



# 2003 Bridge-Building Competition

<http://www.iit.edu/~hsbridge>

These rules have been developed by the International Bridge Building Committee. Questions about these rules may be directed to Ms. Pamela Lorentz by e-mail at [scimompl@aol.com](mailto:scimompl@aol.com) and Mrs. Ava Innerarity-Rosales by e-mail at [ainnerarity@sbab.dade.k12.fl.us](mailto:ainnerarity@sbab.dade.k12.fl.us)

The object of this contest is to see who can design, construct and test the **most efficient** bridge within the specifications. Model bridges are intended to be simplified versions of real world type bridges which are designed to accept a load in any position and permit the load to travel across the entire bridge. In order to simplify the model bridge design process, the number of loading positions are reduced to two, and to allow the contest to proceed in a reasonable amount of time only one loading position is actually tested. These simplifications do not negate the requirement that the **bridge must be designed to accept a load at both of the positions**. Bridges determined by the judges to not meet this requirement will be disqualified and tested as unofficial bridges. Like many bridges in Chicago, this year's bridge will be a "double decker" with upper and lower loading planes.

## 1. Materials

- a. The bridge must be constructed only from the 3/32 inch square cross-section basswood and any commonly available adhesive.
- b. The basswood may be notched, cut, sanded or laminated in any manner but must still be identifiable as the original wood.
- c. No other materials may be used. The bridge may not be stained, painted or coated in any fashion with any foreign substance.

## 2. Construction

- a. The bridge mass shall be no greater than 25.00 grams.
- b. The bridge (see Figure 1) must span a gap (**S**) of 300 mm, be no longer (**L**) than 400 mm and be no taller (**H**) than 70 mm above the support surface. The bridge structure may project a maximum (**B**) of 30 mm below the support surfaces (see Figure 1).
- c. The bridge must be constructed to provide support for the load (see section 3b) at each of the two loading positions described. Any portion of the structure below the loading planes must provide clearance for the threaded rod of the eyebolt which extends below the loading plate (see Figure 2).

- d. The bridge will have two loading planes, the lower one will lie a distance (**L**) 20 to 30 mm **below** the support surface and the upper one will lie a distance (**U**) of 30 to 50 mm **above** the support surface. The load will be applied at the center of the span, with the center of the plate at one of two possible loading locations: The center of the upper loading plane and the center of the lower loading plane.

### 3. Loading

- a. On the day of the contest, an independent judge will decide which one of the two loading positions will be used. The same loading position will be used for all bridges. Competition loading will stop at 50 kg. However, loading will continue until bridge failure (see 4d).
- b. The load will be applied by means of a 40 mm square plate that is at least 6 mm but less than 13 mm thick. A 9.53 mm (3/8 inch) diameter eyebolt is attached from below to the center of the plate (see Figure 2). During loading, the edges of the loading plate will be parallel to the longitudinal axis of the bridge. The load will be applied by means of a loading rod hanging from the eyebolt described above.

### 4. Testing

- a. The bridge will be placed on the support surfaces.
- b. The loading plate will be placed at the specified loading position as determined on the day of the contest.
- c. The load will be applied from below, as described in section 3 above.
- d. Bridge failure is defined as the inability of the bridge to carry additional load, or a load deflection of 25 mm under the loading location, whichever occurs first. If a bridge has leg(s) which fail, the bridge will have failed regardless of deflection.
- e. The bridge with the highest structural efficiency,  $E$ , will be declared the winner.  
 $E = \text{Load supported in grams (50,000g maximum)} / \text{Mass of bridge in grams}$

### 5. Qualification

- a. All construction and material requirements will be checked prior to testing. Bridges failing to meet these requirements, at the conclusion of the time allowed for checking, will be disqualified. Bridges disqualified prior to the start of the contest will be tested as exhibition bridges at the discretion of the builder and contest directors.
- b. If, during testing of a bridge, a condition becomes apparent (i.e. use of ineligible materials, etc.) which prevents testing as described [above](#), that bridge will be disqualified.

