BUILDCON

Task:

Design a UNDER-ARCH-BRIDGE using Popsicle sticks, Fevicol adhesive that can sustain the maximum possible load satisfying the understated constraints.

Figure 1

Specifications:

All Dim in mm
A= ABUTMENT

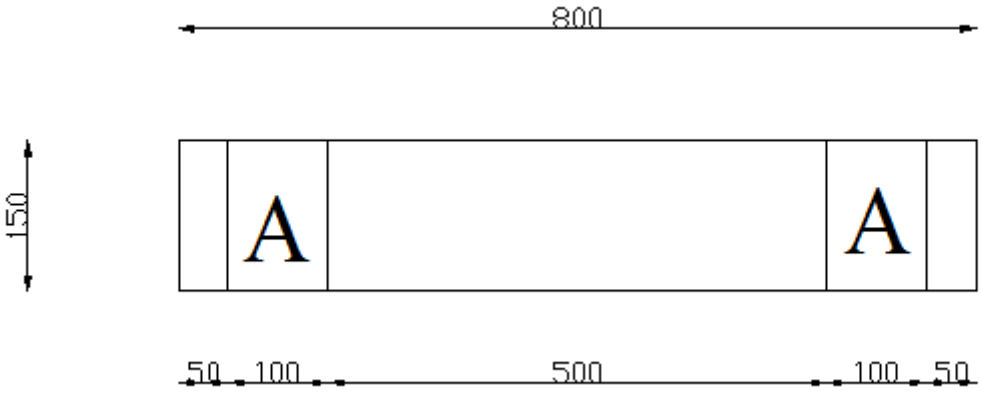

Figure 2: PLAN

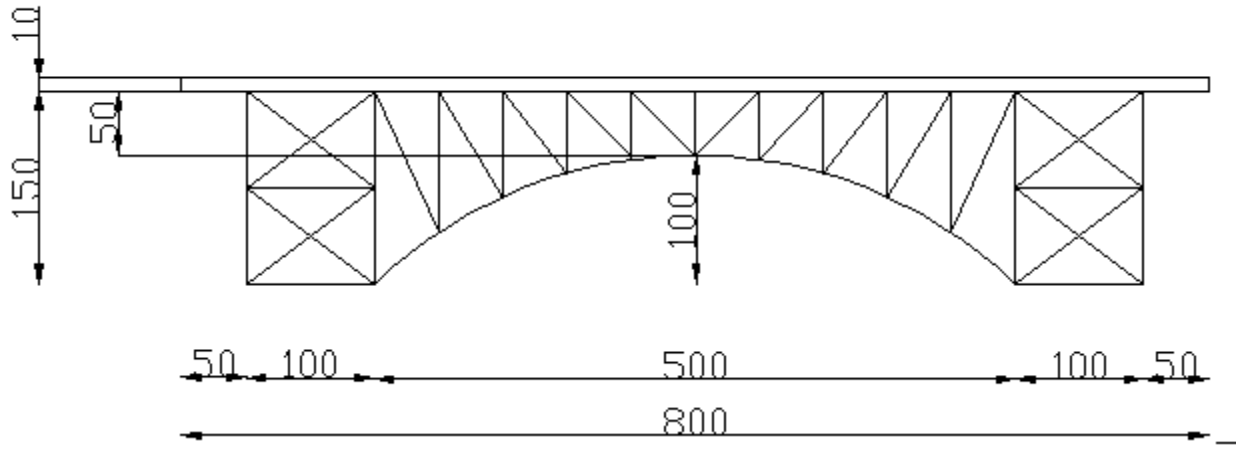

Figure 3: ELEVATION

Design Constraints:

Bridge in General:

1. The UNDER-ARCH-BRIDGE must be of **length 800 mm** with a tolerance of **+/- 10 mm**.
. The **maximum breadth (B)** of the bridge should be **150mm** with a tolerance of **+10mm.**

2. The bridge must have a parabolic arch and the clear **span (S)** must be exactly **500mm** with a tolerance of **+/-10 mm** and height of the crown of the arch must be 100 mm from the base level (excluding the thickness of the deck slab).

3. The roadway should be continuous and should allow a **130 mm x 200 mm** hypothetical vehicle to pass the entire length of the bridge.

4. Total **vertical height (h)** of the bottom chord of the bridge from the base of the **Abutment** must be **150 mm.** (**Penalty**: 10% of load for breaking this rule.)

5. The dead mass of the bridge should not exceed 2.5 kg.

ABUTMENTS

1. The **Abutments** should be exactly **vertical** and the cross section of the **Abutments** should be of uniform dimension 100 mm * 150 mm.

2. The **Abutments** must be in rectangular shape and it should not be a complete solid structure i.e. there should be more than 50% space free in the vertical part of the **Abutment** which is perpendicular to the deck.

Deck:

1. The deck of the bridge must be **10 mm** thick with a tolerance of **2 mm** excluding the thickness of the beams which are provided at the bottom of the deck slab whose members are made of Popsicle sticks.

