

CIVE 546: Structural Design Optimization

Week 11

Graphical Statics and Truss Design

Instructor:

Prof. Yi Shao

Winter 2025

Truss

One of the most common and efficient structural types



Bayonne Bridge, New Jersey



Truss

One of the most common and efficient structural types



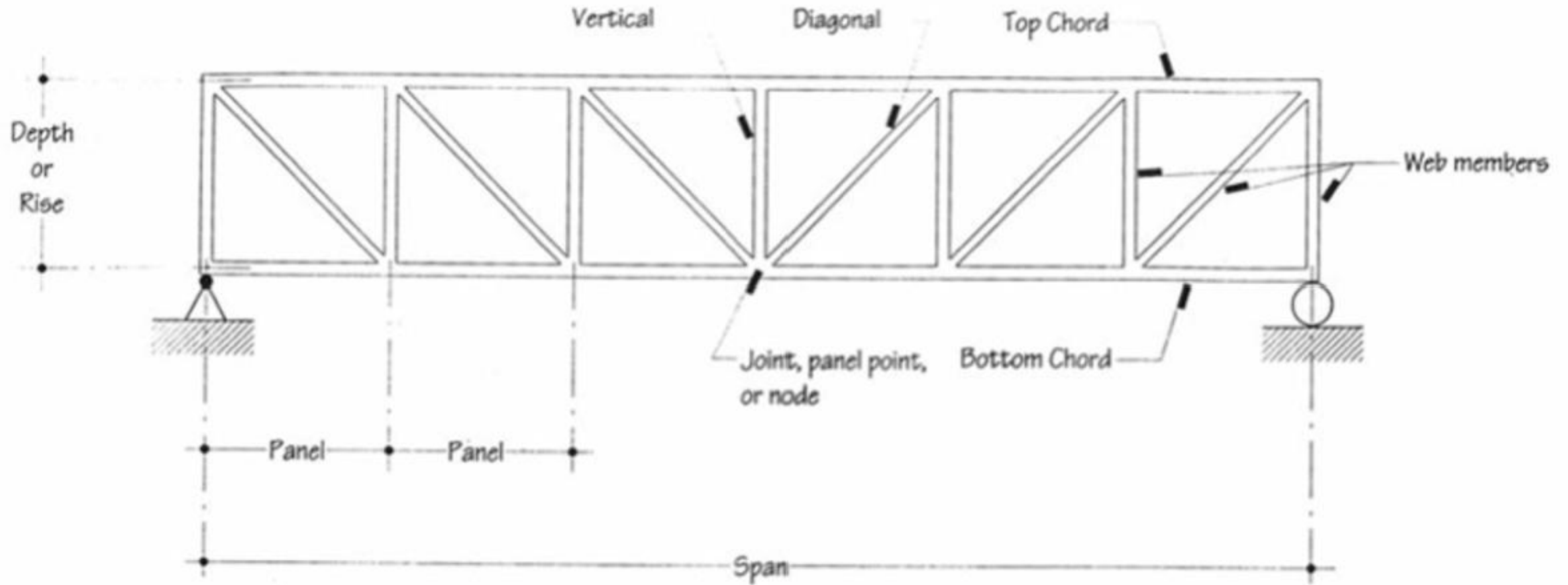
Truss

One of the most common and efficient structural types