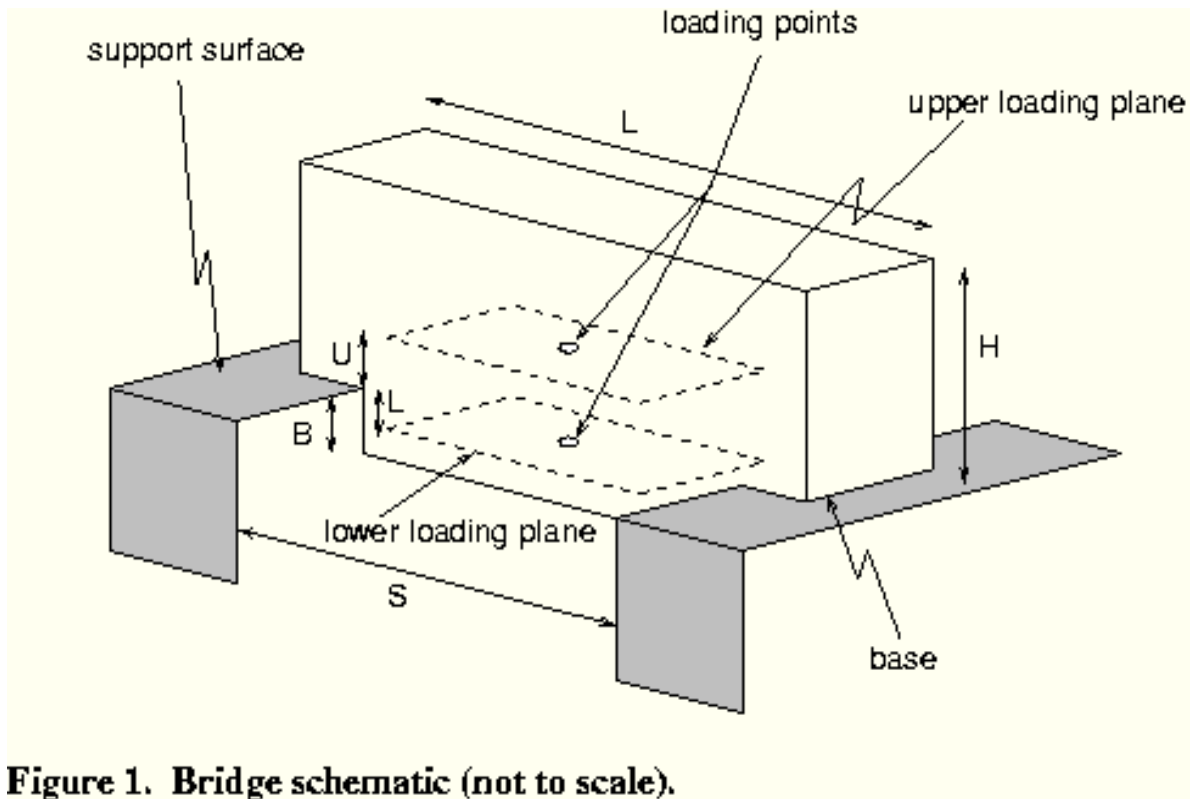


Figure 1. Bridge schematic (not to scale).

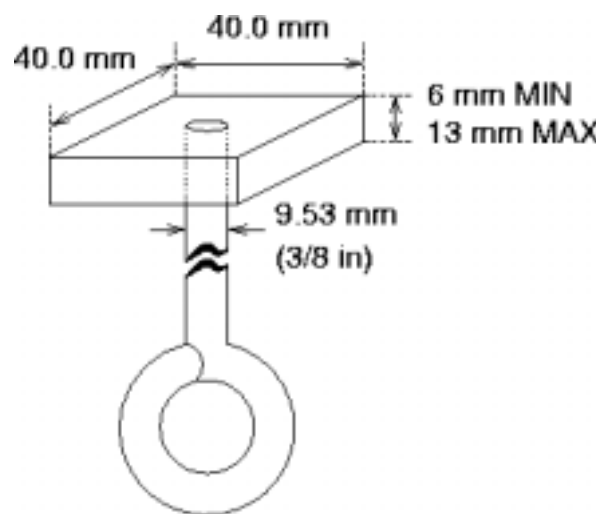


Figure 2. Loading plate detail (not to scale)

# BRIDGE-BUILDING COMPETITION

## (Registration and Evaluation Worksheet)

ID# \_\_\_\_\_ Check one:  Middle School  High School  
*Students should complete only the School and Team section below. All other sections will be filled out by the judges and administrators.*

School Name \_\_\_\_\_

Team Name \_\_\_\_\_

Team Member #1 \_\_\_\_\_

Team Member #2 \_\_\_\_\_

Team Member #3 \_\_\_\_\_

School Coordinator \_\_\_\_\_

### EVALUATION CATEGORIES:

#### I. CONSTRUCTION REQUIREMENTS

SCALE	MEASUREMENT	COMMENTS
Weight	M _____ (maximum error differential - 0.5 g)	25 grams or less
Height Above Support Surface (SS)	H _____	70 mm maximum
Projection below SS	B _____	30 mm maximum
Bridge Length	L _____	400 mm or less
Gap Span	S _____	300 mm
Upper Loading Plane (see page 17, section 2d)	U _____	30-50 mm above SS
Lower Loading Plane (see page 17, section 2d)	L _____	20-30 mm below SS

#### II. SCORING\*\*

Structural Efficiency Score (E) = Load Supported in grams\*/Mass of bridge in grams

\*Bridges failing with loads greater than 50 kg will be considered to have 50 kg for calculations.

\*\*Failure-when deflection of 25 mm under the loading point occurs.

Load Capacity (kg) \_\_\_\_\_

Structural Efficiency \_\_\_\_\_

Final Ranking

\_\_\_\_\_

**NOTE:** *Decisions of the judges are final.*