

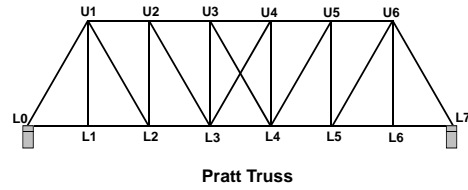
# Structural Considerations for Trusses



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## Introduction



Pratt Truss



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## Truss Types

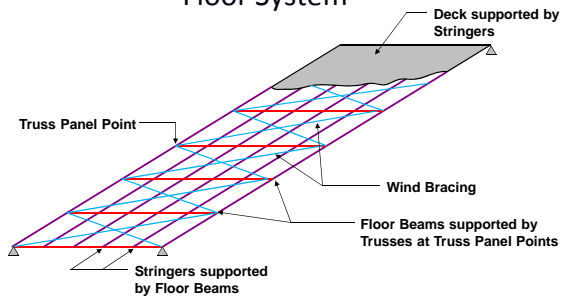
- Three types of trusses in Alberta:
  - Pony trusses
  - Through trusses
  - Deck trusses
- Traffic loads are transferred to the trusses by a floor system.



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## Floor System



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### Pony Truss

The diagram illustrates a pony truss bridge structure. It features a series of vertical floor beams supported by a truss system above. Red lines indicate the wind bracing system, which connects the floor beams to the truss members. Labels include 'Wind Bracing' and 'Floor Beams'.

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### Through Truss

The diagram shows a through truss bridge structure. The truss is positioned above the deck. Labels include 'Upper Wind Bracing System' at the top, 'Portal Brace' connecting the truss to the deck, and 'Batter Posts' supporting the deck from below.

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### Portal Brace & Batter Posts

This diagram focuses on the portal brace and batter posts. It shows a rectangular frame with a floor beam at the bottom. A wind load is applied to the top edge. A portal brace connects the top corners, and batter posts are shown at the bottom corners. Labels include 'Wind Load', 'Portal Brace', 'Batter Posts', and 'Floor Beam'.

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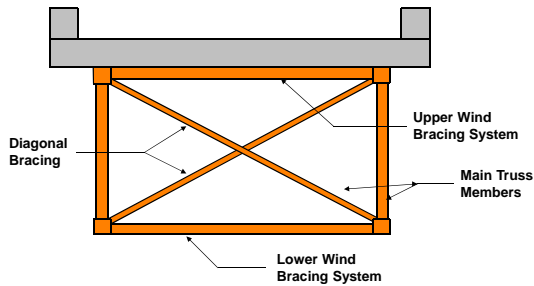
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### Deck Truss

The diagram depicts a deck truss bridge structure, where the truss is located below the deck. A 'Lower Wind Bracing System' is shown connecting the deck to the truss members.

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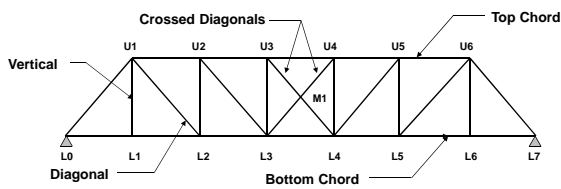
### Deck Truss – Wind Bracing



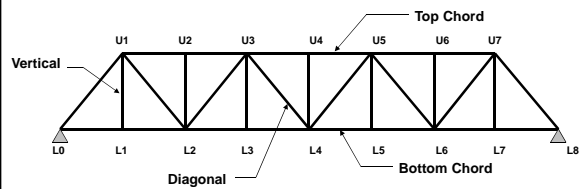
### Truss Configurations

- The way truss members carry loads depends on the configuration of the truss.
- Most trusses are either Pratt or Warren trusses.

### Pratt Truss



### Warren Truss



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### Truss Curvature

Top Chord

Bottom Chord

Tension

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### Loads in Diagonals

U1 U2 U3 U4 U5 U6

L0 L1 L2 L3 L4 L5 L6 L7

M1

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### Loads in Diagonals

U2 U3

L2 L3

This side of the panel is being held up by the left support

This side of the panel is being pulled down by the loads to the right

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### Loads in Diagonals

U1 U2 U3 U4 U5 U6

L0 L1 L2 L3 L4 L5 L6 L7

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### Loads in Diagonals

This side of the panel is being pulled down by the loads to the left

This side of the panel is being held up by the right support

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### Loads in Diagonals

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### Loads in Diagonals

This side of the panel is being held up by the left support

This side of the panel is being pulled down by the loads to the right

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### Loads in Diagonals

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### Loads in Diagonals

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### Loads in Diagonals

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### Loads in Diagonals

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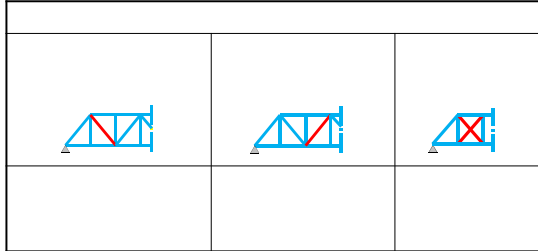
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### Summary – Loads in Diagonals

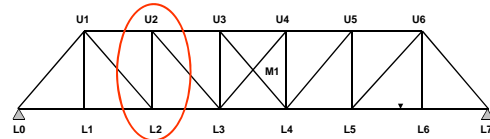
- Diagonals that slope away from the nearest support as they approach the bottom chord are primarily tension members.
- Some diagonals near the center of the truss may go into compression.
- Diagonals that slope towards the nearest support as they approach the bottom chord are primarily compression members.
- Crossed diagonals are tension members.

