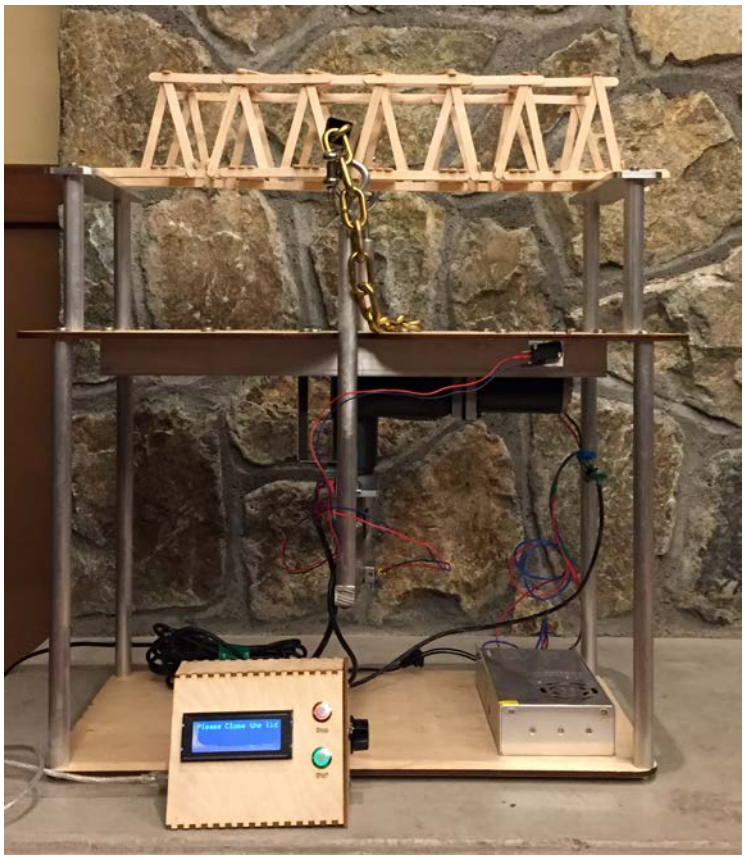
2017 VICTORIA BRANCH POPSICLE STICK BRIDGE BUILDING COMPETITION

RULE BOOK



Contents

1. Registration:

One entry per entrant or up to teams of three (3) is permitted. Contestants are encouraged to register in advance to speed up registration on the day of the event. All bridges must be weighed at the registration table prior to the event. Please email completed registration form to vic@apeg.bc.ca by April 20, 2017. The registration form and additional contest information can be found on our website www.apeg.bc.ca/vic

2. Bridge Dimensions and Rules

1. **First Rule is to have fun building your bridge!**

a) Construction

1. The bridge must be constructed by the registered participants. Failure to follow this construction rule will result in disqualification from the prizes.

b) Dimensions

1. The bridge is required to **span a 500 mm gap** and should be long enough to have a bearing area on both ends beyond 500 mm (i.e**. 50 mm excess on either end for a total length of 600 mm**). **The bridges cannot be longer than 600mm or they will not fit into the 'Crusher'.** The bridge must incorporate a flat area to attach the loading mechanism. Please note, that the 'Crusher' is top loading.
2. The bridge must be a **minimum 100mm wide (but less than 200mm).**
3. Bridge should be **less than 200mm high.**
4. Bridge must protrude **no more than 50mm below the bottom of the bridge deck**.
5. Bridge must be free from support by **30mm on each side**.
6. Bridge deck must be covered in construction paper to allow a "Matchbox" sized car roll across. See Section 1c) and 1.e) for more details. This paper is not a structural component of the bridge.
7. Bridges have a maximum allowable vertical deflection of 5cm – if there is more than this the bridge may not be testable.
8. Bridges will be inspected during registration. Any violations of the rules above will result in disqualification from the prizes; entrants will still able to test the bridge as per the discretion of the event organizers.