2. Projections of **50 mm** must be present at the both the ends of the bridge as measured from the outer surface of the column. (As shown in the figure)

Arch criteria

1. The arch must span for **500 mm** with tolerance of **10 mm** along the length and **100 mm** should be the height of the crown.

Material Constraints:

1. **Popsicle** sticks (maximum length 120 mm, width 12 mm and thickness 2 mm) and **Fevicol** MR White adhesive should only be used to build the structure. The Popsicle sticks can be cut or trimmed to any shape or size.

2. Adhesive can only be used to join Popsicle sticks together; Adhesives cannot be applied on the Free surface of a member made of Popsicle sticks to increase its strength.

3. The team will be disqualified if found using any other material other than those specified. (In any part of the structure)

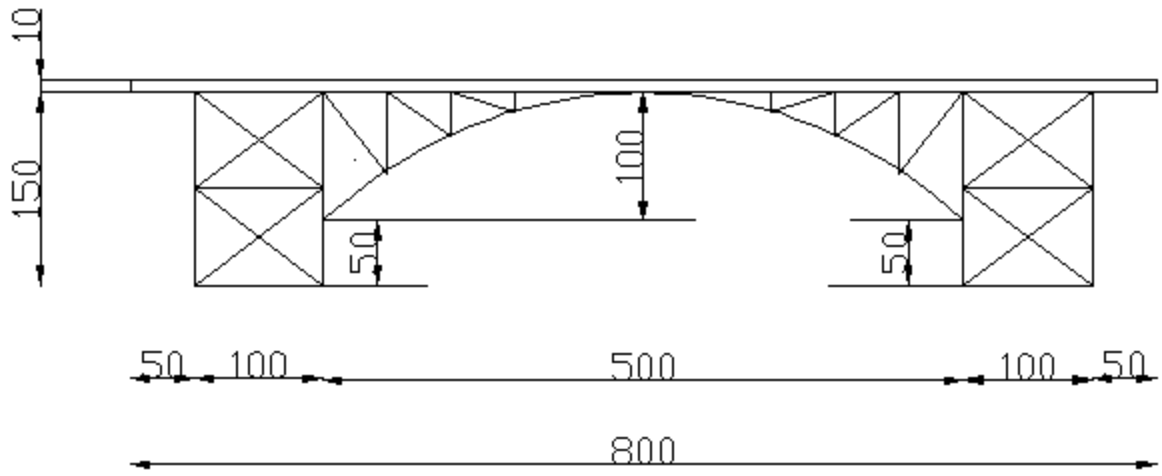

Figure 4: ELEVATION

Game play:

Testing:

Teams will be given 20 minutes to make final changes in their structure before the testing, and once the changes are done, the structure will be weighed. After weighing is done no changes can be made in the structure.

Test 1:
The dimensions of the structure will be measured.

All construction and material requirements will be checked prior to testing. Bridges failing to meet these requirements and constraints will be disqualified or penalized accordingly.

Test 2:

Rolling load will be applied along the length of the deck using a controlled mechanism.

Test 3:

Loading will be done with the load placed along the length of the bridge.

(**Note** that the loading mechanism might change according to the circumstances during the competition but the mechanism won't affect the results.)

Definition of failure:

The structure is considered failed when any of the following happens.-

- The loading machine registers maximum load if the crack occurs at any component of the bridge or bridge deck or the structure fails to follow any of the mentioned constraints.

- Vertical Deflection of the centre of the beam exceeds 50 mm.

Rules:

1. Shape - the deck should be rectangular in the longitudinal direction.
2. Once the structure is weighed, you are not allowed to modify your structure in any way.
3. If any of these constraints are not met, point deductions (as mentioned) or disqualification may be imposed at the sole discretion of the organizers.
4. Any team that is not ready at the time specified will be disqualified immediately.
5. Judges decision shall be final and binding on all.
6. The organizers reserve all rights to change any or all of the above rules as they deem fit.
7. Change in rules, if any will be highlighted on the website and will be mailed to all the registered participants.

Judging Criteria:

The judging of the structure is based on 3 important criteria:

1. Dead mass of the Bridge (M) in kg

2. Vertical Deflection of the centre of the bridge deck during failure (D) in mm
Load carried by the structure before failure (L)

3. If the structure carries ‘A’ kg load before failure and has incurred a penalty of ‘B’ kg, the corresponding team will be awarded the ‘E’ score where Structural Efficiency E = (A-B)/M points. Bridges will be ranked according to ‘E’.(the vertical deflection not satisfying the criteria will be converted in penalty “P” kilograms which will be decided by the judging committee.

Team Specifications:

A team may consist of a maximum of 4 members. Students from different educational institutes can form a team. Registration can be done before the event and even spot entries are welcomed.

Eligibility

All students with a valid identity card of their respective educational institutes are eligible to participate in this competition at NEEV 2015.

Certificate Policy

1. Certificate of excellence will be given to the top 3 winners.
2. Certificate of participation will be awarded to all.
3. Disqualified teams will not be considered for any certificates.