Popsicle Stick Bridge

Structural engineers design buildings and bridges to support different types of loading like people, cars, trucks, wind and earthquakes. They design with different types of materials (concrete, steel, wood, and masonry) and different types of member orientation (trusses, frames, beams, and columns).
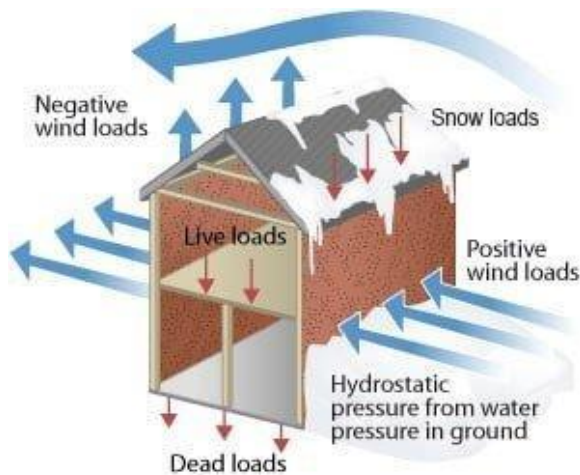

Figure 1: Truss bridge   Figure 2: Building loads

Objective: Design a simple wood truss bridge

Materials: Each group will provide their own supply of Popsicle sticks. There are no restrictions on the type of glue used. Glue may be used only to join members at joints, and to glue Popsicle sticks together lengthwise for lamination. Glue may not be used to reinforce members.

Restrictions

- Bridge supports are 24" wide and bride must sit on the supports
- The bridge will be loaded from above using a rectangular loading plate. The loading plate is 16- 1/2" long by 5" wide. Bridge design must allow for loading using the plate at two or more nodes per truss
- Members must be made of Popsicle sticks only
- Bridge must be a truss configuration
- The maximum height of the bridge above the abutments is 9 inches.
- The maximum width of the bridge is 5 inches.
- The maximum length of the bridge is 30 inches.
- No part of the bridge may extend more than 4.25 inches below the abutments. No more than 4 pieces of wood can be laminated together lengthwise to make a single member
- The bridges cannot be painted
- Laminated Popsicle sticks members may be used by gluing together Popsicle sticks lengthwise
- There is no upper limit on the length of individual pieces of wood, or the length of an individual member
- Popsicle sticks may be cut.
- The bridge may be "shimmed" using Popsicle sticks and/or cardboard to improve its alignment in the testing apparatus
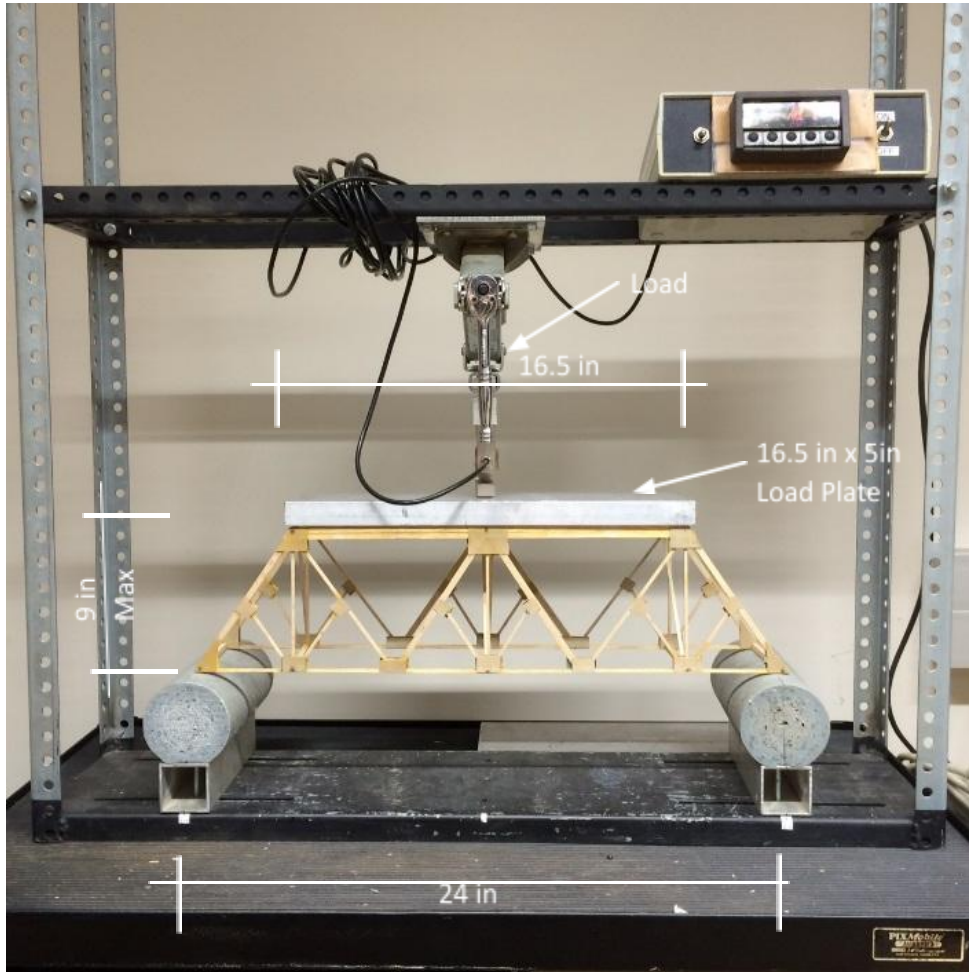- Not abiding by these restrictions can lead to point deduction or disqualification.

Figure 3: Test setup (note this is an example with balsa wood not popsicle sticks)

Scoring Criteria

Criteria	Value
Weight (as a mass) (g)	
Load (lb)	
Efficiency ratio (lb/g)	

1) Capacity will be based on the largest load the bridge can take

2) Efficiency will be based on the ratio of the capacity to the weight of the bridge