



# The Bridge Design Problem

# The Need

- ❖ Hauptville, NY
- ❖ The current bridge need to be replaced
- ❖ A new bridge must be built on the existing site



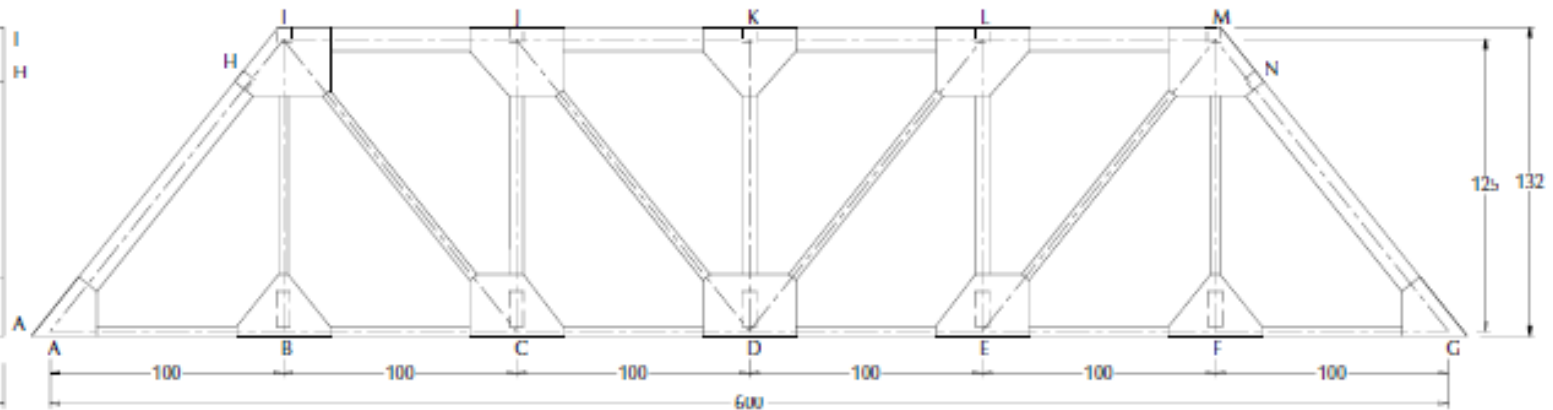
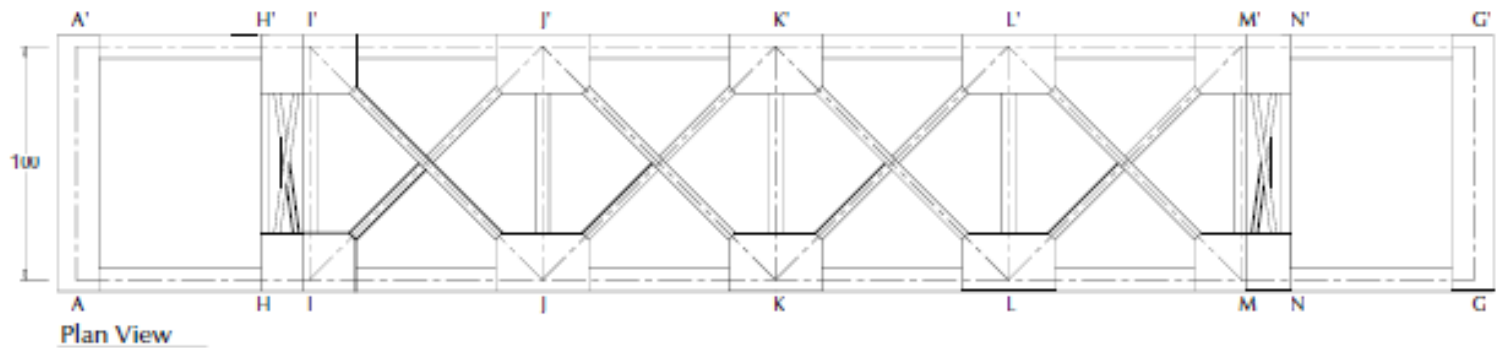
# Design Requirements

