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Fall 2026

Truss Bridge Project – Preliminary Report

Pre-Test Design Proposal Requirements:

Explanation – Describe the structural design logic that led to the development of your design. How have the principles of truss analysis influenced your design decisions? This may include comparisons to an existing truss or bridge design, but you should also reflect on structural principles you have learned in class.

Illustration – Include diagrams and drawings so that your structure can be understood in its entirety. At least one transverse cross section, one elevation, and one three-dimensional view (axon or perspective) of your bridge are required. Orthographic drawings must be dimensioned, and the member sizes labeled in a clear way that corresponds to your calculations. Also, be sure to consider the way in which your bridge rests on the supports. A drawing of this detail may be beneficial. All drawings must be digitally produced to scale; free hand sketches are not permissible as illustrations of your bridge design, nor are screen shots or print-to-file images of Rhino models.

Analysis – Calculations* should include the following:

- **internal axial forces** (including sign – T or C) for each truss member. This analysis can be conducted manually (method of joints or sections), or using computer software (Dr. Frame, etc.). Loading should be considered as a distributed load over the length of the bridge; however, this load will be transferred to the joints of the truss by the deck. Thus, in analysis, only apply loading as point loads to joints directly beneath the bridge deck.
- **cross-sectional sizing** for each member in your design (based on **F = P/A** or **A = P/F**). This step involves deriving the required cross-sectional area based upon the axial loads applied to a member.
- **weight estimate** of entire bridge – break down should include each member and take into consideration the weight of connections (i.e., about 5% for glue) – total should be under 4 oz. *(See properties of basswood for unit weight.)*
- **load capacity** - predict the ultimate capacity in lbs. that the bridge can support. Choose a critical member (for instance, a member that carries the largest axial load, or the member with the largest internal stress) and determine the load level that will cause this member to fail.

* If an excel spreadsheet is used to make calculations for any portion of the analysis, make sure to provide the equations being used for each column in the table.

The Pre-Test Design Proposal is worth 40 points of the total score for this project. **SUBMIT ONLY ON 8½ X 11 PAPER.** NO 11X17 PAPER SUBMISSIONS WILL BE ACCEPTED. Once returned to you graded, **save the original copy** of the Preliminary Report for submission together with the Final Report.

Remember that the report is to be a professional document. Writing should be clear, grammatically correct, and language should be appropriate and professional. *(See Report Guidelines for more details)*

Properties of Basswood (approximate):

Unit Density	24 lb/ft^3 (0.222 oz/in^3)	Compression ⊥ to grain	370 psi (bearing)
Weights:	¼" x ¼" is 0.2 oz/ft	Compression ‖ to grain	4730 psi
	1/8" x 1/8" is 0.05 oz/ft	Tension ‖ to grain	4500 psi (estimate)
G (shear modulus)	25,000 psi	Shear ‖ to grain	990 psi
E_{min} (for buckling)	460,000 psi	E (for deflection)	1,460,000 psi

Testing Frame:

