisions of the judges are final.**

A **Teacher's Workshop** will be held at UNLV in the B building of the Thomas Beam Engineering Complex, on **January 10th, 2018 from 4:00 – 5:30 pm**. At the workshop, we will discuss the specifications, bridge design, and ideas for presenting this program in the classroom. Bridge Kits will be available at the workshop.

The **School Competition** traveling trophy in the High School Division will be awarded to the school with the highest average efficiency for its best **five** bridges, respectively.

Do you have a question? Check out our frequently asked questions page located here: <http://www.modelbridgecomp.com/help/faq/>. Still have questions? Please reach out to us at casey.collins@snwa.com or reastland@usbr.gov.

Have fun and we'll see you on March 3rd!