Graphic Statics

Description

This project introduces parameters of form determination and optimization of simple truss structures. Using the given truss as a starting point a new, lighter truss is to be designed using graphic statics techniques. Based on 4x, 5x and 6x lumber sizes, using No.2, Doug-Fir-Larch, the weight of the new truss is determined. Finally, the weight of the two trusses is compared.

Objectives

- to review vector statics and truss analysis
- to choose wood sections based on axial tension and compression
- to explore techniques of graphic statics in truss design
- to investigate efficient geometries for a truss structures

Procedure

- Modify (redraw) the graphic force diagram of the given truss to reduce member force and overall weight of the truss.
- Determine the force in each member using the force graph.
- Check your results using Dr. Frame (or some similar analysis program).
- Choose tension and compression members using the given tables.
- Determine the weight for each member and the overall weight of your truss.
- Compare your design with the original design.
- Record your results on the attached summary sheet.



Submit on Canvas

- Graphic statics drawings of your redesigned truss.
- Completed summary sheet (attached).

Summary Sheet

Member	Length	Dr Frame	Graphic		Weight
	(FT)	(Kips)	Method	Size	(LBS)
A-1	8	16 k T	16 k T	4x8	49.3
A-2	8	16 k T	16 k T	4x8	49.3
A-5	8	16 k T	16 k T	4x8	49.3
A-6	8	16 k T	16 k T	4x8	49.3
B-1	10	20 k C	20 k C	6x8	100.3
C-3	8	24 k C	24 k C	6x8	80.2
D-4	8	24 k C	24 k C	6x8	80.2
E-6	10	20 k C	20 k C	6x8	100.3
1-2	6	0	0	4x4	17.9
2-3	10	10 k T	10 k T	4x4	29.8
3-4	6	12 k C	12 k C	4x5	23.0
4-5	10	10 k T	10 k T	4x4	29.8
5-6	6	0	0	4x4	17.9

Truss As Given:

TOTAL TRUSS Weight = 676.6 LBS

Your Redesigned Truss:

Member	Length	Dr Frame	Graphic		Weight
	(FT)	(Kips)	Method	Size	(LBS)
A-1					
A-2					
A-5					
A-6					
B-1					
C-3					
D-4					
E-6					
1-2					
2-3					
3-4					
4-5					
5-6					

TOTAL TRUSS Weight = _____