



SELMON EXPRESSWAY BRIDGE DESIGN COMPETITION



2016 Balsa Wood Bridge Competition Rules

MATERIALS

Balsa wood:

- Max cross-section size is $\frac{1}{4}$ " x $\frac{1}{4}$ ".
- Pieces of larger cross-section may be fabricated by gluing several $\frac{1}{4}$ " x $\frac{1}{4}$ " pieces together.
- Any other wood than balsa wood used will be grounds for disqualification.

Glue:

- Any type of glue may be used.

DESIGN AND CONTEST RULES

1. The bridge shall be designed and constructed by a team of students consisting of at least three and a maximum of four students.
2. The bridge contest will be scored on the following four areas of achievement:
 - a. **Load capacity** - The bridge will be loaded to determine how much weight it can support.
 - b. **Design Drawings** - Score will depend on:
 - i. **Resemblance** - The accuracy of the drawings in relationship to the bridge. The drawings may be full size or to scale.
 - ii. **Dimensioning** - Proper indication of the height, width and length of various parts of the bridge.
 - iii. **Completeness of title block** - Must indicate: Name of project, school name, teacher name, team name, team members, grade levels and date of completion.
 - iv. **Appearance and neatness** - Quality and cleanliness of the representation.
 - c. **Craftsmanship** - The workmanship and care taken in constructing the bridge.
 - d. **Originality** - Imaginative or innovative concepts used in design and construction of the bridge.
3. The bridge must be "free standing."
4. Total mass of the bridge, including glue, may not exceed 110 grams.
5. The maximum length of the bridge shall not exceed 550 mm and the width shall not exceed 100 mm.
6. The maximum height of the bridge is 300mm.
7. The bridge feet must be at a minimum 400 mm apart from each other measuring from the inside and must raise the bridge a minimum of 20 mm.
8. The minimum height of the "roadway surface" is 100 mm above the bottom of the bridge feet.



SELMON EXPRESSWAY BRIDGE DESIGN COMPETITION



9. The bridge must provide a "roadway surface" that is approximately level .The roadway surface must have a minimum width of 46 mm. The roadway surface must extend the entire length of the completed bridge.
10. No fastening method other than mechanical interlock of the balsa pieces or commercial glue is allowed.
11. The bridge design must allow the standard testing block to be placed on the roadway surface with the testing rod(s) extending beyond the sides of the bridge. The standard testing block is shown on the drawings attached to these instructions. Alternatively a $\frac{3}{4}$ inch hole may be provided for a metal rod to extend up through the deck for the testing block to be affixed.
12. The bridge may not be painted or coated in any way including coating of members with glue.
13. All bridges, when presented for judging at the competition shall have, a way of identification which shall indicate the school name and team name.
14. In order to prevent damage to the bridge during transportation to the contest, during handling and during the contest, each bridge should be in a protective container such as a cardboard box. The bridge should be fabricated of high enough craftsmanship to withstand normal handling by the judges. The contest supervisors are not responsible for any damage to bridges protective container or not.



SELMON EXPRESSWAY BRIDGE DESIGN COMPETITION



JUDGING

1. Bridges will be visually inspected, measured and weighed for compliance to the rules. Bridges failing to pass these requirements will not be scored in the competition. The failed bridges may be load tested at the discretion of the judges, if the team requests the test.
2. Bridge design drawings will be examined and compared with the completed bridge.
3. Points will be given for craftsmanship, originality and design drawings.
4. The load capacity test will be conducted with a Pitsco Structure Testing Instrument as follows:
 - a. The bridge will be placed on the testing stand consisting of two flat, level surfaces which will be level with respect to each other and separated by approximately 350 mm.
 - i. A 17 x 4 cm testing block will be placed on the roadway surface at the center of the span with a 12.5 mm diameter rod extending beyond the sides of the bridge. The load shall be applied to the bridge from two rods placed in slots in the test block symmetrical about the center of the span.
 - ii. A 17 x 4 cm testing block will be placed on the roadway surface at the center of the span with 12.5 mm diameter rod extending up through the bridge. The load shall be applied to the bridge using the rod placed in a hole in the test block symmetrical about the center of the span.
 - iii. Whether option i. or ii. is used will be determined by the design of the bridge. If either option would work, the tester will use one rod (option ii).
 - b. A testing device will slowly apply pressure downward until one of the following occurs:
 - i. Catastrophic destruction takes place.
 - ii. The vertical force applied drops to zero.
 - iii. The downward deflection of the bridge exceeds 35 mm. The load that the bridge sustained when the deflection reached 35 mm will be considered to be the failure load.
 - c. If there is more than one bridge which attains the same load capacity at failure, the position of an entry will be decided by comparing the efficiency of the bridges. The efficiency of each bridge will be determined by dividing the load at failure by the weight of the bridge.



SELMON EXPRESSWAY BRIDGE DESIGN COMPETITION



SCORING

$$\text{Efficiency} = \frac{\text{Failure load}}{\text{Weight of Bridge}} \times 100$$

<u>Category</u>	<u>Points</u>	<u>Maximum Points</u>
Craftsmanship	0 to 10	10
Originality	0 to 10	10
Design Drawing	0 to 10	10
Load Capacity	Highest	70
	2nd Highest	60
	3rd Highest	50
	All Others	30

If a tie occurs, highest load place will be decided by the team with the highest efficiency rating.



SELMON EXPRESSWAY BRIDGE DESIGN COMPETITION

