Bridge Specifications and Contest Rules

SCOPE/ DESIGN OBJECTIVE:

Design a bridge from 100 popsicle sticks with the highest possible load capacity to weight ratio that also meets the required specifications for its geometry.

ALLOWED BUILDING MATERIALS:

Teams are allowed to only use the following construction materials to build their bridges:

- 100 popsicle sticks (i.e. a maximum of 100 sticks may be used)
- 1 – 120 mL bottle of white glue

TESTING LOCATION:

Structures Lab (Room 1C01, Engineering Building)

CONTEST REGISTRATION:

Participants shall indicate their interest in the contest either by email to communications@cscesaskatoon.com, or by registering in person at the Civil & Geological Engineering Department office (3B48 Engineering). Registrations shall be accepted up until the start of the competition.

Building material kits are provided (at no cost) by CSCE Saskatoon, and are available from the Civil & Geological Engineering Department Office (Room 3B48). Teams are also allowed to purchase their own building supplies, provided they use only the allowed materials listed above.

There are no entrance fees for student teams, and monetary prizes are awarded for the top bridges constructed by undergraduate students. The entrance fee for professional teams is $75, payable on the day of the bridge competition.

QUALIFICATION:

Bridges entries may be constructed by **individuals or groups of up to 4**. Each registered individual or group may be involved with the design and construction of only one bridge.

SPECIFICATIONS:

The following constraints apply:

- Reactions at the supports are to be vertical only; at no time may the bridge contact the vertical members of the loading frame –see Figure 1 below. The horizontal reaction initiated by such contact has been judged atypical of "truss" bridge behavior, and more characteristic of an "arch" bridge. Bridges exhibiting this arch type behavior at any point during testing will be disqualified.

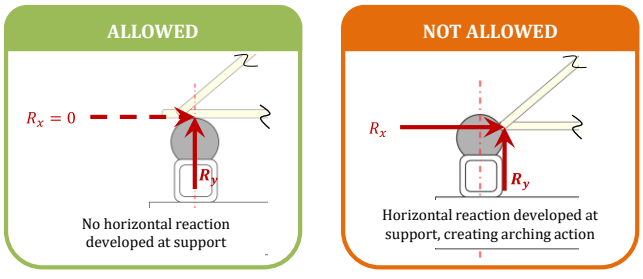
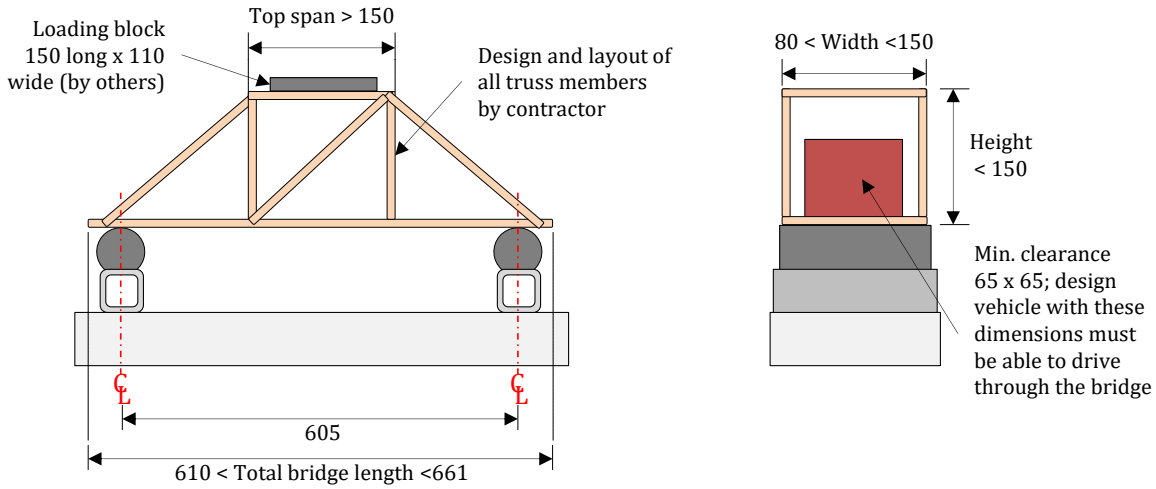


Figure 1: Bearing condition requirements to avoid arching

- Popsicle sticks may be neatly cut or split.
- Painting of the bridges is not allowed.
- All members of the bridge must be at or above the elevation of the bearing points.
- Bridges shall have a length, height, width, loading platform, and minimum clearance for traffic that comply with the dimensions shown in Figure 2 below. The placement of the bearing blocks is fixed as shown.



a) Elevation **b) Cross Section**

Figure 2: Geometric specifications and loading configuration (NTS)
(All dimensions are in mm unless noted otherwise)

TESTING:

Upon delivering the bridge for testing, participants will complete a written statement indicating the following:

1. Team name and names of all members of the design/build team,
2. Number of sticks used in construction, and
3. Predicted failure load of the bridge.

Bridges will be weighed and measured to assess compliance with the specified geometric constraints prior to testing. All bridges will then be tested to failure.

JUDGING:

During the judging process, points will be awarded as follows:

1. For the bridge with the highest applied load/self-weight ratio: up to 35 points; for second highest load/self-weight ratio: 25 points; similarly 20 for third highest, 15 for fourth highest, 10 for fifth highest, and finally 5 for sixth highest;
2. A 10-point bonus will be awarded to each team whose bridge fails within 10% of its predicted failure load ; and
3. A 15 point deduction for a bridge that does not comply with the geometric specifications provided for the contest.

Bridge Statement

Please complete the following prior to the commencement of testing:

COMPETITION:

- ☐ Professionals' Challenge
- ☐ Student Competition
  - ☐ Undergraduate students
  - ☐ Graduate students

TEAM NAME: _____

TEAM MEMBERS:

1. _____
2. _____
3. _____
4. _____

NUMBER OF POPSICLE STICKS USED: _____

PREDICTED FAILURE LOAD OF BRIDGE: _____

FOR CSCE SASKATOON EXEC. USE ONLY

WEIGHT OF BRIDGE: _____

ACTUAL FAILURE LOAD OF BRIDGE: _____

COMPLIANCE WITH SPECIFICATIONS:

610 mm < Total Length < 661 mm	*y / n*
Top Span > 150 mm	*y / n*
Height < 150 mm	*y / n*
80 mm < Width < 150 mm	*y / n*

Minimum Clearance 65 mm x 65 mm	*y / n*
All members at or above elevation of bearing points	*y / n*

OTHER NOTES (IF APPLICABLE):