BRIDGE BUILDING CONTEST

OVERVIEW: Teams (two members per team) entering the Bridge Building contest will construct a model truss bridge to be destructively tested revealing the design efficiency of the bridge.

I. CONTEST PURPOSE

The purpose of the Bridge Building contest is to provide a means for contestants to demonstrate their ability to fabricate a truss bridge after having been assigned span and width specifications.

II. ELIGIBILITY FOR ENTRY

A. Schools may enter up to three (3) teams in this competition.
B. Only DoDDS students are eligible to enter.
C. Contestants must be registered for, and attending, the Technology Fair.

III. LEVELS OF COMPETITION

Level I - Middle and Junior High School grades 6-7-8-9
Level II - Senior High School grades 9-12

IV. TIME LIMITATIONS

Projects and displays will be set-up in the contest area during the time specified.

V. SPECIFIC REGULATIONS

A. The bridges are not constructed on site. The teams build their bridges before the conference and bring them to the fair for destructive testing.
B. There shall be two (2) members per team - no more, no less.

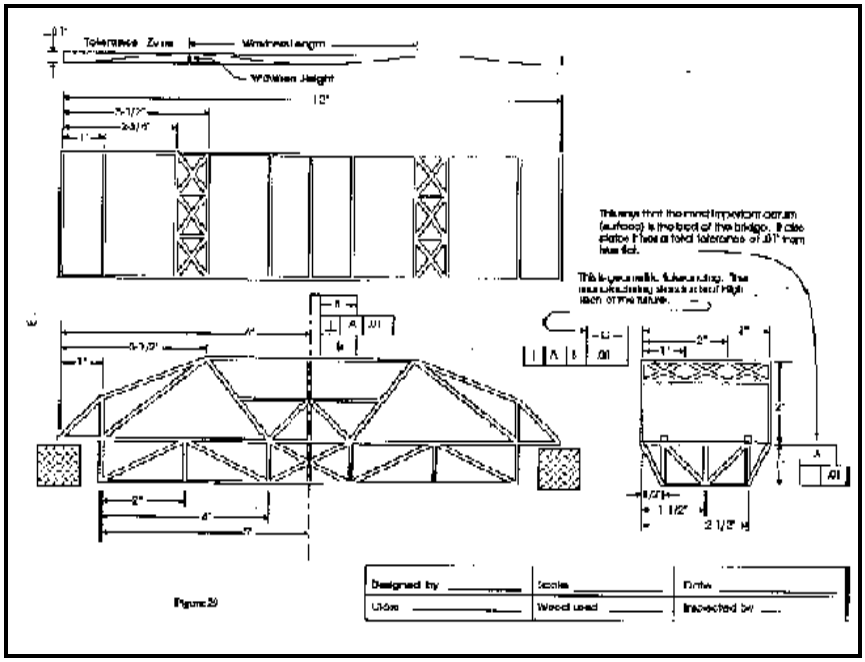

Figure 1 Drawing Format

C. Teams should sketch their bridge before constructing it. The sketch must be submitted with the entry. In the event of a tie, the sketch will be used to determine the winner. Use the format as shown in the figure below.
D. Entries must be constructed exclusively from 1/8" x 1/8" (3mm x 3mm) balsa wood stock and white glue.
E. The completed bridge cannot weigh more than 35 grams.
F. Teams may use as much material as their design requires. Entries will be weighed at the contest site prior to testing with weight measurements recorded to the nearest thousandth of a gram. This measurement will be the official weight used in the team's efficiency formula.
G. Pins and/or fasteners used in the construction of the bridge must be removed before it is tested. Coating or chemically treating entries is not permitted
H. The following definitions and graphic explanations are an integral part of the contest regulations. Refer to figure 1.

