



# 2017 Ohio Valley Student Conference

Thursday, April 6, 2017 through Saturday, April 8, 2017

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## Balsa Wood Bridge Competition

### Materials Provided:

- 20 – 1/8" x 1/8" x 36" Balsa Wood pieces
- 2 – Super Glue Gel 2g tubes
- 2 – Single Edge Razor Blades
- 1 – Construction Paper

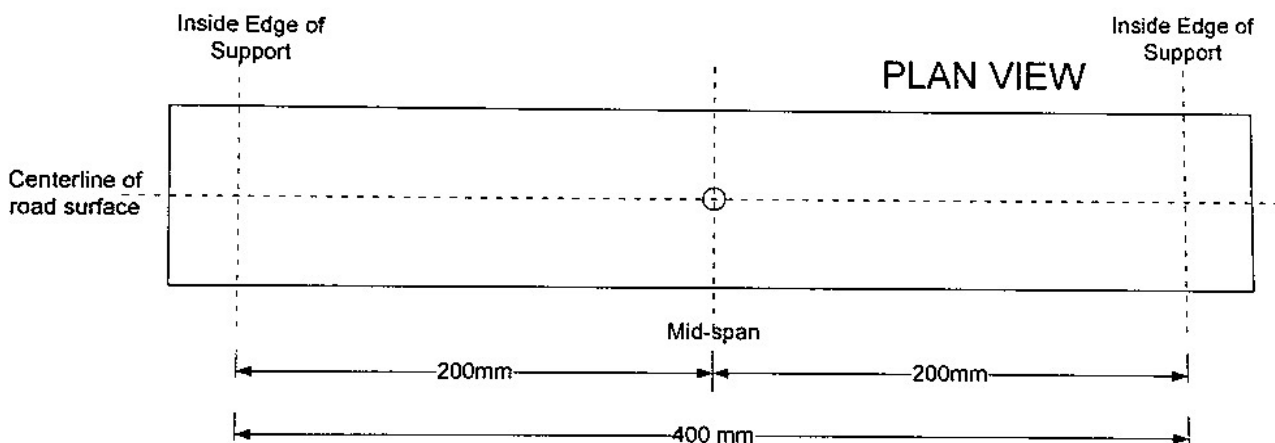
### A. Materials

1. The bridge is to be a single structure constructed of wood bonded by glue. No other materials shall be incorporated into final product.
2. Only wood provided at the competition may be used.
3. The entire bridge, including the road surface, must be constructed of individual pieces of wood provided day of the competition.
4. Only the glue provided at the competition may be used as a bonding substance.

### B. Construction

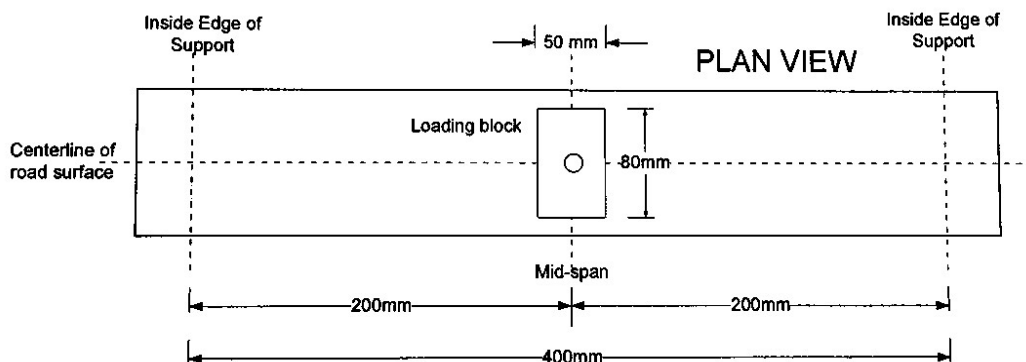
1. Any type of bridge that meets the specifications below may be constructed. Sound engineering practices such as truss construction, gussets, and mitered joints are encouraged.
2. All construction must be completed on the day of the competition during the specified time. No additional materials except for those listed above will be given.
3. The bridge may not be coated with any material, e.g., paint, stain, glue.
  - a. The bridge **may not** be fully coated/laminated in glue.
4. Each team may bring any tools required for construction (e.g. pencils, rulers, and other cutting instruments).
5. Bridge dimensions:
  - a. Span – at the competition, the bridge will be supported by two vertical supports, with inside edges that are 400mm apart. (See figure) There is no maximum length of the bridge.