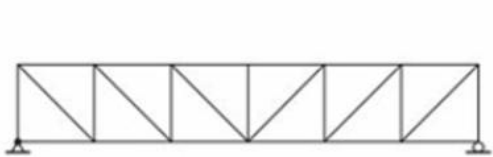
Truss

Terminology

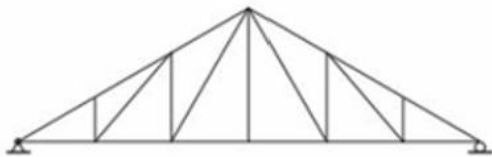


Truss

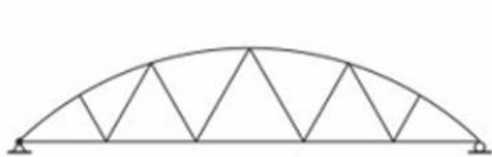
Common Truss Configurations



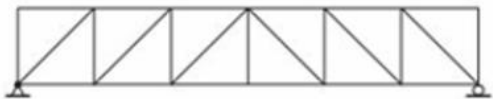
Flat Pratt



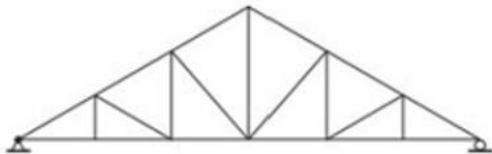
Triangular Pratt



Bowstring



Flat Howe



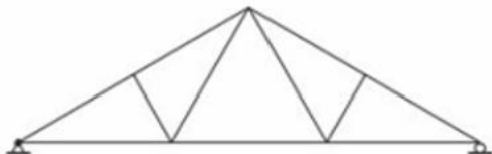
Triangular Howe



Inverted Bowstring