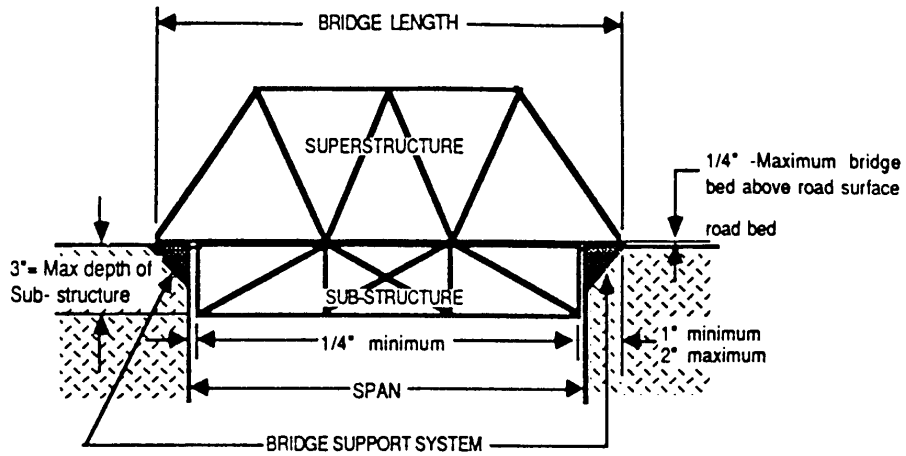

Figure 1. Truss Bridge Structure

Bridge Length:	The overall length of the bridge including the span and the required bearing surface area of the road bed (1 " minimum, 2" maximum) on the bridge supports.
Truss Bridge:	A bridge with a super-structure and/or a sub-structure supporting a road bed across a span.
Super-Structure:	The structure of a bridge which extends above the road bed.
Sub-Structure:	The structure of a bridge which extends below the roadbed. Three inches (3") maximum.
Test Block:	That piece of test apparatus to which the hook that holds the weight is attached. See 2.
Span:	The distance between the bridge supports.
Width:	The width of the bridge, measured from the outside of the beams.
Bridge Support System:	The vertical edges beneath a bridge that the bridge rests upon; as river banks support a bridge across a river. The bridge supports shall be at least 6" x 6" x 6" .
Roadbed:	The part of the bridge that is meant to be traveled on. The bridge must be constructed to allow the test block (without the hook) to pass through the bridge opening on the road bed from one end to the other. The roadbed must rest upon the bridge support system. The roadbed must be flat and not greater than 1/4" thick.
Failure:	The point at which a truss bridge collapses or is determined to have failed due to the stresses of the load placed on it.
Lamination:	Two adjacent (wood grain running parallel) pieces of 1/8" x 1/8" beams glued together on any surface (or not glued). If glued, refer to 3.

White Glue: Pertains to the type of glue and not its color. Wood glue, craft glue, and other similar water soluble adhesives qualify as "white glue".

I. The exact span of the bridge will be twelve inches (12") and have a width precisely three inches (3") outside dimension.
J. Bridges must be constructed in such a manner as to accommodate the test hook at the bridge's center. See 2. The road bed of the bridge must be free of obstructions.
K. Bridges should be allowed to dry for a minimum of twelve (12) hours.
L. A truss member may include laminations. (Refer to the definition of lamination and to 3.) The maximum amount of glue allowed will be 1/4" for every two inches of lamination. No more than two pieces may be laminated together.

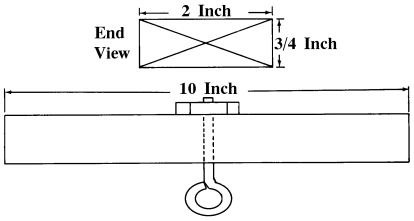

Figure 2. Test Hook

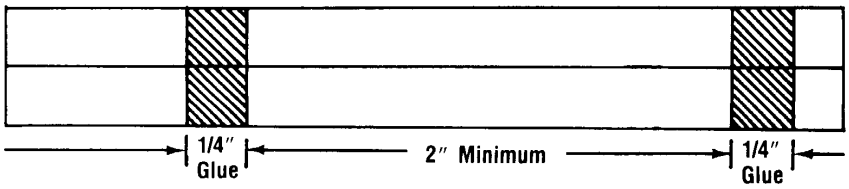

Figure 3. Lamination Specifications

VI. PROCEDURE

A. Registration: Contestants must pre-register for this event. The Competitive Events Coordinator must receive all registration material by the final registration date.
B. At the scheduled time, contestants must check-in with the event's Contest Coordinator. At that time the Contest Coordinator will attach an entry number to the entry.
C. All contestants will follow "Specific Regulations" and adhere to directions provided by the Contest Coordinator.
D. Contestants must display their project in the designated area.
E. Judges will rate each entry and total the points for the entry on the rating sheet.
F. Entries shall be ranked in numerical order on the basis of accumulated points determined by efficiency index.
G. Judges will deliver the contest results to the Contest Coordinator for each level. The winner will be that contestant whose entry receives the highest point total. Other places will be determined in the same manner. In case of a tie, the Contest Coordinator shall consult with the judges to ascertain the winner.
H. The Contest Coordinator will provide the Competitive Events Coordinator with a sealed packet containing the results of the event.
I. All judges' ratings and results are to remain confidential.

VII. REQUIRED CONTEST PERSONNEL AND EQUIPMENT

A. Personnel
   1. Contest Coordinator
   2. Judges, three (3)
B. Equipment
   1. Contest guidelines, three (3)
   2. Judges' rating sheets
   3. Marking pens for judges, three (3)

4. List of entries
5. Display tables for entries
6. Testing block set, ten (10") inch
7. Testing hook
8. Two five (5) gallon pails per testing station
9. Lead shot weight (150 Lbs)
10. Scales (One for bridges and one for the bucket)
11. Calculator

VIII. CRITERIA FOR JUDGING

A. Bridge efficiency shall be determined by the following formula:

$$\text{Efficiency (E)} = \frac{\text{Failure Weight (in grams)}}{\text{Weight of Bridge (in grams)}}$$

B. An increasing load will be applied to the bridge via the test hook until the bridge fails. The load will be weighed and entered in the formula as "Failure Weight."

C. In the event of a tie, the bridge's sketch will be evaluated using the following criteria:

Drawing 100 Points (Max) (Bridge will be compared to drawing and specifications)

Accuracy	45 Points
Neatness	10 Points
Dimensions	15 Points
Point to Point Contact	15 Points
Line Thickness	15 Points
Total	100 Points

IX. AWARDS

Awards will be given to the first three places for each level of competition.