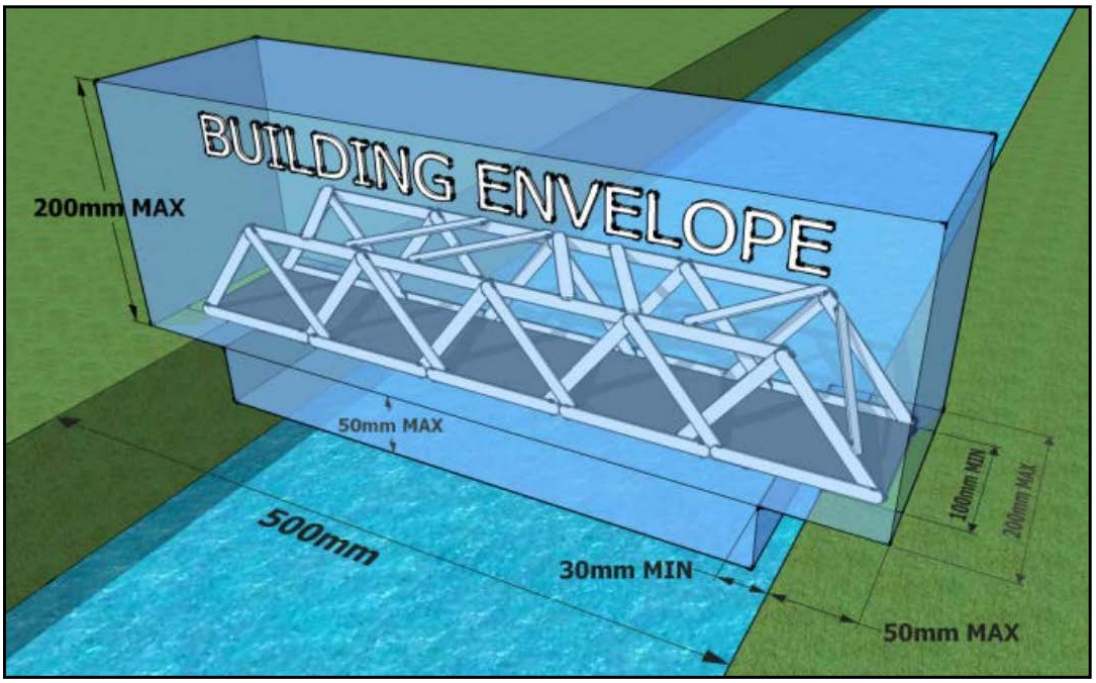


Figure 1 - From APEGBC Northern Branch Popsicle Stick Bridge Building Competition

c) Materials and Components

1. Bridges must be built using a maximum of 150 standard popsicle sticks and standard all-purpose white glue. No other glues are acceptable (including carpenter's glue). The material for the bridge construction will be provided,:
    a. One(1) pack of 150 popsicle sticks
    b. One(1) 4oz bottle of white glue.

    Bridge building kits will be dropped off at the schools of registered students at least two weeks prior to the competition.

2. If entrants choose to use their own popsicle sticks, they must be within the following specifications:

1) 113mm Long.
2) 10mm Wide.
3) 1.5mm Thick.

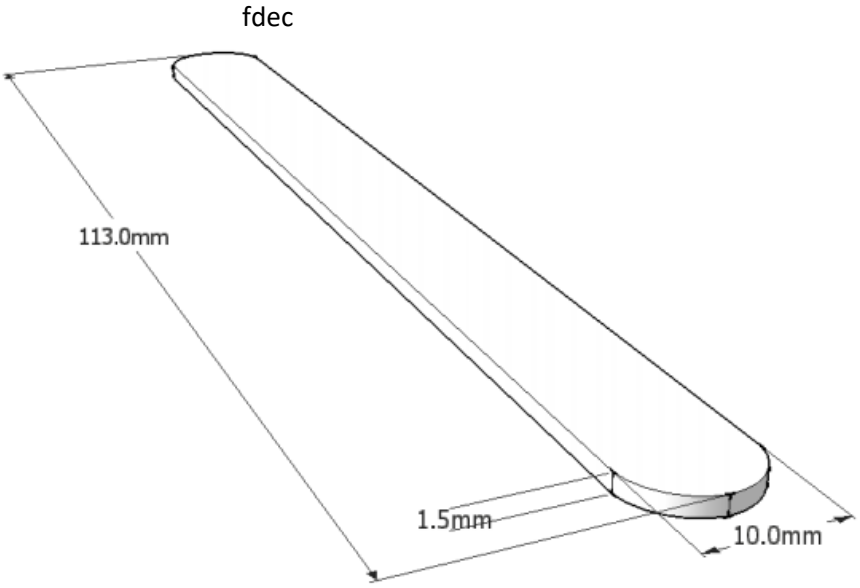


Figure 2 - From APEGBC Northern Branch Popsicle Stick Bridge Building Competition

3. Construction Paper (not provided) will be used to make the bridge deck, ensure it is a flat, single sheet and will allow a "Matchbox" / "Hot Wheels" sized car to roll across. Use only the thickness of one(1) sheet for the deck of the bridge. This paper is not a structural component of the bridge.

d) Aesthetics

1. The full name of the school, grade and team name must appear on the bridge, on a banner attached to the bridge. The letters are to be a minimum of 10mm high. It should be in place on the bridge before registration.

e) Rules

2. The bridge must conform to **A. Construction, B. Dimensions, and C.Materials and Components**
3. The complete bridge is to contain a maximum of **150 Popsicle sticks** joined together with all purpose, nontoxic glue (**note: crazy and industrial glue are not permitted**). White glue is the only glue permitted.
4. Popsicle sticks may be cut.
5. A "Matchbox" / "Hot Wheels" sized toy car must be able to be rolled across the bridge on the bridge deck. The car is approximately 3.5 cm wide and 2 cm in height.

