

MISSION: STEM BALSA BRIDGE CONTEST RULES

MATERIALS:

Balsa wood and glue are the only materials allowed to be used for construction of the bridge.

DESIGN AND CONTEST RULES:

1. A team shall consist of three students who shall construct the bridge.
2. Teams are responsible for constructing the superstructure for their bridge. The foundation for the bridge shall be provided at the testing site. See Figure 1- Figure 4
3. The bridge shall be constructed in such a manner as to allow passage of a block which is 35.0 cm in length and 4.0 cm in height to pass underneath without contacting any portion of the bridge when the bridge is in the testing position. See Figure 2
4. The maximum allowable superstructure height is 20 cm. See Figure 1
5. The minimum allowable superstructure height is 10 cm. See Figure 1
6. The bridge must provide an approximately level surface (horizontal), called the roadway, such that a Hot Wheels™ or Matchbox™ car can roll across with a light push.
7. The minimum width of the roadway shall not be less than 5 cm. See Figure 1

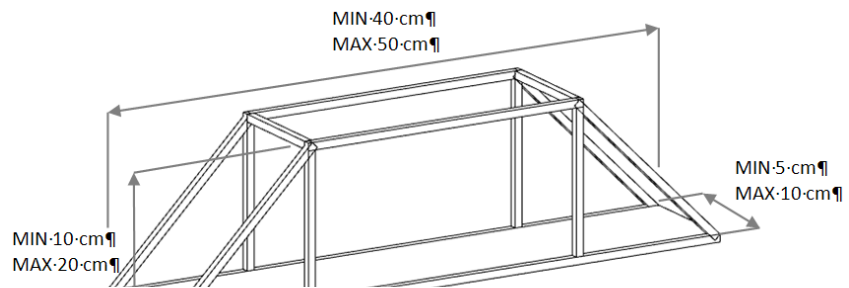


Figure 1 – “FOR EXAMPLE ONLY”

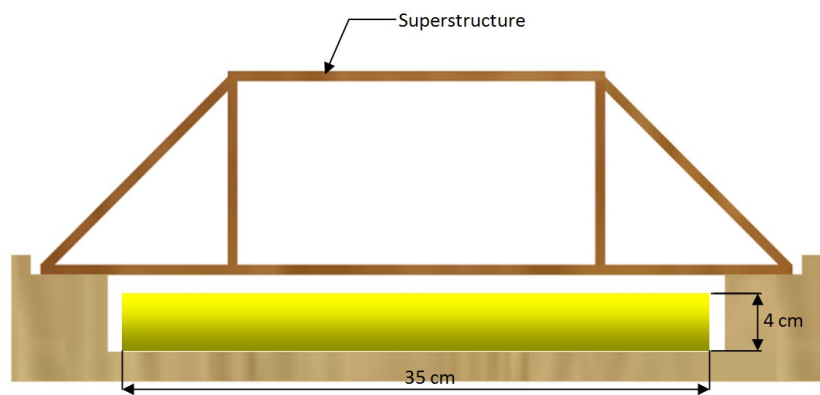


Figure 2

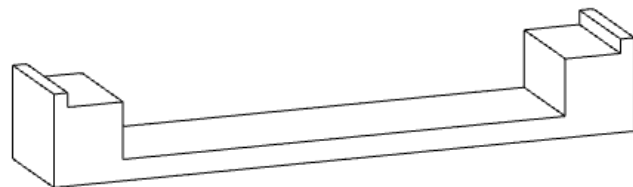


Figure 3

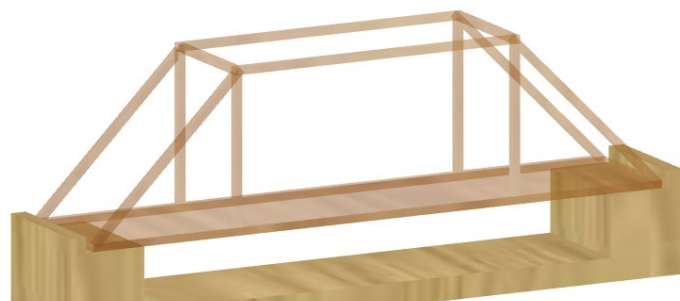


Figure 4

8. The maximum width of the roadway shall not exceed 10 cm. See Figure 1
9. The minimum length of the roadway shall not be less than 40 cm. See Figure 1
10. The maximum length of the roadway shall not exceed 50 cm. See Figure 1
11. The bridge shall be constructed of members with a width and height not to exceed 0.635 cm (1/4 inch). Teams may attach member to one another to create a "built-up" member. Maximum built-up are 3/4", excluding the roadway width. The members MUST be made out of Balsa wood not Basswood, be sure to check your material. See Figure 6
12. The total weight of the superstructure shall not exceed 110.0 grams. Remember that wood does absorb moisture so bridges that are borderline may gain/lose weight due to moisture prior to weigh-in.
13. No method of fastening other than the mechanical interlock of the balsa pieces or commercially available glues are allowed.
14. The bridge must be designed as to allow for the testing of the roadway at the middle of the structure. See Figure 7 and 8
15. For dimensions of the foundation See Figure 5
16. The goal for the bridge is to have the Highest Strength to Weight Ratio.
(Maximum load applied ÷ Weight of Bridge)
17. The team is trying to design the most efficient bridge. Therefore just because the bridge resists the highest load it may not win the competition.
18. Most importantly HAVE FUN!!