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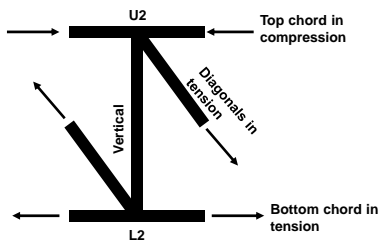
### Summary – Loads in Diagonals



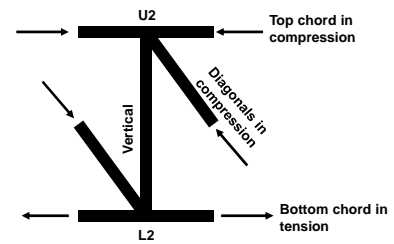
### Loads in Verticals



### Loads in Verticals



### Loads in Verticals



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### Loads in Verticals

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### Loads in Verticals

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### Loads in Verticals

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### Loads in Verticals

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### Loads in Verticals

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### Loads in Verticals

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### Summary – Loads in Verticals

- Verticals connected to diagonals at both ends will be in compression if the diagonals are in tension and in tension if the diagonals are in compression.
- Verticals connected to diagonals at the top chord only will be in tension for pony and through trusses and will be unloaded for deck trusses.
- Verticals connected to diagonals at the bottom chord only will be in compression for deck trusses and will be unloaded for pony and through trusses.

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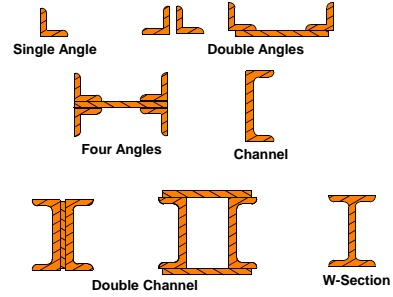
### Summary – Loads in Verticals


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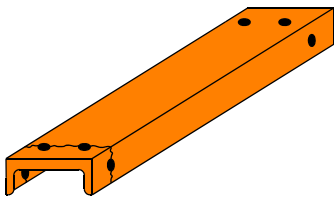
### Summary – Loads in TC, BC & BP

- Top chords are in compression.
- Bottom chords are in tension.
- Batter posts are in compression.

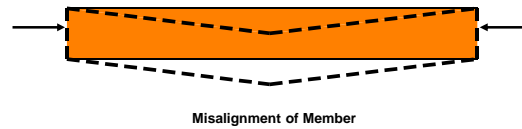
### Steel Sections



### Tension Member



### Compression Member

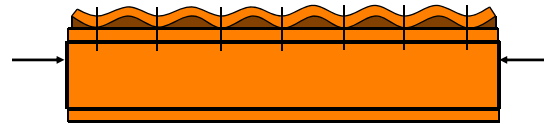


### Compression Member



Bent Member

### Compression Member



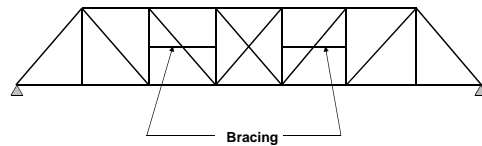
Ripling of Plate

### Compression Member



Ripling of Plate

### Compression Member



Bracing

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### Class Exercise

A truss structure with upper nodes U0 to U8 and lower nodes L0 to L8. The truss consists of a top chord, a bottom chord, and vertical members. Diagonal members connect U1-L1, U2-L2, U3-L3, U4-L4, U5-L5, and U6-L6. Blue circles highlight members 1 (U0-L0), 2 (L2-L3), 3 (U3-L3), and 4 (U5-L5).

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Structural Considerations for Trusses

### Class Exercise

A truss structure with upper nodes U1 to U8 and lower nodes L0 to L9. The truss consists of a top chord, a bottom chord, and vertical members. Diagonal members connect U1-L1, U2-L2, U3-L3, U4-L4, U5-L5, U6-L6, U7-L7, and U8-L8. Blue circles highlight members 5 (U1-L1), 6 (U2-L2), 7 (U3-L3), 8 (U4-L4), 9 (U7-L7), and 10 (U8-L8).

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### Truss Loads

A truss structure with upper nodes U1 to U7 and lower nodes L0 to L8. The truss has a 60-degree angle at the ends. Downward loads are applied at lower nodes: 5 at L0, 10 at L1, 10 at L2, 10 at L3, 10 at L4, 10 at L5, 10 at L6, 10 at L7, and 5 at L8. Upward reaction forces are shown at L0 and L8, both labeled 40.

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# Questions??

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