

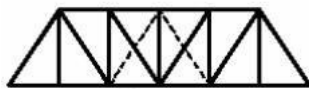


ENGINEERS &  
GEOSCIENTISTS  
BRITISH COLUMBIA

# POPSICLE STICK BRIDGE EVENT RULES & INSTRUCTIONS

ORGANIZED BY THE TRI-CITY BRANCH OF  
ENGINEERS AND GEOSCIENTISTS BC

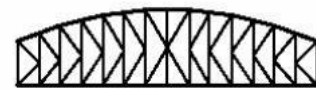
**Submission deadline, April 6<sup>th</sup> 2024**



Pratt



Parker



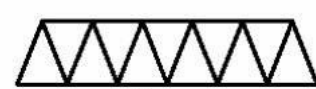
K-Truss



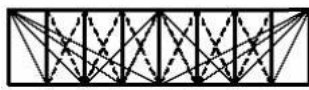
Howe



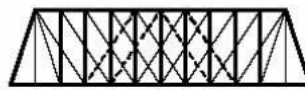
Camelback



Warren



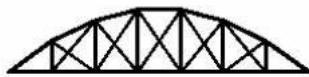
Fink



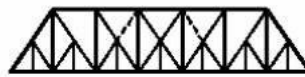
Double Intersection Pratt



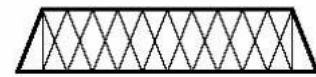
Warren (with Verticals)



Bowstring



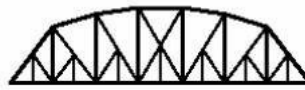
Baltimore



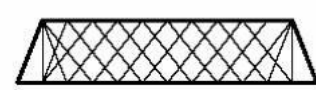
Double Intersection Warren



Waddell "A" Truss



Pennsylvania



Lattice

**“Logic will take you from A to B. Imagination will take you everywhere”.**

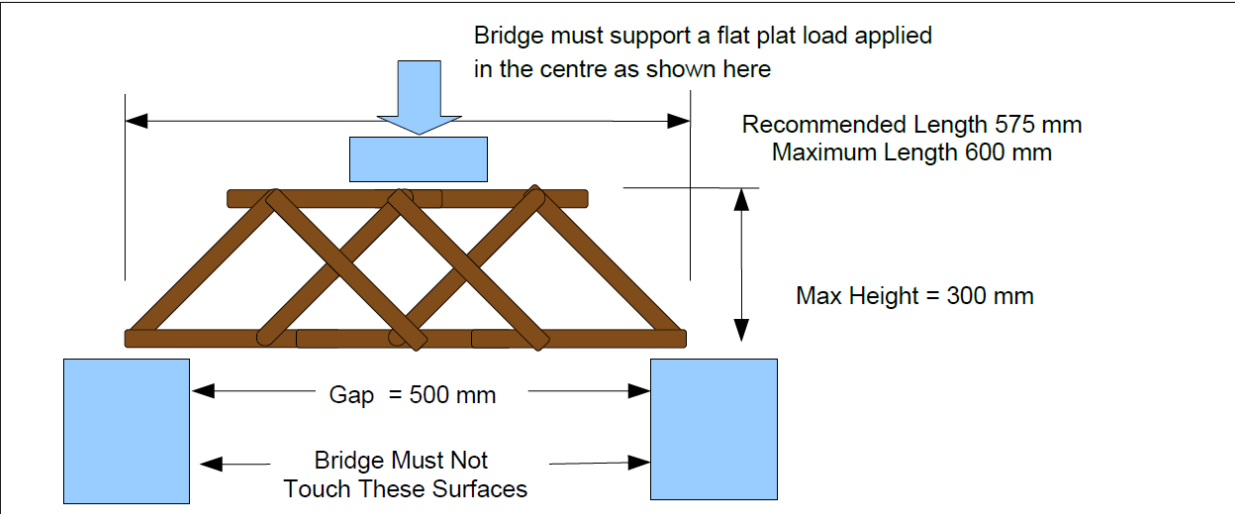
**- Albert Einstein**

**DESIGN BRIEF**

The goal of the activity is to construct the strongest bridge possible with 100 Popsicle sticks and white school glue provided in the kits. The bridge must span a 500 mm gap with a maximum height of 300mm, the deck of your bridge must also have a clear path, 50 mm wide and 75mm high for the test apparatus. The design and construction of the bridge is left up to the competitor.

Loading on the bridge can only be applied parallel to the decking distance as shown below. Adjustments to the loading position will not be made.

Specifications are included in the official event rules below.