- ✓ The existing supports are **24 meters** apart (our **1/40 scale model** bridge will actually have a span of **60 centimeters**)
- ✓ The bridge must carry **Two lanes of traffic** (our model bridge must have a roadway **width of at least 9 cm** and at least **9 cm of overhead clearance** above the deck)
- ✓ The bridge must meet the structural safety requirements of the AASHTO bridge design code (our model bridge must carry a “traffic load” consisting of a **5 kg mass** placed on the structure at mid-span)



# The Design

# Plan

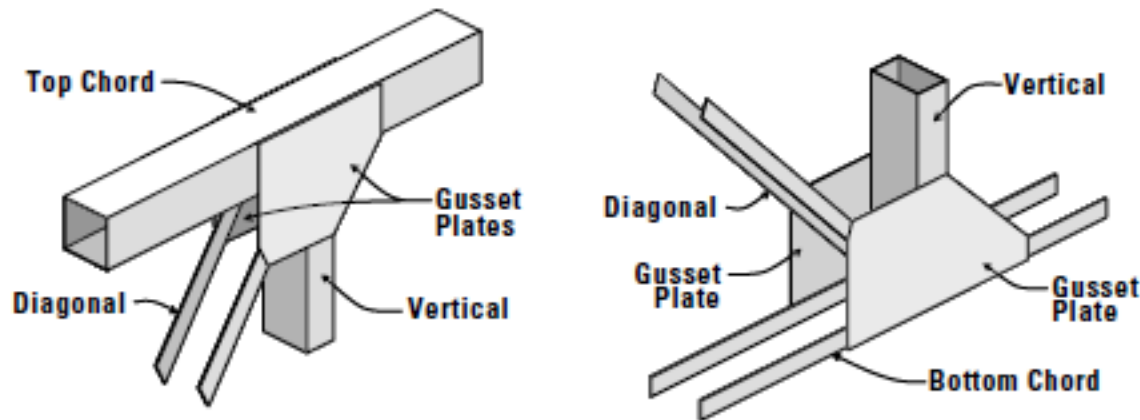


**Notes:**

1. All dimensions are in millimeters.
2. All structural members and gusset plates are made from standard file folder material.
3. See Schedule of Truss Members for specific member sizes.

Thayer Associates, Inc. Architects & Engineers		HAUPTVILLE, NEW YORK	
Designed by: <i>[Signature]</i>		GRANT ROAD BRIDGE OVER UNION CREEK	
Drawn by: <i>[Signature]</i>	Reviewed by: <i>[Signature]</i>	Date:	NOVEMBER 10, 2000
Checked by: <i>[Signature]</i>	Approved by: <i>[Signature]</i>	Sheet Reference Number	S-1

