

	PROFESSIONAL ENGINEERS & GEOSCIENTISTS NEWFOUNDLAND AND LABRADOR
	NATIONAL ENGINEERING AND GEOSCIENCE MONTH

<b>Main Competition Date:</b>	Saturday, March 7, 2020*		
<b>Location:</b>	Johnson Geocentre		
<b>Time:</b>	9:00 AM – 3:00 PM		
<b>Admission:</b>	<b>FREE</b>		
<p>* Check with your local NEGM chapter for exact competition date as competition time and date may vary  <b>For more updates, info, and cool facts, check us out at:</b></p> <p style="text-align: center;"><a href="http://www.modelbridgesnl.com">www.modelbridgesnl.com</a></p>			
	<b>FACEBOOK</b> Facebook.com/ModelBridgesNL		<b>TWITTER</b> @ModelBridgesNL

## MODEL BRIDGE BUILDING COMPETITION – GENERAL RULES AND INFORMATION

### 1 PRIZES

The competition is split into two levels; regional, and provincial. Each of the four regions: Eastern, Central, Western, and Labrador will host their own competition and a first, second, and third place prize will be awarded to the top three bridges within each region. Additionally, the top three entries province wide will also be awarded prizes. Awards are also given to the sponsoring schools of the winning students for their performance. Please note that cash prizes will be distributed evenly amongst teams with more than one participant. The prize structure is as follows:

#### 1.1 REGIONAL PRIZES

1 <sup>st</sup> PLACE	2 <sup>nd</sup> PLACE	3 <sup>rd</sup> PLACE
<b>\$200.00</b>  +  <b>NEGM T-Shirt</b>	<b>\$150.00</b>  +  <b>NEGM T-Shirt</b>	<b>\$100.00</b>  +  <b>NEGM T-Shirt</b>

## 1.2 PROVINCIAL PRIZES

Please note, teams of more than one person will be given the cash prize equivalent to share equally. Individual winners are permitted to choose between either the prize listed below, or the monetary equivalent.

1 <sup>st</sup> PLACE	2 <sup>nd</sup> PLACE	3 <sup>rd</sup> PLACE
\$500.00	\$200.00	\$100.00

In addition to the personal prizes, the schools of the provincial winners will also receive awards for their contribution. Prizes for schools are as follows.

## 1.3 PRIZES FOR SCHOOLS

Please note, a school is only considered to be a sponsoring school if and only if the bridge competition has been imported into the science curriculum. Winners that attend a non-sponsoring school will be awarded their personal prizes but the schools will not be recognized.

1 <sup>st</sup> PLACE	2 <sup>nd</sup> PLACE	3 <sup>rd</sup> PLACE
A STEM prize pack worth \$500.00	A STEM prize pack worth \$200.00	A STEM prize pack worth \$100



## 2 RULES

The most important thing is for you to have fun! We have to establish rules to ensure fair competition and so we can guarantee your bridge will physically fit in the testing device and be able to be tested. The following section outlines the rules for the competition. In order for your bridge to be considered competitive, it is essential your bridge is compliant with the following criteria.

### 2.1 TEAMS

Students are permitted to work teams up to and including a maximum of three students. Students must be from the same school as schools are scheduled to compete at different times throughout the day. All prizes will be shared evenly amongst team members.

TEAM CHECKLIST			
ITEM	Y	N	N/A
Team is less than or equal to three members			
All members are from the same school			
All team members between grades 7 and 9, inclusively			
Registration form completed			
All team member names on registration form			

### 2.2 MATERIALS

The only materials permitted to be used for construction are as follows. Please pay careful attention as violation will result in non-competitive status. Non-competitive bridges may or may not be tested during the competition depending on the reason for non-compliance.

**Acceptable Materials:**

- Wooden, un-painted Popsicle sticks (Dimensions: Length – 114 mm, Width – 10 mm, Thickness – 2 mm)
- White liquid school glue (Example: Elmer’s School Glue)

Note: Popsicle sticks may be marketed as coffee stir sticks or craft sticks. Product must meet the dimensions listed above; any alternates will result in non-compliance. Sticks may be cut or sanded, but **must remain unpainted**.

**Unacceptable Materials:**

- Painted or coloured sticks
- Sticks with various dimensions not conforming to those listed above
- Other adhesives

**2.3 DIMENSIONS**

It is essential bridges are constructed to meet the following minimum dimensions as some dimensions listed ensure the bridge will fit in the testing frame and allow the hydraulic ram to contact the deck. Dimensions are checked at the registration desk and bridges that do not meet the following criteria will be marked as non-competitive.

BRIDGE DIMENSIONS		
DIMENSION	MINIMUM	MAXIMUM
Length	70 cm	N/A
Width	6 cm	15 cm
Height	N/A	25 cm
Weight	100 g	N/A
<p><b>Other:</b></p> <ul style="list-style-type: none"> <li>• The bridge must contain an opening in the top-middle of the bridge (<b>NOT</b> in the bridge deck) that meets the following dimensions. This ensures the hydraulic ram can successfully contact the bridge deck to apply the testing load: <ul style="list-style-type: none"> <li>▪ Minimum Length = 12 cm</li> <li>▪ Minimum Width = 6 cm</li> </ul> </li> <li>• The bridge deck must be flat and continuous. A small toy vehicle <b>must</b> be able to roll across the deck</li> </ul>		

To aid with bridge construction, teams may use the following table as a checklist or guide to ensure their bridges are compliant with the required dimensions. We recognize the hard work

students put into their bridges every year and we most certainly do not want to see anyone disappointed on Bridge Day!

DIMENSION CHECKLIST			
ITEM	Y	N	N/A
Bridge length at least 70 cm			
Bridge width greater than or equal to 6 cm but not more than 15 cm			
Bridge height less than or equal to 25 cm			
Opening (Access to bridge deck) included			
Deck flat and allows car to roll smoothly and unobstructed			

To aid with the dimensions given above, please refer to the following figures below for guidance.

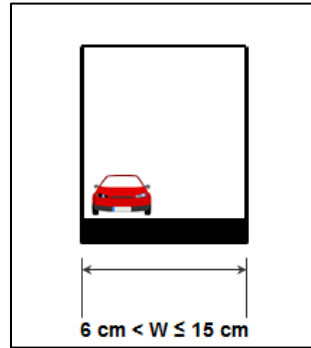


Figure 1 - Bridge Width

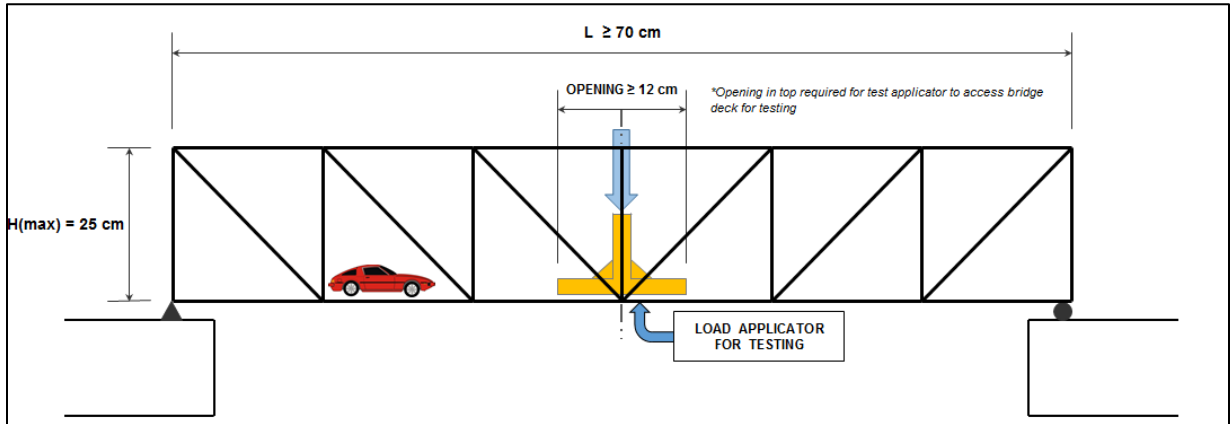


Figure 2 - Bridge Length and Height

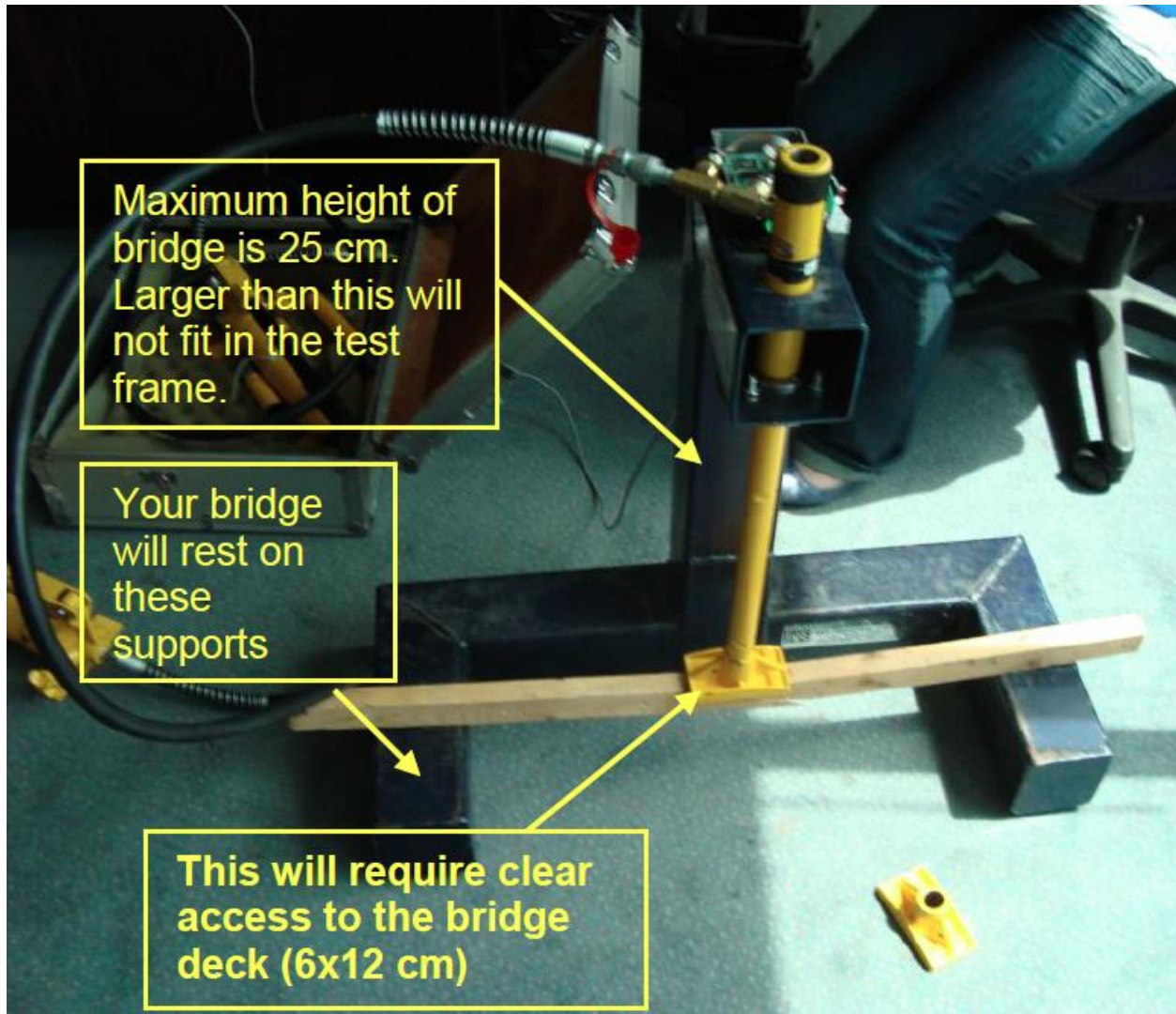


Figure 3 - Photo of Test Frame

### 3 JUDGING

All bridges are subject to evaluation by a panel of judges comprised of members of the engineering community. Judging of bridges will be based on a blended criteria consisting of judges evaluation of the bridge (dimensional compliance, neatness of construction, aesthetics, etc.), application of engineering principals, and of course the performance of the bridge. This section outlines the breakdown of the scoring criteria. The total score will be out of 100.

### 3.1 DESIGN CONSTRUCTION (JUDGES EVALUATION) – 20%

The table on the following pages outlines the judge’s scores for each bridge. It is important to note the bridge must simply rest and span across the supports.

DESIGN AND CONSTRUCTION		
ITEM	DESCRIPTION	WEIGHT
Joint Work	Are joints clean, tapered, and show good transition of members	5%
Dimensions	Does bridge appear uniform and symmetrical	5%
Test Vehicle	Does test vehicle pass freely along the bridge span	5%
Overall Aesthetics and Creativity		5%

### 3.2 APPLICATION OF ENGINEERING PRINCIPLES – 10%

The goal of this event is to promote professions in the applied science field. With this score, the judges are simply looking for how effectively the students planned their designs and if the application of engineering principles is apparent.

APPLICATION OF ENGINEERING PRINCIPLES		
ITEM	DESCRIPTION	WEIGHT
Weight Consideration	Does design show minimization of weight at non-critical points	5%
Use of Engineering Principles	Does the design show use of structural engineering principals	5%

### 3.3 STRENGTH FACTOR – 70%

Finally, the majority of the score will be weighted on the bridge’s overall performance. Bridges will be evaluated based on how much weight they can support while factoring in how much the bridge weighs. Remember, engineers do not want to waste materials!

$$\text{STRENGTH FACTOR} = \frac{\text{MAXIMUM LOAD}}{\text{MASS OF BRIDGE}}$$



The maximum load will be evaluated by testing the bridge until failure. Failure is defined as:

- The point at which the load becomes unstable on the display and starts to drop (i.e. cannot sustain the applied load. Failure is not always visible in this scenario)
- The bridge catastrophically fails

## 4 CONCLUSION

This event is meant to be fun! We would like to thank all our participants for their hard work and dedication and we wish you the best of luck. Please follow this document as a guideline and remember to have fun, be creative, and showcase your love for engineering and geoscience.

### 4.1 PARKING

As a reminder, parking is limited at the Geocentre so please plan accordingly. Admission is free for the day and we encourage the whole family to come join in the fun and excitement and take in the exhibits.