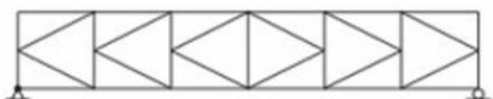
Warren



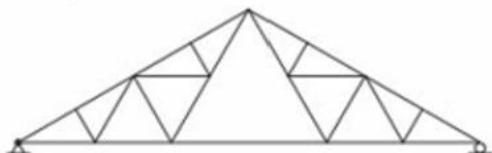
Simple Fink



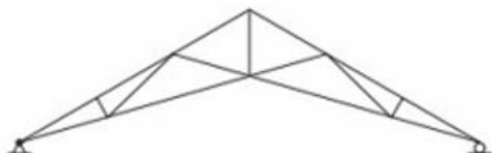
Lenticular



K-Truss



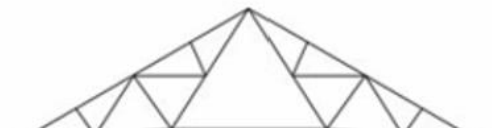
Fink



Scissors



Camelback

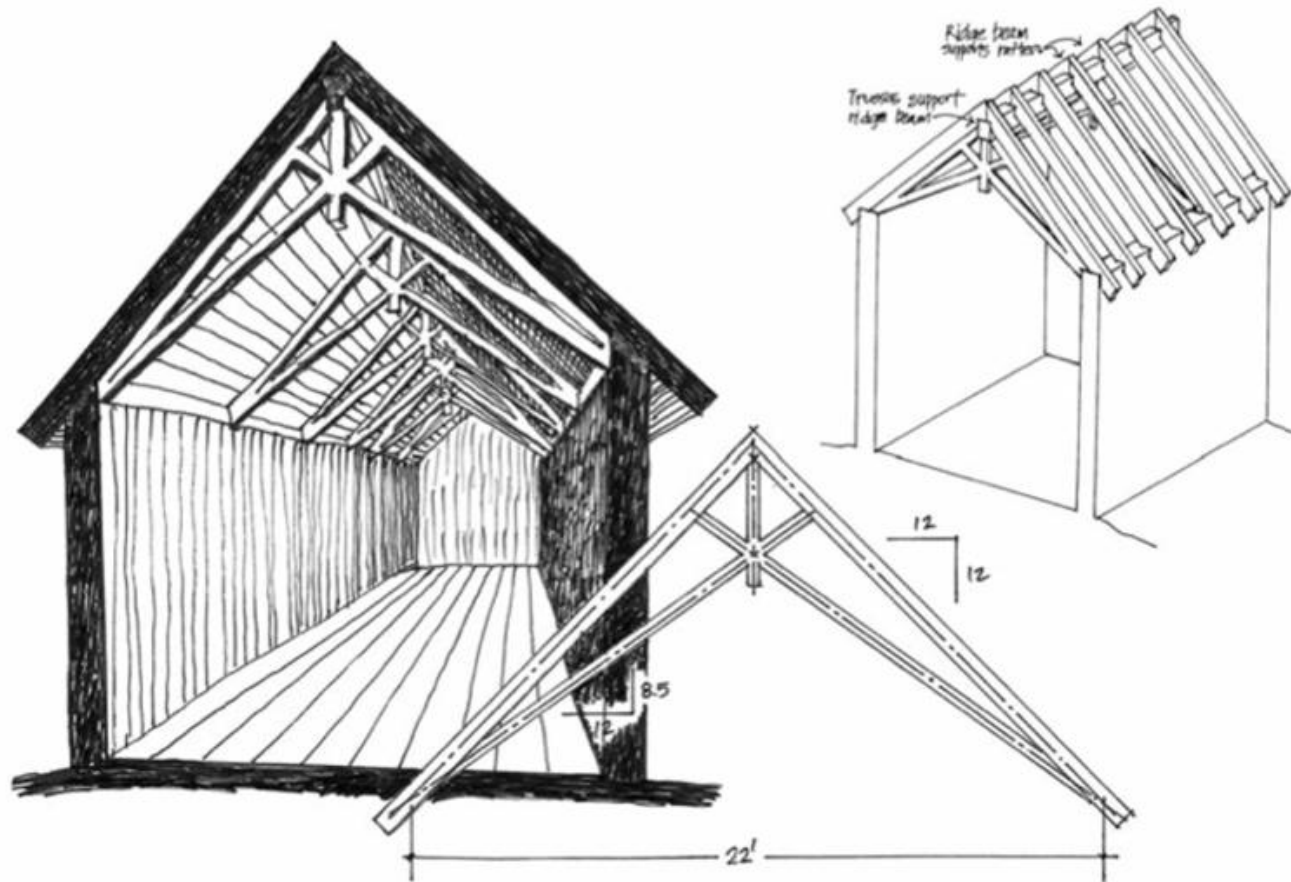


Cambered Fink



Shed

Is Scissors a good option?

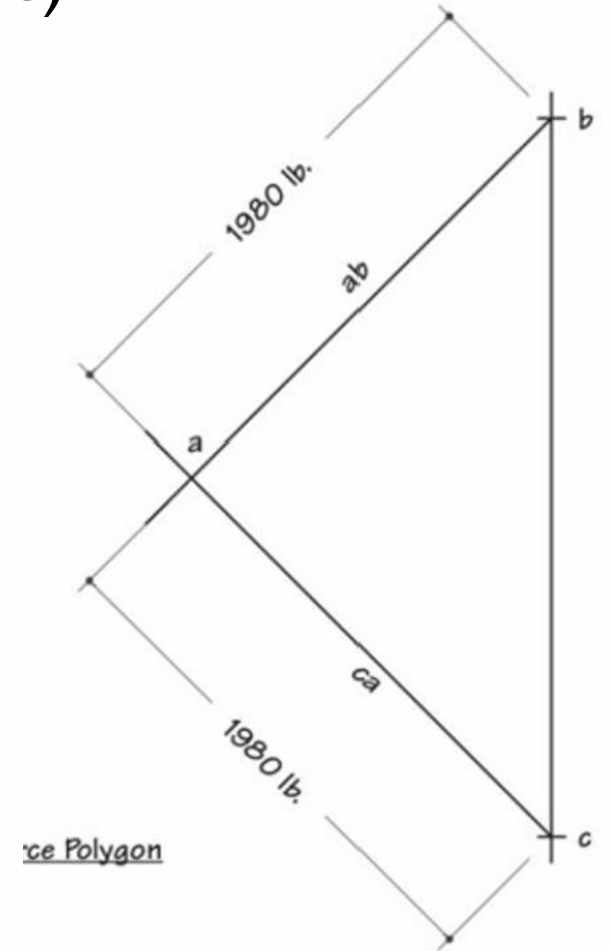
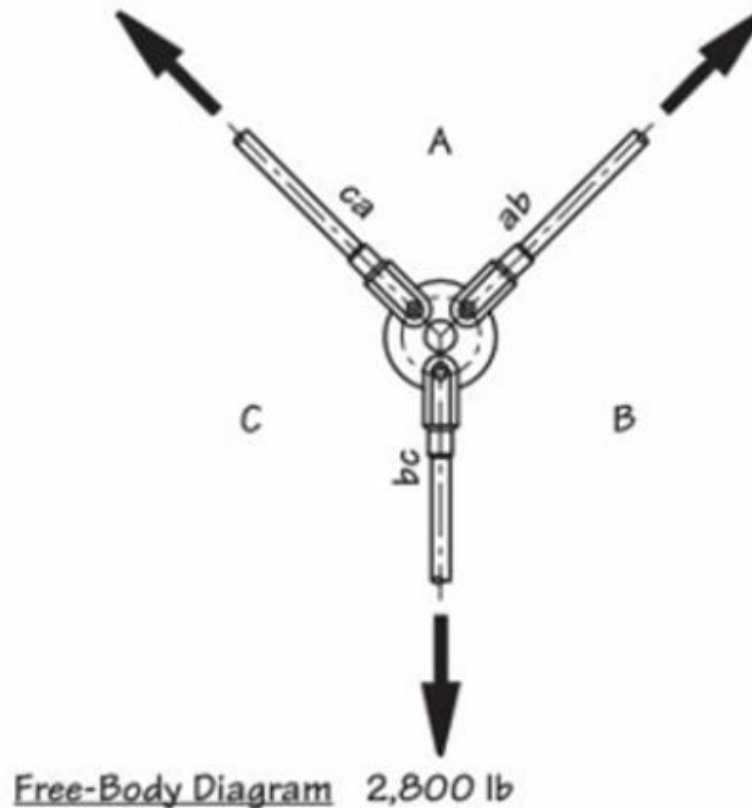