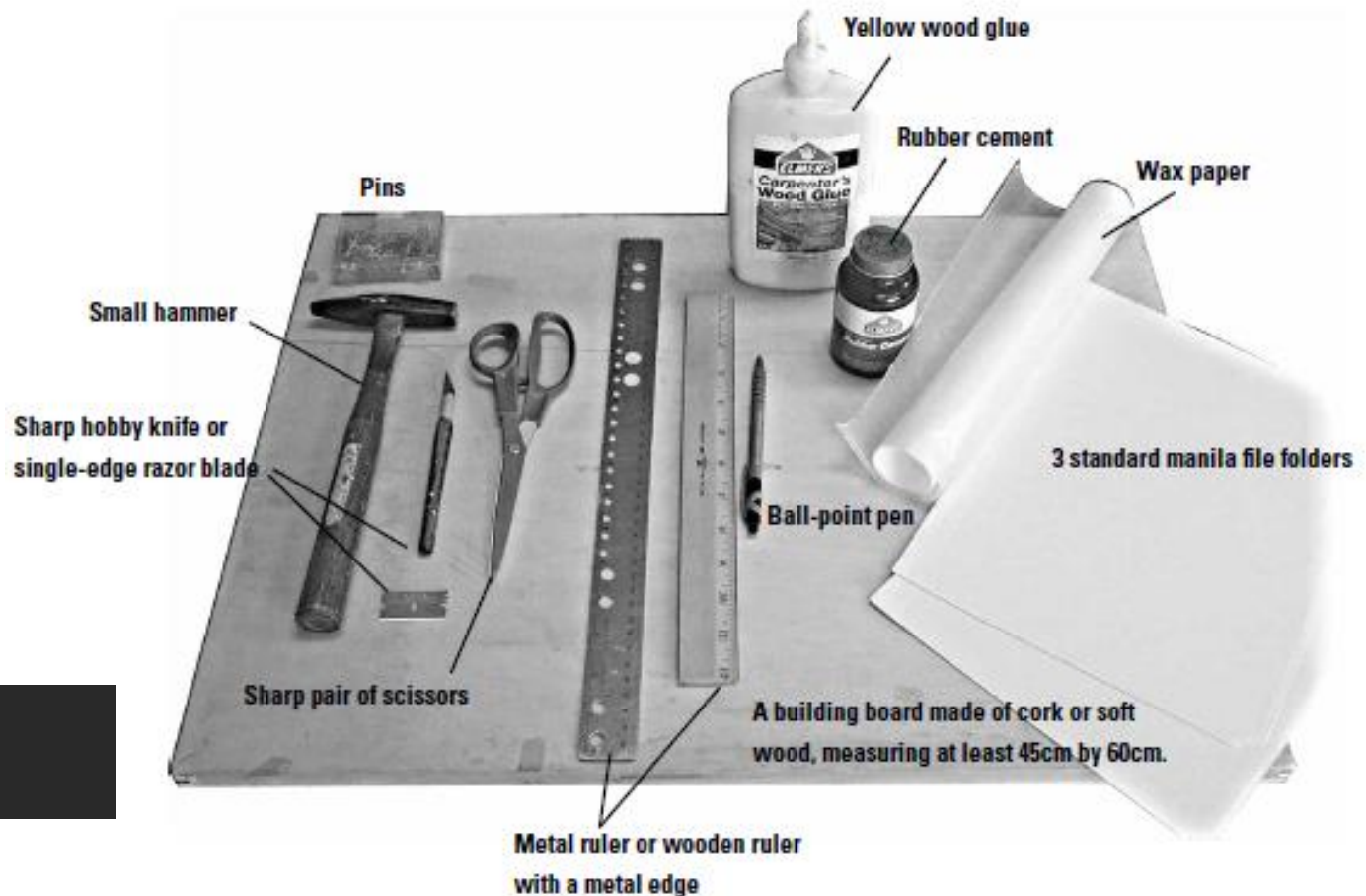
# Typical Connections and Schedule of Truss Members



