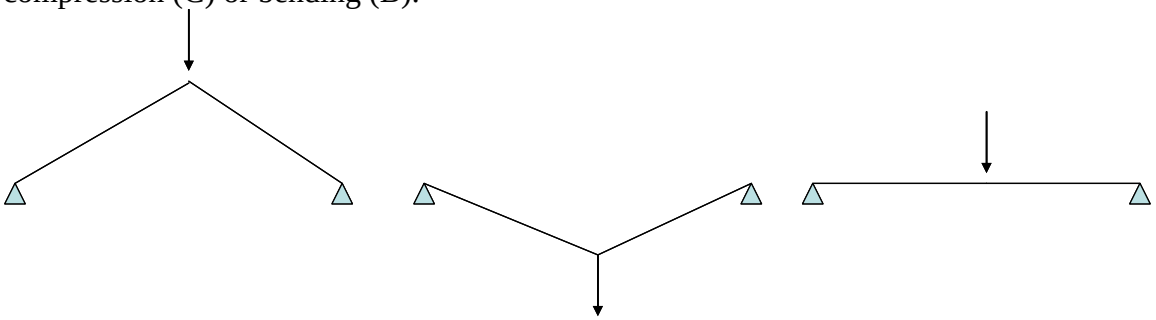
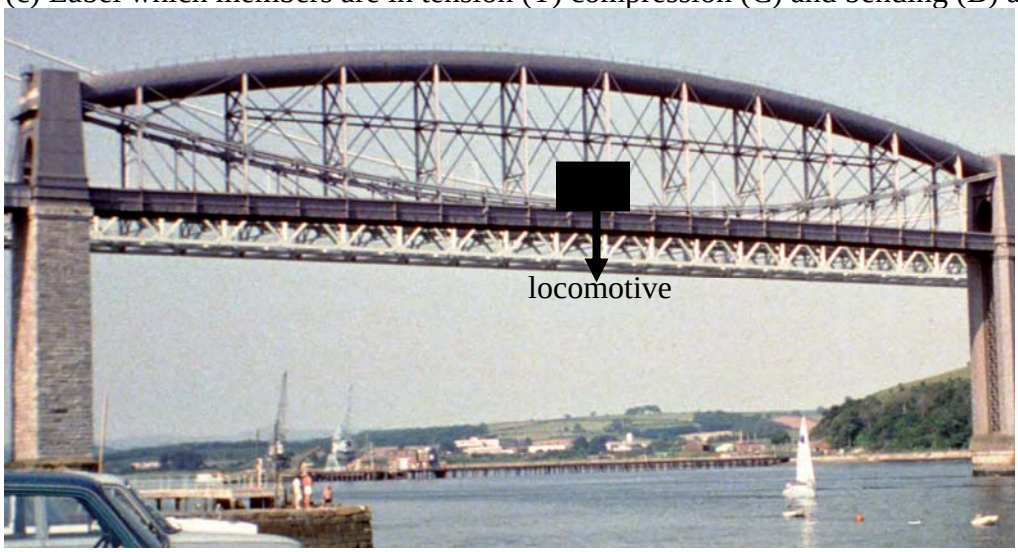
Perspectives on the Evolution of Structures
Analysis 1 homework

Problems 1-4: Eiffel Tower Structural Study
Complete the 4 questions in the Eiffel Tower Structural Study

Problem 5: Load Path
For the three small structures given below, show the load path for how the applied vertical load gets to the supports (the small triangles). Indicate whether the members are in tension (T), compression (C) or bending (B).