Review of graphical statics

Step 1: Label all the spaces

Step 2: Draw force diagram of external forces

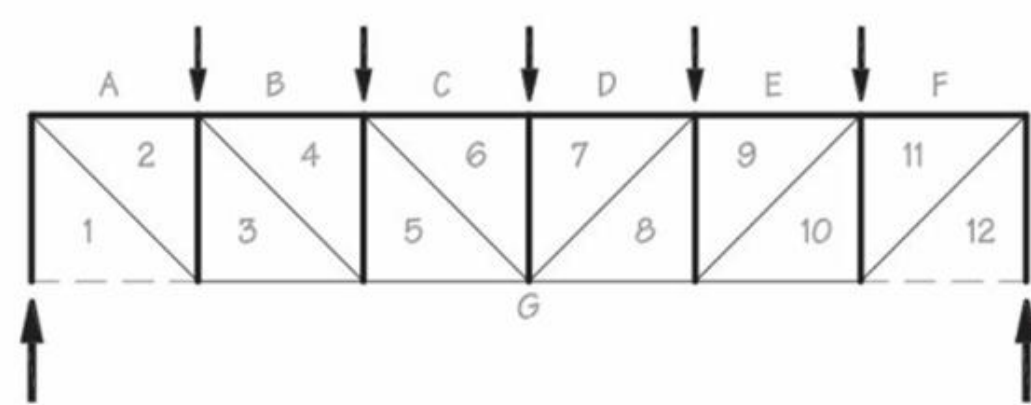
Step 3: Draw force diagram of internal forces (for each node)