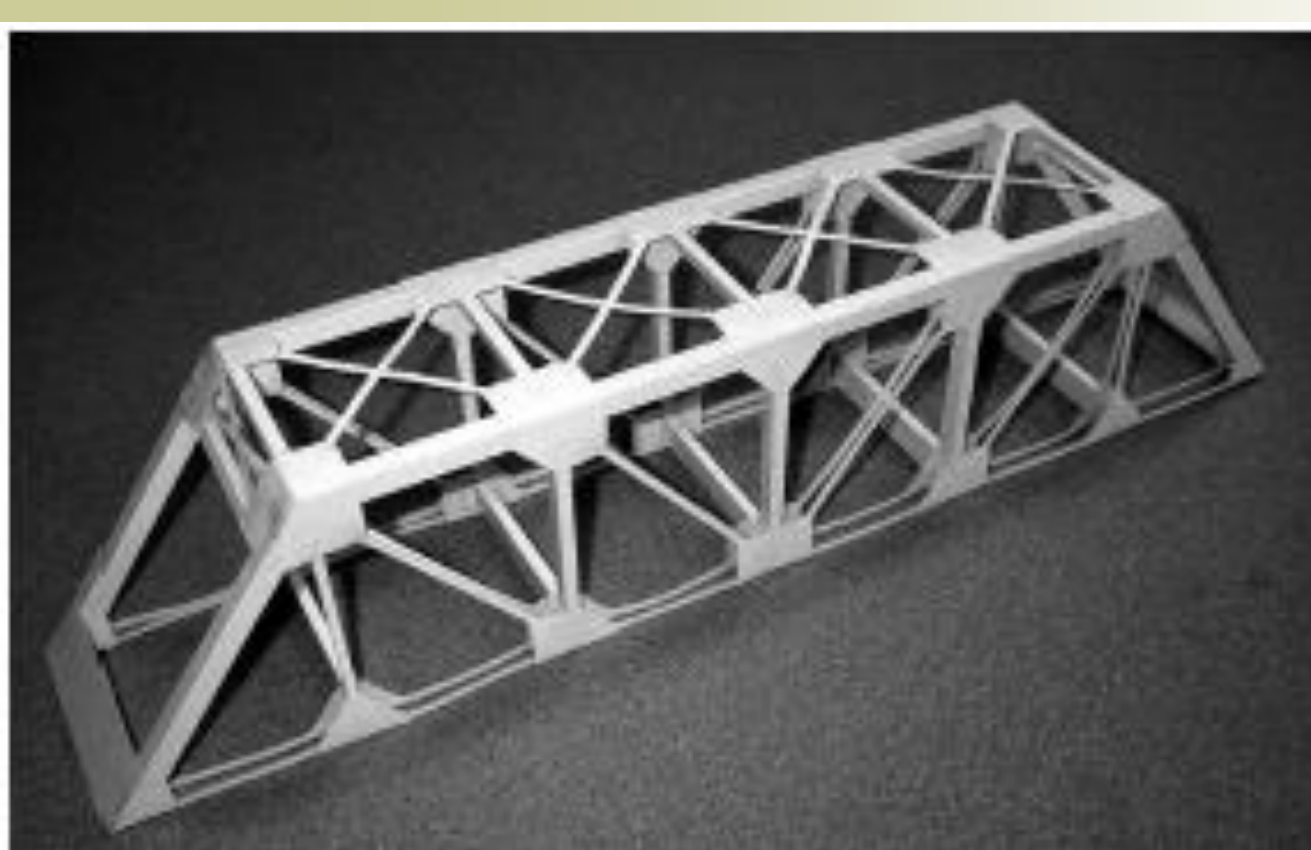
Component	Members	Type	Approx. Length	# Req'd
Bottom Chords	AD, DG, A'D', D'G'	4mm bar (double)	30cm	8
Diagonals	CI, DJ, DL, EM C'I', D'J', D'L', E'M'	4mm bar (double)	15cm	16
Verticals	BI, FM, B'I', F'M'	4mm bar (double)	11cm	8
Top Lateral Bracing	IJ', I'J, JK', J'K, KL', K' L, LM', L'M	4mm bar (single)	12cm	8
Portal Bracing	HI', H'I, MN', M'N	4mm bar (single)	10cm	4
Top Chords	IK, KM, I'K', K'M'	10mm x 10mm tube	21cm	4
End Posts	AI, GM, A'I', G'M'	10mm x 10mm tube	17cm	4
Verticals	CJ, DK, EL, C'J', D'K', E'L'	6mm x 10mm tube	12 cm	6
Top Struts	HH', II', JJ', KK', LL', MM', NN'	6mm x 6mm tube	9cm	7
Floor Beams	BB', CC', DD', EE', FF'	6mm x 15mm tube	10cm	5
Floor Beams	AA', GG'	28mm x 13mm angle	11cm	2

# Necessary Supplies and Tools

- 3 standard manila file folders
- Wax paper
- Pins
- Small Hammer
- Scissors
- Knife
- Ruler
- Pen
- Yellow wood glue
- Rubber cement



# Final Product



- Bring your Bridge on WVSU Engineering Day
- First, we will measure the dimensions of the bridge to see if you satisfied the design requirements
- We will Load Test the bridge to determine the maximum load your bridge can carry (P)
- Will also measure the weight of the bridge to determine the amount of materials (W)

- Bridges will be scored and ranked based on an efficiency factor calculated by dividing the load sustained at failure by the weight of the bridge ( $P/W$ )
- The winner will be the bridge that has the highest efficiency value.
- If you have any question, contact [towhid@wvstateu.edu](mailto:towhid@wvstateu.edu)
- **For more information, look at two pdf files: [Bridge\\_guide.pdf](#) and [Bridge\\_drawing.pdf](#)**