



RICHMOND/DELTA BRANCH POPSICLE STICK BRIDGE CONTEST



LANSDOWNE PARK SHOPPING CENTRE MARCH 4, 2007

Event will **start at 12:00 pm** and bridges will be tested on a First Come First Serve basis. Note that bridges **must be checked in by 2:30 pm** to be included in the competition.

Category/Event	1st Prize	2nd Prize
Elementary* (under 13 years old)	\$100.00	\$50.00
Secondary (14 to 18 years old)	\$100.00	\$50.00
Open (19 years and older)	\$100.00	\$50.00

- Children under 13 must be accompanied by an adult.
- Most interesting bridge award (all bridges will be judged by a panel and an award will be given to the most interesting design)

Prizes:

- ❖ **Winners must be present to claim prizes.**
- ❖ Category prizes to be awarded following completion of testing of all bridges.

The goal of the contest is to construct the strongest bridge possible with 100 Popsicle sticks and white glue. The bridge must span a 500 mm gap with a maximum height of 150mm, and a matchbox car must be able to cross the bridge on a deck made of construction paper. Otherwise, the design of the bridge is left up to the competitor. Specifications are included on the following page.

Anyone is welcome to participate.

Participants are encouraged to start building the bridge early. Contestants may participate as individuals or as teams. For more information, please email us at rd@apeg.bc.ca or visit our website at www.apeg.bc.ca/rd/

For ideas and general information about bridges, check out www.bridgesite.com/funand.htm
Also check out <http://bridgecontest.usma.edu/> for a free bridge design program.

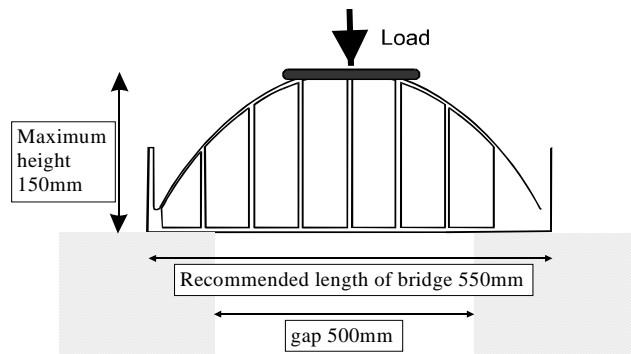
OFFICIAL CONTEST RULES

Registration:

1. Each bridge built by a team or an individual contestant is considered as 1 entry. All entries must be registered in advance by email. Registration is free.
2. **Email the requested contestant information (see the registration information form) back to rd@apeg.bc.ca by the deadline shown on the registration.**

Construction:

1. Start early, as you will have to build the bridge in steps. It would be difficult to build it before letting previous glued joints dry due to the varying orientations of surfaces to be glued.
2. Participants can purchase their own bridge building supplies from craft, hobby, or dollar stores. You will need popsicle sticks, glue, and a sheet of construction paper (for the deck).
3. The bridge must be built with a maximum of 100 popsicle sticks and **white all-purpose glue or white wood glue (i.e. Elmer's, LePages, etc.). No other glues will be accepted.** Only standard sized popsicle sticks can be used to build your bridge. A standard sized popsicle stick measures 11.3 cm long and 1 cm wide. Popsicle sticks with different dimensions will not be accepted.
4. Popsicle sticks must be left whole. The sticks may not be altered and the sticks must not be coated with glue except at the glued joints.
5. The bridge must have a deck made from construction paper that must be wide enough for a matchbox car to roll across the bridge.
6. The bridge must span a 500mm gap. We recommend that the bridge **be at least 550 mm long** to ensure that the bridge does not fall through the 500mm span when the load is applied (please see the diagram below).
7. The bridge **must not be taller than 150mm.**
8. The highest centre portion of the bridge should be designed to support a 10cm wide loading plate.
9. The bridge must bear a minimum load of a 2 kg weight (otherwise, it will break before you start testing!).
10. Bridges will be inspected at registration check-in. Any violations of the rules outlined above will result in disqualification from the official contest and you will not be eligible for prizes. However, the contestant(s) will still be allowed to participate by unofficially testing their bridge.



Testing the Bridges:

1. Bridges will be weighed at check-in before being tested. If there is a tie, the lightest bridge wins.
2. Bridges will be loaded on top with a loading plate and hanger connected to a jack located below the bridge. The load is applied by operating the jack to put pressure on the loading plate. The amount of load carried is measured electronically.
3. All contestants (and parents) in the testing area must wear protective eyewear (provided).
4. The contestant (or a parent in the elementary class) will test their own bridge. The winner is the bridge that holds the largest load prior to failure.
5. All bridges will be destroyed during testing unless the contestant decides to stop (to save their bridge!). So, if you want a photo of your bridge, make sure you have it done before testing!

Teams:

1. The oldest team member will determine the team's age category (except for parents accompanying contestants in the elementary category who are not considered to be "team" members).
2. **ALL** members of the team must be signed up on the registration form. Otherwise winning certificates may not be issued to team members who are not identified prior to the deadline.



RICHMOND/DELTA BRANCH POPSICLE STICK BRIDGE CONTEST

**(LANSDOWNE PARK SHOPPING CENTRE, Mar 4, 2007)
BRIDGE BUILDING GUIDELINES**

- 1 **Please email the registration information by the deadline.** Include your name(s) using the spelling that you want to appear on certificate for winning entries. Note: Registration will not be available on the day of the contest.
- 2 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 testing).
- 3 The gap that your bridge has to span across is 500 mm. **We recommend the overall length of the structure to be at least 550 mm. The maximum height of the bridge is 150mm.**
- 4 For bridge ideas look around at real bridges. A Popsicle stick bridge is of course much smaller, but the same principles apply (remember that for a real bridge, the important part is not the deck that the cars drive on, but the steel or concrete structure that supports the deck). 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 rely on cables.
- 5 Your bridge needs to have a solid, stiff shape in all 3 dimensions. Engineers call this "maximizing the moment of inertia" of your structure. For example, take a Popsicle stick on its flat side and have it overhang from the edge of a table. Then, apply a bit of force with your fingers at the loose end and notice the deflection of the stick. Now, try the same thing; but, this time place the stick on its edge and try to bend the stick now. Notice how the stick is much stiffer and stronger when on its edge?
- 6 A bunch of sticks glued together flat, like a raft, has very little strength and will sag during testing under very little load.
- 7 The strongest structural shape is the triangle. A bridge which is made of a series of triangles will be very strong.
- 8 A bridge that is symmetrical is less likely to twist when loaded and hence will probably carry more load. Remember that cross-bracing will help to reduce twisting and premature collapsing.
- 9 Bridges which are built too tall will have a high moment of inertia (which increases stiffness and strength - a good thing); however, they may become unstable under a load (a bad thing). This may cause your bridge to twist or topple to one side and...well, you can guess. 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. How stiff does it feel? Does it want to twist sideways and fall over?
- 10 Research the Internet and your local library for excellent bridge reference information to help you design your bridge.
- 11 **In past years winning bridges at this competition held over 300 kg (660 pounds). The record for a bridge with only 100 sticks is 321.9 kg (710 pounds)!**