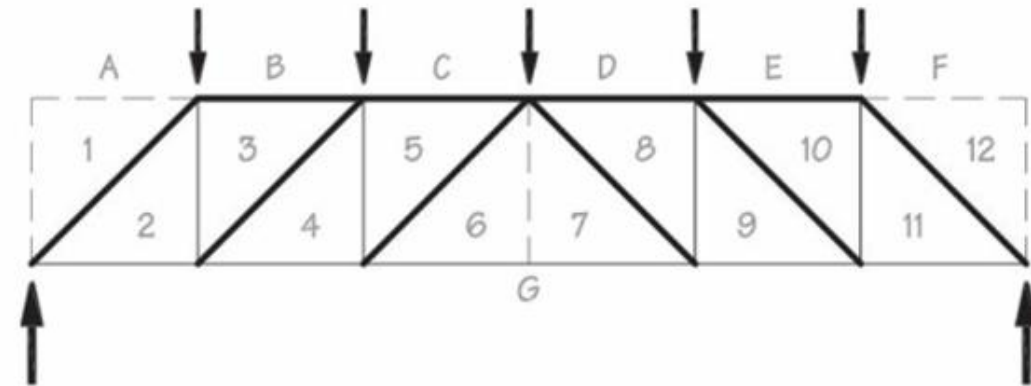
Truss

Common Truss Configurations

Flat Pratt



Flat Howe



Mercury Course Evaluation



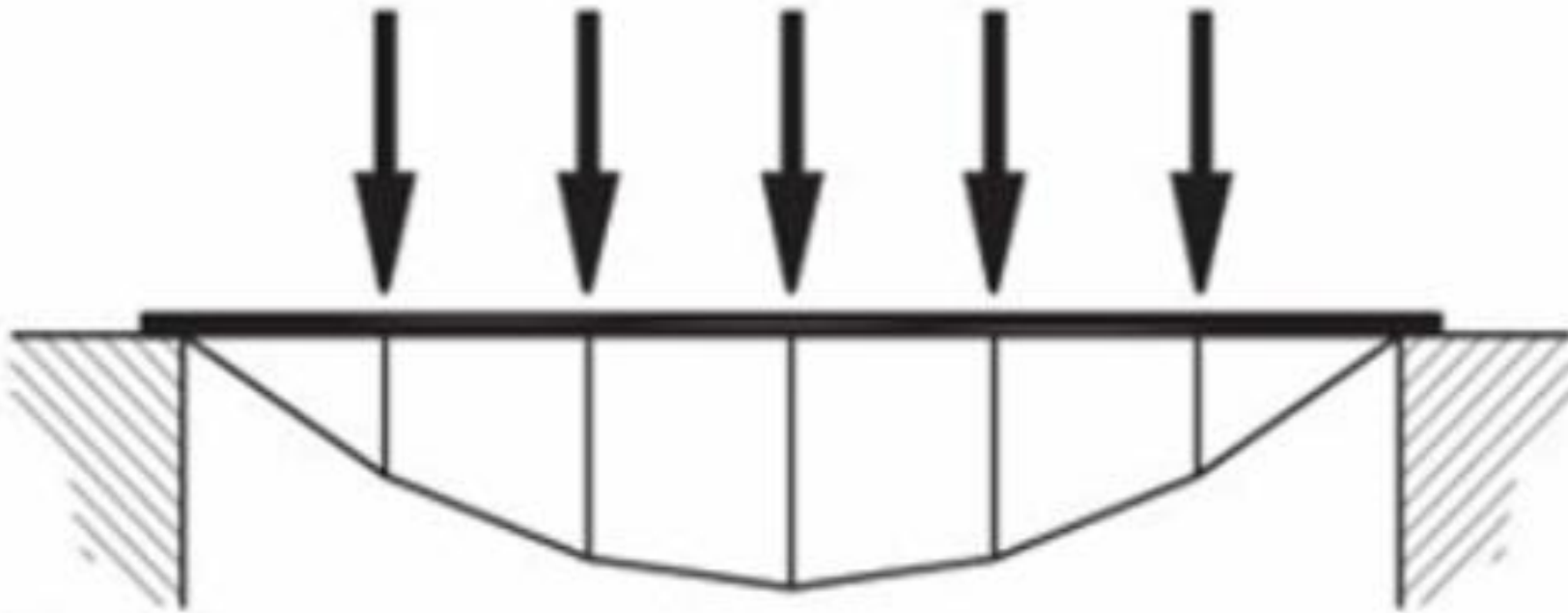
CIVE 546: Selected
Topics in Civil Eng 1 -
Lecture (Section 001,
CRN 1708)