- b. Width – the inside width of the road surface must be greater than 80mm so that an 80mm wide loading brick will fit between the sides of the road surface and so that a piece of paper will fit on each side of the block. There is no maximum width of the bridge.
  - c. No portion of the bridge may extend more than 13mm below the top surface of the test supports.
6. The road surface is defined as a surface or surfaces that must allow the free passage of a rolling Matchbox™ or Hot Wheels™ model car along the entire length of the bridge. The car must have an axle width of  $30 \pm 5$  mm. The surface does not have to be solid.
  - a. Raised curbs, rails, or tracks are permitted and become an extension of the road surface in which the loading block may rest.
  - b. Length – the road surface must extend along the entire length of the bridge.
  - c. Height – the height of the road surface must not exceed 13 mm above the surface of the test supports at any point.
7. Loading
  - a. The load point will be at the mid-span point on the centerline of the road surface.
  - b. The bridge must accommodate an 80 mm long x 50 mm wide x 20 mm thick loading block (provided at the testing site). A hole large enough to accommodate a 10mm diameter rod must be provided through the road surface at the mid-span of the bridge. The rod (provided at the testing site) is used to apply load to the bridge. (See figure)
  - c. The bottom surface of the loading block will be no more than 13 mm above the test supports when placed on the load point.



### C. Testing

1. Bridges will be assessed prior to the testing to determine if they meet the above specifications.
2. Test #1
  - a. The bridge will be inclined by placing a 50mm high block under one end of the bridge.
  - b. The model car will be placed on the elevated end of the road surface and allowed to roll down its length and exit the bridge.
3. Test #2
  - a. The bridge will be centered on the testing apparatus containing the 400mm opening between the supports.
  - b. The 80mm x 50mm x 20mm loading block will be applied to the bridge. The 80 mm dimension of the loading block will be oriented perpendicular to the longitudinal axis of the bridge. (See figure)
  - c. A 10 mm diameter rod will be attached to the loading block, which will be used to apply force to the loading block at the mid-span location.
  - d. Bridges shall be loaded until failure has occurred. Failure is defined as the inability to hold any additional load.





#### **D. Evaluation of Test Results**

1. There is no score for the rolling test. Failure of this test **disqualifies** the bridge.
2. Prior to loading, bridges will be judged on innovativeness/aesthetics of the design. Each team will be ranked based off the design; the ranking will be the Design Score. Therefore, the best design will receive a Design Score of 1, the second a 2, and so on.
- 3.

$$\text{Strength Factor} = \frac{\text{Maximum Applied Load}}{\text{Model Weight}}$$

Bridges will be judged on magnitude of Strength Factor. The largest Strength Factor will be assigned a Strength Score of 1, the second highest 2, and so on.

#### **E. Awards**

1. Teams will be ranked in order of the best Overall Score, which is determined by summing the Design Score and the Strength Score. The lowest, second lowest, third lowest, and so on Overall Scores will be declared first, second, third, and so on.
  - a. Example: The Design Score of a bridge is 8, and the Strength Score is 3. The Overall Score would be 11 for this bridge.

#### **F. Judging**

1. The judges are those appointed by the host school.
2. The judges will make the final determination on compliance with the rules and penalties for rule violations.
3. The decision of the judges will be final, and appeals will not be considered.

#### **G. Competition Schedule**

1. The Balsa Wood Bridge competition will take place according to the conference schedule.
2. The testing order will be determined based on a random drawing of teams and be posted before the testing period begins.