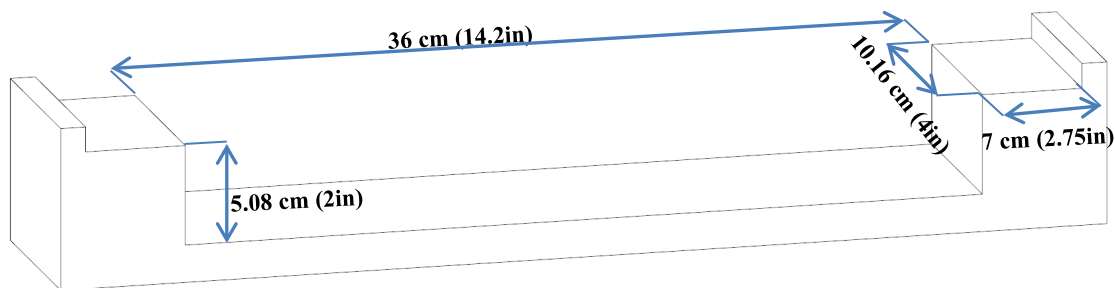


Figure 5

Teams may consist of one (1) to three (3) students. At least one (1) team member must be present during testing of their bridge. Maximum of two (2) teams per school.

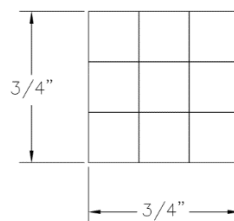


Figure 6

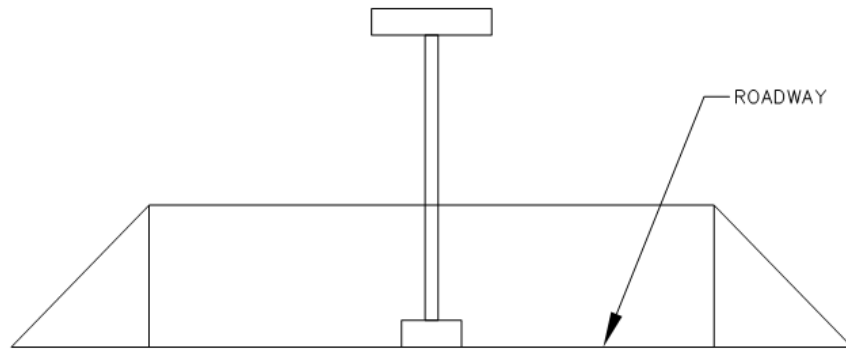


Figure 7 Test location if Roadway on Bottom

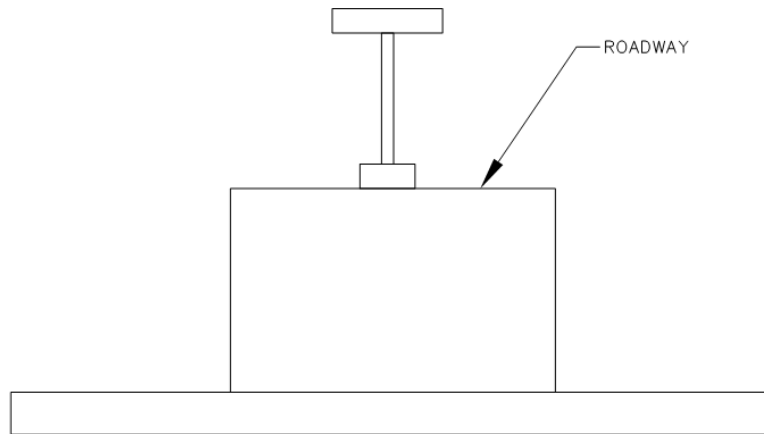


Figure 8 Test location if Roadway on Top

Team Name: _____ Team Members: _____

School Name: _____

STUDENT CHECKLIST FOR BRIDGE

Your Bridge	Compliance with the Rules
Is the bridge made of only balsa wood and glue?	
Does any of the pieces of balsa used to build the bridge exceed ¼ in. wide or ¼ in. high?	
Is the bridge height within the given range? (10 – 20 cm)	
Is the bridge width within the given range? (5 – 10 cm)	
Is the bridge length within the given range? (40 – 50 cm)	
When the bridge is placed on a 5.08 cm (2 in.) stack can a 4 cm high block fit underneath?	
Is the weight of the bridge less than 110.0 grams?	
Is the roadway level?	
Can a Hot Wheels™ car roll across the roadway?	
Is there a clear path to the middle of the roadway for the loading device?	

JUDGING:

1. All bridges will be visually inspected, measured, and weighed (in the presence of the team) for compliance with all of the rules.
2. Points will be awarded for the highest strength to weight ratio ($\text{Max Load Resisted} \div \text{Bridge Weight}$). In the event of a tie the bridge that held higher load resisted will be awarded 5 points.
3. Once the bridge has passed the visual inspection, measurement, and weight requirements the judges will secure the bridges until the time of testing. For testing of the bridges they will be placed upon the foundation and slid into the testing machine. The testing contact surface will be lowered until just prior to contact with the roadway surface. The automated testing procedure will then begin. Testing will continue until either the bridge fails (load resisted by the bridge drops to zero) or the pieces of the bridge make contact with the testing apparatus (the bridge bends down and contact the base of the foundation).

SCORING:

Prize Categories:

- | | | |
|-------------------------|--------------------------------|----|
| • 1 st Place | Maximum Points | 80 |
| • 2 nd Place | 2 nd Highest Points | 70 |
| • 3 rd Place | 3 rd Highest Points | 60 |

Judge's Tip: Check out the ASCE Florida Bridge Design Competition at <https://www.asceflbridge.org/>. Download the free software and evaluate your bridge design before building it. Your team could also enter the ASCE Florida Bridge Design contest, for more information email JGonzalez@drmp.com.

—————Please bring this sheet on the day of competition —————