6. Pinning, clamping or non-white glue are not allowed to be used for connections. Failure to abide by this rule will result in disqualification.
7. The banner must be clearly visible. For more information on the label, see Section 1.d) Aesthetics.
8. The bridge must have clearance to insert the loading bar. Sizes can be found in Section 5. Bridge Testing

5. Bridge Testing:

1. Bring your constructed bridge to the contest.
2. Bridges will be weighed upon registration on the day of the event to ensure that a maximum of 150 popsicle sticks are used.
3. The bridges will be loaded from the top, the loading bar will be placed roughly over the center of the bridge. Sufficient space must be provided for the loading mechanism, a **30mm x 30mm** gap must be provided between the vertical members of the bridge at the center(see figure below). The gap is to be continuous throughout the width of the bridge and must allow the bar to sit directly on the bridge deck.

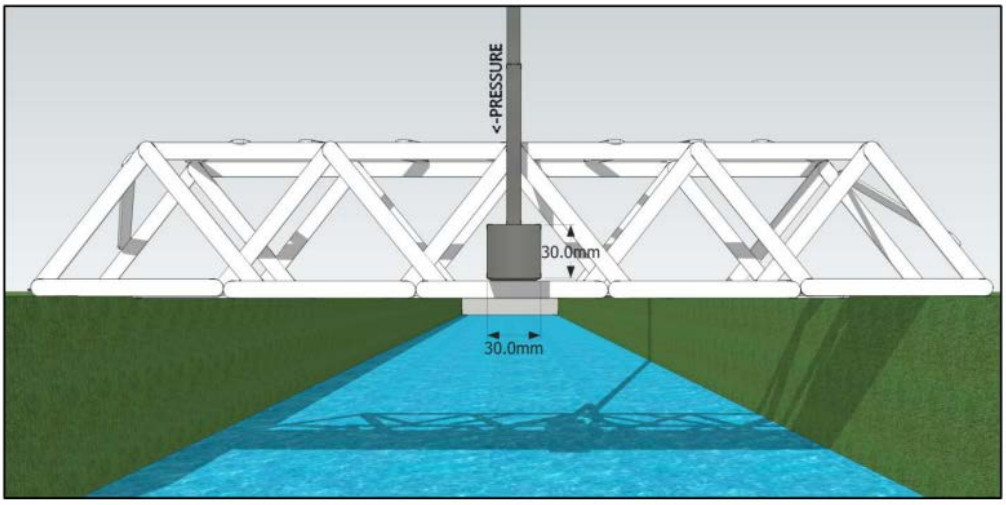


Figure 3 - From APEGBC Northern Branch Popsicle Stick Bridge Building Competition

4. All contestants and officials within the loading area must wear protective eyewear (provided).

Note: Testing will result in most or all bridges being destroyed, so take your pictures before!

a) Judging Criteria:

1. Evaluation will be 50% aesthetics and 50% strength.
2. Bridges will be judged separately on the basis of aesthetics and the ratio of load carrying capacity to bridge mass
3. Judges will examine each bridge to ensure that only popsicle sticks, white glue and construction paper are used and that the construction paper is only used for the bridge deck.
4. The full name of the school and team name of each team must appear on their bridge, on a banner attached to the bridge. For more information on the label, see Section 1.d) Aesthetics.
5. APEGBC's Bridge Testers will record the maximum load that each bridge carries prior to failure.
6. The recorded load will be divided by the bridge's mass to determine the load/mass ratio.
7. The highest load/mass ratio will determine the winners. In the event of a tie (same load/mass ratio) the lighter bridge will win.

3. Prizes

Plaques will be awarded to the first, second and third place winners of the contest in each category.

Each entrant will receive a certificate of participation.

There will also be draw prizes for participants.

Helpful Hints

- Give yourself plenty of time; don't wait until the last minute to build your bridge. The glue will need at least 24 hours to dry and will get stronger if allowed to dry for 2 days or more. Also, wood joints are always stronger if you clamp them tight while the glue dries. Try using big paper clips to clamp the sticks together (clamps must be removed before competition).

- For bridge ideas look around at real bridges. A Popsicle stick bridge is of course much smaller, but the same principles apply (the important part is not the deck, but the steel or concrete structure that supports it). Look particularly at railway truss bridges, but also at bridges like the Johnson Street Bridge, Bay Street Bridge, and in Vancouver the Port Mann Bridge and the Second Narrows Bridge. The Lions Gate Bridge and Alex Fraser Bridge are not good examples to follow because they rely on cables.

- Research the Internet and your local library for bridge reference information to help your design.

- Your bridge needs to have a solid, stiff shape. Notice how a Popsicle stick is much stiffer and stronger when on its edge. A bunch of sticks glued together flat, like a raft, has very little strength and will sag during testing. The strongest structural shape is the triangle.

- A bridge that is symmetrical is less likely to twist when loaded and hence will probably carry more load.

- If you aren't sure if your bridge will be stable, test it yourself - span it across two tables set about 500 mm apart, and press down on the top of the bridge in the middle of the span.

- The winning bridge at this competition in 2014 held 158.8 kg (350 pounds). The record for a bridge with only 150 sticks is 321.9 kg (710 pounds)!