

POPSICLE BRIDGE BUILDING COMPETITION SHOWCASE

HOSTED BY THE TRI-CITY EGBC BRANCH

April 1, 2023
9:00 AM – 3:00 PM
Douglas College Coquitlam,
1250 Pinetree Way, Coquitlam, BC V3B 7X3

This event will feature a presentation of popsicle stick bridges built by students, announcement of test results, science tutorials, and remarks about the engineering and geoscience profession.

To find out more or to register, email us at **outreach.tc@volunteer.egbc.ca** or at **egbc.ca/Events/Branch**.



ENGINEERS &
GEOSCIENTISTS
BRITISH COLUMBIA

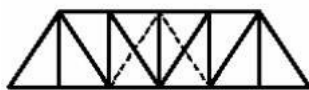


ENGINEERS &
GEOSCIENTISTS
BRITISH COLUMBIA

POPSICLE STICK BRIDGE EVENT RULES & INSTRUCTIONS

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

Submission deadline, April 1st, 2022



Pratt



Parker



K-Truss



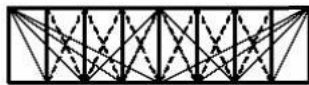
Howe



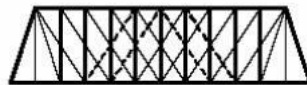
Camelback



Warren



Fink



Double Intersection Pratt



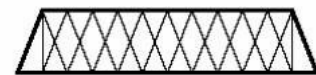
Warren (with Verticals)



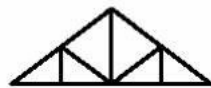
Bowstring



Baltimore



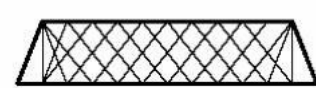
Double Intersection Warren



Waddell "A" Truss



Pennsylvania



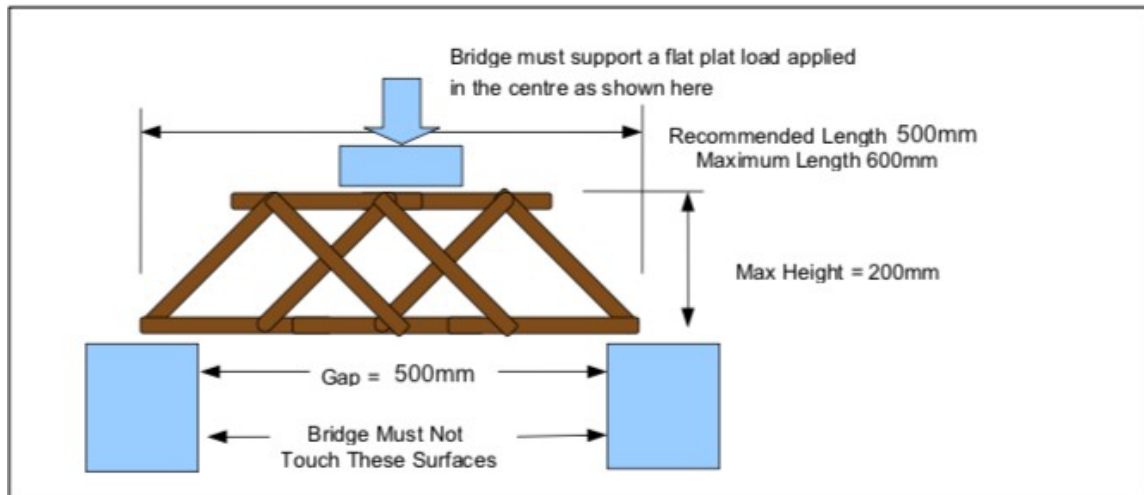
Lattice

“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 (or similar). The bridge must span a 500 mm gap with a maximum height of 200mm, 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. Specifications are included below.