- https://go.blueja.io/d8X_kOdnHEutkYtI5RDcQw

Truss

Design of efficient truss

Target: Constant axial force in top chord



Truss

Design of efficient truss

Shiosai Bridge
Japan



Truss

Design of efficient truss

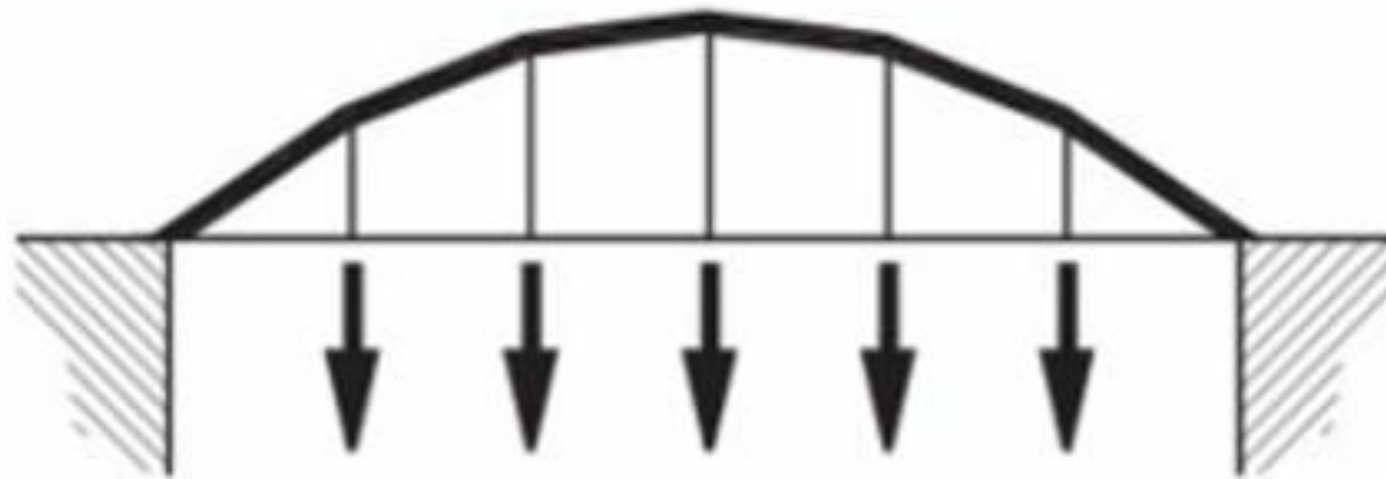
Alamodome in
San Antonio, Texas



Truss

Design of efficient truss

Target: Constant axial force in bottom chord

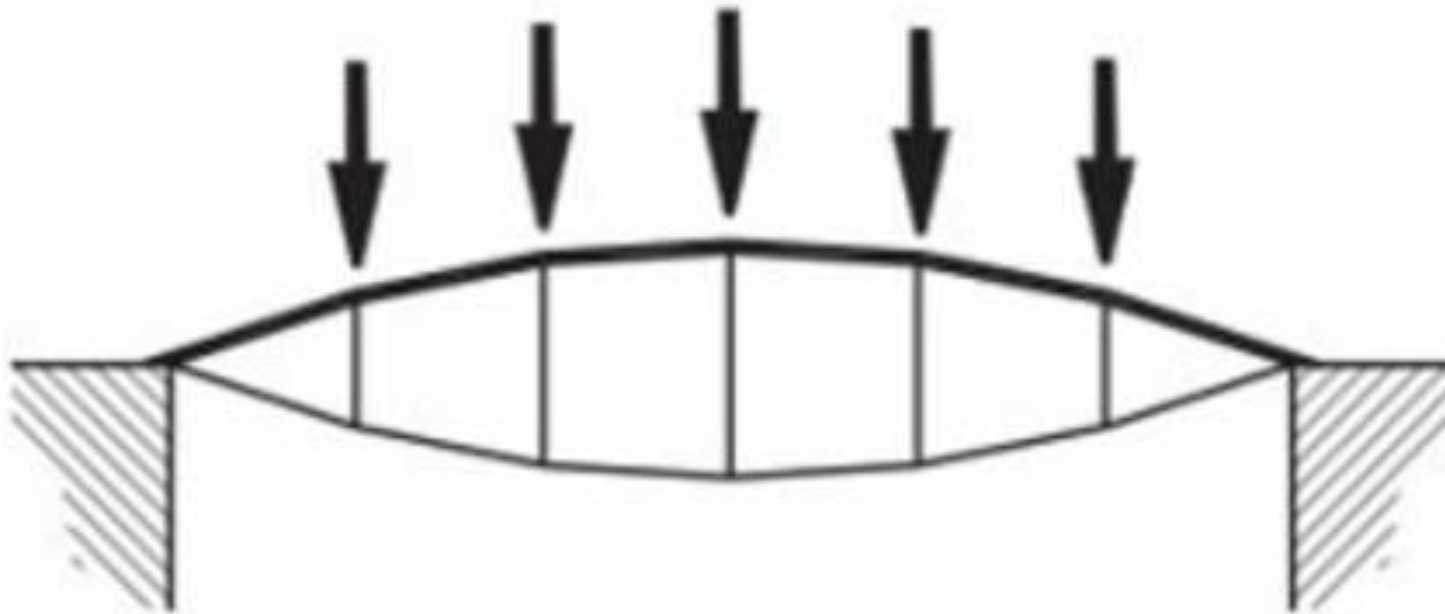


Ideal Form

Truss

Design of efficient truss

Target: Same force in top and bottom chord



Truss

Design of efficient truss