# OFFICIAL EVENT RULES

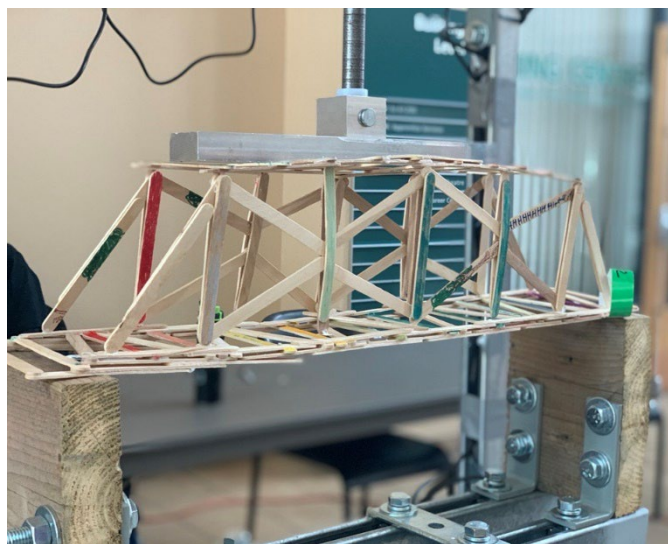
## SUPPLIES

The materials kit consists of 100 popsicle sticks approximately **11 cm long and 1 cm wide** and School Glue. The bridge to be built with only provided supplies. Using additional materials than the one provides in the material kit will disqualify the bridge from the competition.

## CONSTRUCTION

1. The bridge is to be built with **the 100 Popsicle sticks and glue provided**. Popsicle sticks must be used whole and without alteration. No cutting, grinding, or sanding is permitted. No other construction materials are allowed, including screws, pins, nails, wire, and string.
2. Refer to the image on page 2 which shows the testing apparatus and the required dimensions of the popsicle bridge. It is critical that the bridge spans the minimum 500mm gap. It is recommended that the bridge be at least 575mm long (the landing pad is 38.1mm) to ensure that the bridge does not fall through the 500mm opening when the load is applied. The maximum length of the bridge is 650mm. The bridge should not exceed 125mm in width. The bridge should not exceed 300mm in height. The bridge depth to be no more than 150 mm below the landing pads.

3. Bridge must have a clear path on the top, 20 mm in diameter, for the load leg of test machine to travel straight down and connect to the removable load foot. To position the load foot, the deck of your bridge must also have a clear path, 50 mm wide and 75mm high. The load foot is 38.1 mm wide and 300 mm long. The load foot will be oriented in the same direction as the length of the span. The loading foot normally applies force to the deck of the bridge but can also apply force to the top of your bridge. If unclear, please indicate where you want force to be applied on your bridge. Force will not be applied to the side trusses. The deck of your bridge does not have to be completely covered in sticks. You may add construction paper to the deck area.



4. Write your registration information on a small piece of paper and tape it to your bridge.
5. Bridges not following the rules above will not be permitted to compete in the competition and is not eligible for prizes.

## TEST PROCEDURE:

1. Testing will be performed by the judging panel and recorded. The strongest bridge is the bridge that holds the highest load at failure. All bridges will be destroyed during testing!
2. Test results will be announced during the in-person event on April 6<sup>th</sup> from 10AM to 2PM. Registration for this event is required and details will follow via link on the EGBC website: <https://www.egbc.ca/Events/Events/2024/TC1APR24>

## BRIDGE BUILDING ADVICE

- 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 binder clips to clamp the sticks together (clamps must be removed before testing).
- 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 Port Mann Bridge, the Second Narrows Bridge, and the Queensborough Bridge. The Lions Gate Bridge and Alex Fraser Bridge are not good examples to follow because they are suspension bridges and rely on cables.
- Research the internet and your local library for excellent 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 a triangle. In your design consider which stick will be in tension or compression when your bridge is tested. Compression is the type of force that your arms feel when you do a handstand. Tension is the type of force your arms feel when you hang from the monkey bars. Remember that long structural members will stay straight under tension but may buckle under compression.
- A bridge that is symmetrical is less likely to twist when loaded and hence will probably carry more load.
- By the time you have completed your bridge project, you will have learned a lot about construction and how you might improve in the future. You might even want to first build a smaller trial bridge with popsicle sticks and white glue from the dollar store.
- If you aren't sure if your bridge will be stable, test it yourself - span it across two tables 500 mm apart, and press down on the top of the bridge in the middle of the span. Just be careful not to break your untested creation!
- In past years, the strongest bridges have held over 300 kg (660 pounds). The all-time record for a bridge with only 75 sticks was 322 kg (710 pounds) and with 100 sticks was 415 kg (915 pounds)!

**“Your limitation – It’s only your imagination.”**