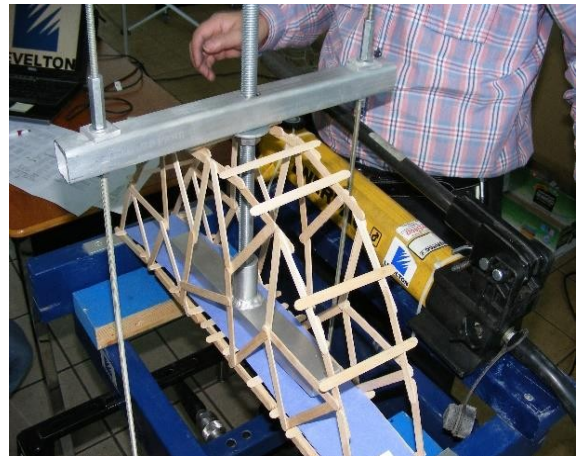
OFFICIAL EVENT RULES

SUPPLIES

The materials kit consists of around 100 popsicle sticks **11.3 cm long and 1 cm wide**.

CONSTRUCTION

1. The bridge is to be built with **100 Popsicle sticks** and **white school glue such as Titan School Glue, Elmer's School Glue or similar**. 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 graph on page 2 which shows on blue the testing machine and on gray the test load applied to the bridge. It is critical that the bridge **to span a minimum 500mm gap**. It is recommended that the bridge to be **at least 575mm long** (the landing pad is 38.1mm) to ensure that bridge does not fall through the 500mm opening when the load is applied. There is no maximum length for the bridge. **The bridge not to exceed 125mm in width. The bridge not to exceed 200mm 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.
4. The load 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.
5. Paint, markers, crayons decoration of bridge is encouraged.
6. **Write your registration information on a small piece of paper and tape it to your bridge**



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 1st from 9AM to 3PM. Registration for this event is required and details will follow via link on the EGBC website.

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 will 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. Also the strongest structural shape is a triangle. Consider in the design of your bridge, which sticks 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 a dollar store.
- If you aren't sure if your bridge will be stable, test it yourself - span it across two tables at 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.”



TRI-CITY BRANCH POPSICLE STICK BRIDGE COMPETITION

REGISTRATION AND CONSENT FORM

Judging/Competition Date: Saturday April 1, 2023

1. A non-refundable \$5.00 registration fee for each bridge entry, whether individual or team, must be submitted with this Registration and Consent Form.
2. Maximum of four members in a team.
3. Frequently Asked Questions, full competition rules and construction hints are available at egbc.ca/tc
4. For further information, please contact us by email outreach.tc@volunteer.egbc.ca
5. Each individual contestant, whether solo or team, must complete this form and have it signed by a parent or guardian before picking up the bridge kit.
6. **Submit** registration at any Tri-city Public libraries (Locations to be announced)

PARENT CONSENT

To be allowed to participate, you must grant permission 1) for this child to participate in the Popsicle Stick Bridge Building Competition, 2) for this child to have his/her photo or video taken at the event, and 3) for any of those photos to be used for Engineers and Geoscientists BC and Douglas College informational materials including printed publications, web sites and social media. No names will be used. You, or a responsible adult, must be present at the competition site at all times, and are responsible for the safety and well-being of the child.

I, the undersigned parent or legal guardian of _____ (child's name), hereby consent my child to enter the Popsicle Stick Bridge Building Competition, am aware of my responsibilities, and consent to having the child's photo or video taken.

Parent/Guardian Signature

Date

REGISTRATION FORM

Engineers and Geoscientists BC Tri-City Branch 2020 Popsicle Stick Bridge Building Competition (Apr 1, 2023)

Student Name (First, LAST)			
School			
Grade			
Entry Type (Please tick selection)	<input type="checkbox"/> Individual <input type="checkbox"/> Team Team Name (if applicable): _____ If Team, please include names of other team members: 1. 2. 3.		
Parent/Guardian Emergency Contact Information			
Parent Name (First, LAST)			
Email			
Phone Number			
Mailing Address			
Medical Alerts, Allergies (if any). Disabilities or special concerns we should be aware of.			
How did you hear about our competition?	<input type="checkbox"/> School	<input type="checkbox"/> Library	<input type="checkbox"/> Word of Mouth
	<input type="checkbox"/> Previous Entry	<input type="checkbox"/> Other explain:	