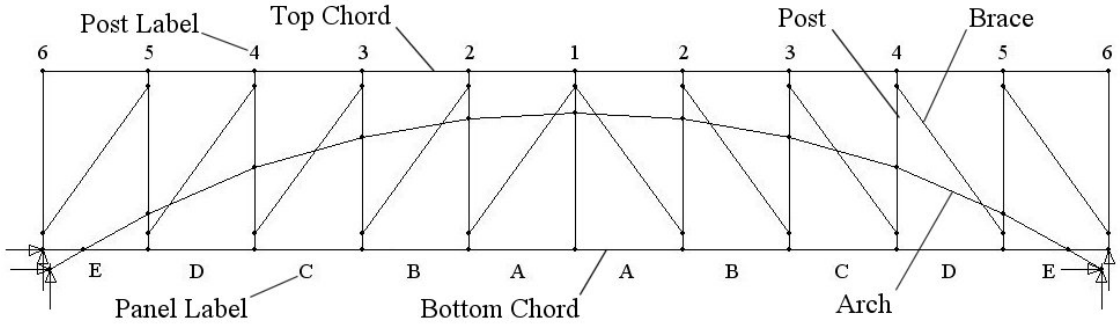
Problem 6: Load Path
(a) Draw the load path for the indicated locomotive load on Brunel's Saltash bridge.
(b) Comment on your results (below).
(c) Label which members are in tension (T) compression (C) and bending (B) as best you can.



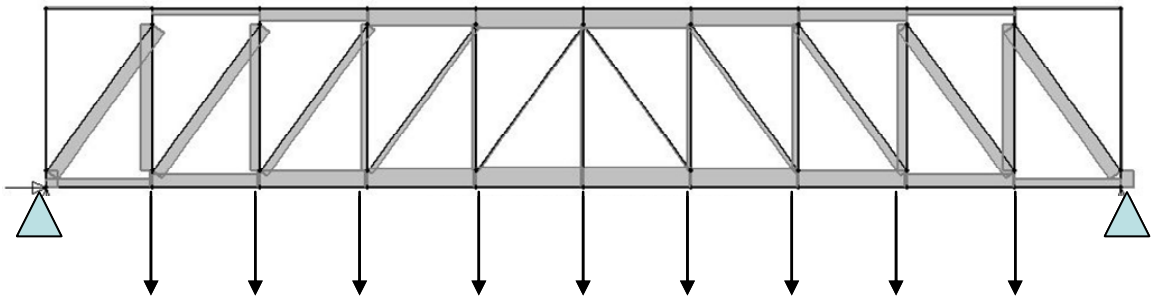
Comment:

Problem 7: Axial Force Diagram

Consider a Burr Truss-Arch as commonly used in Covered Wooden Bridges



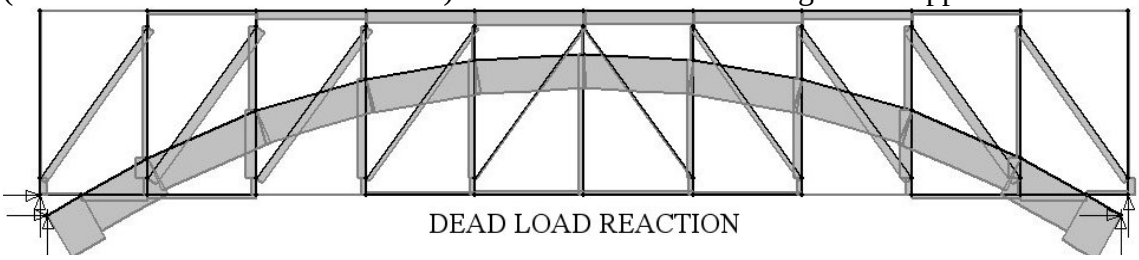
Now, consider the truss alone, under uniform vertical load. The "axial force" diagram is shown:



(a) Label which members you think are in tension with a T and which ones you think are in compression with a C (Note, trusses do not have bending in their members, if the load is at the panel points – as is the case here.. so no B's only T's and C's)..

(b) The width of the shaded bars reflect the magnitude of the axial force circle the most highly loaded members for the top chord (top horizontal members) bottom chord (bottom horizontal members) and diagonal members. Note, the maximum force is 33,000 pounds.

Consider the same structure, but now with the arch added to the truss. The axial force diagram, (drawn to the same scale as before) and under the same loading before appears as follows.



Describe what has happened to

(c) the magnitude of the forces in the truss member top chord (the horizontal members at the top),

(d) the truss member bottom chord (horizontal members at the bottom):

(e) the truss member diagonals:

(f) is the arch a good idea based on what you see here, what other information would you want to know?