

2008 Maryland TRAC Design Bridge Challenge SPECIFICATIONS

Mission

To build a lightweight structure that can carry a lot of weight as compared to the weight of the structure.

THREE LEVELS OF ENTRY

7 th and 8 th grade	Span length 10 inches	Max bridge weight 200 g
9 th and 10 th grade	Span length 15 inches	Max bridge weight 300 g
11 th and 12 th grade	Span length 20 inches	Max bridge weight 400 g

Each bridge shall be built using craft sticks (supplied in your kit) and glue (supplied by participant). Additional craft sticks may be purchased and used as long as they are identical to the craft sticks provided.

Each bridge shall be built to have a clearly defined roadway path capable of passing a vehicle 1 ½" (W) x 1 ½" (H) unimpeded for its full length. If the structure does not meet these criteria, then it will not be considered a qualifying bridge.

Each bridge will be supported on a load frame supplied by the judges (specifications included). The load frame shall be the sole means of support for the bridge. Any bridge found to gain support from an area other than the load frame shall be classified as loaded to failure.

At the contest, each participant will install a load transfer device (LTD - supplied at the contest – but similar to the one supplied in your kit) in the middle of the span and along the clearly defined roadway path. The load transfer hook at the bottom of the device must be accessible to allow attachment of the load. Replacement of the LTD will be allowed if the LTD fails before the bridge fails. Each participant should have someone with them who will assist with applying load to the bridge. Weights will be supplied by the judges. Only the contestants and their assistants may load the bridge. Note the LTD provided in your kit is only to provide you with a means of testing your bridge prior to the competition and to ensure that your bridge is built to accept an LTD.

Each qualifying bridge will be loaded to failure (as determined by the judges).

The competition winner in each category (see table above) shall be determined using the following criteria:

All bridges shall be weighed by the judges before any load is applied; no LTD may be attached to the bridge at this time. All bridges shall be loaded to failure by the participant while under review by the judges. Once the bridge fails, the judges shall take the highest load held by the bridge (the load prior to the one that caused the bridge to fail) and divide that load by the previously determined weight of the bridge to establish the bridge's efficiency index. The bridge with the highest efficiency index will be the winner. In case of a tie the bridge that held the heaviest load of the tied contestants shall be the winner.

Example of efficiency index calculations to determine winner - (Highest ratio wins)

Bridge A weighs 198 g and holds 50 pounds - index equals $50 / 198 = .2525$

Bridge B weighs 170 g and holds 45 pounds - index equals $45 / 170 = .2647$

Bridge B would be the WINNER!

Where do we construct our project?

Teams are asked to construct the project and deliver it to the bridge building challenge on November 1, 2008.

DESIGN AND TECHNICAL FREQUENTLY ASKED QUESTIONS

How will failure be determined?

Generally failure is defined as the point at which the structure is no longer capable of supporting the load.

Deflection, distortion or even the separation of jointed members does not constitute failure as long as the bridge still provides the sole means of support of the load. The judges are the only ones to make a determination relative to bridge failure.

What constitutes a clearly defined roadway path?

The intent is to have participants build a bridge and not some other type of load carrying structure (load frame). It is not necessary to build a riding surface out of craft sticks across the bridge (you are welcome to do so if you

believe it will help to create a more efficient bridge). The judges will have a piece of thin cardboard 1 ½ “ wide and long enough to go from one end of your bridge to the other.

Contestants will place this card stock across their bridge to help define the roadway path for the judges. This card stock may not be present during loading.

Remember your LTD must be situated on this roadway path for loading.

How is the 10” (15” or 20”) span length measured?

In the case of the 7th and 8th grade contest where the span length is set at 10”, the 10” will be measured from inside face of end support to inside face of end support on the load frame.

Basically if your bridge is only 10” long, then it will be too short to be supported on the end supports. These end supports will be made from 2” x 6” lumber which measures about 1 ½” wide by 5 ½” high.

Can the bridge contact the inside face of the end support during loading?

Yes, the requirement for support is that the load frame be the sole means of support for the bridge. Since the inside face of the 2” x 6” is part of the load frame, it too can be used to support your bridge.

What is the length of the 2” x 6” end support on the load frame?

Not applicable for this challenge. The intent is to have you construct a bridge such that the two 2” x 6” end

supports space to match your designated span length (10”, 15” or 20”) support the bridge.

How tall is the load frame?

The load frame is about 4’ tall from floor to top of end support. This should give you ample room to hang weights on the LTD. The load will be level (as determined by the judges) from one support to the other.