MESA DAY
BRIDGES
Forces at Work
Forces in a Bridge

Building Better Bridges
Rules

Testing Procedures
Materials Suppliers
Forces are transmitted through materials 4 ways:

- Compression
- Tension
- Torsion
- Shear
Wood Properties

Wood can transmit:

- Hundreds of times its weight in compression ("pushing")
- Thousands of times its weight in tension ("pulling")
- Only a limited amount of torsion ("twisting") or shear ("tearing")
The Problem

The applied force must be transmitted to the two supports in a way that minimizes shear and torsion.
Force Transmission

Because force is applied vertically, bridge components with a vertical orientation will transmit the force as compression or tension.

The more horizontal the orientation, the greater the amount of force transmitted as torque or shear.
Forces in a Bridge

Compression

Compression

tension

Compression
Using White Glue

For the strongest bonds using white glue:

- Sand the joints carefully so that the members fit well and square.
- Allow to dry in a cool, moist environment.
- Do NOT place in oven or hair dryer to speed drying.
- Maximum bond strength occurs after two weeks of drying time.
Building Tips

- Orient components to transmit forces as either tension or compression
- Use the full vertical space allowed
- Use all the wood. Keep your design near the maximum weight.
- Sand all joints prior to gluing
- Make the bridge neat and square
- Build a level base footing. Sand the completed bridge footing so that it is perfectly flat
- Allow about 14 days drying time (i.e. don’t wait until the last minute!)
CRAFTSTICK DIMENSION SUMMARY

- Max. length = 17 inches
- Max. width = 5 inches
- Max. height above top of roadway = 7 inches
- Max. below top of roadway = 3.5 inches
- Min. length = 15 inches
- Min. width = 4 inches
CRAFTSTICK RULES SUMMARY

- Max. stick surface glued/overlap = 50%
- Elmer’s type white glue only
- No coatings allowed
- Bridge must be open
- Bridge MUST have 3.5 inch roadway
- No I-beams, or T-sections
I-Beam, T-Section
Which Sticks are Legal?
Is this Legal?

CRAFTSTICKS
FILE FOLDER DIMENSION SUMMARY

- Max. length = 35 cm (8th), 45 cm (9th, 10th)
- Max. width = 10 cm
- Max. height = 15 cm
- Min. length = 32 cm (8th), 42 cm (9th, 10th)
- Min. span = 30 cm (8th), 40 cm (9th, 10th)
- Max. mass = 55 g (8th), 70 g (9th, 10th)
FILE FOLDER RULES SUMMARY

- Only standard, non-plastic, letter-size manila file folders
- No part of bridge below the support surface
- Any glue ok
- No coatings allowed
- Tested by 10cmX10cm plate on top center of bridge
- Roadway NOT required.
What is a Truss?

- A structure composed of members connected together to form a rigid framework.
- Usually composed of interconnected triangles.
- Members carry load in tension or compression.
Pratt

Howe

Fink

Bowstring

Waddell “A” Truss

Parker

Camelback

Double Intersection Pratt

Baltimore

Pennsylvania

K-Truss

Warren

Warren (with Verticals)

Double Intersection Warren

Lattice
MESA Bridge Tester
MESA DAY
BRIDGES