Introduction to Bridge Engineering

Define of Bridge

A bridge is a construction made for carrying the road traffic or other moving loads in order to pass through an obstacle or other constructions. As well as the interchanging to diminish the congestion delay at busy traffic intersections instead of using optical signals. Thus, the bridge is the key element in a transportation system.

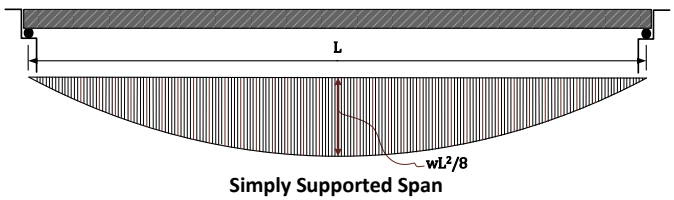
Types of Bridges

Bridges can be classified according to its own properties into:

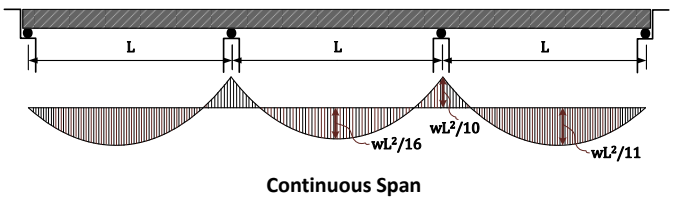
- Purpose of construction (pedestrian, highway, railway)
- Materials of construction (wood, stone, brick, reinforced concrete, steel)
- Chance of use (temporarily, permanent, military)
- Length of span (short [6 - 39] m, medium [40 - 125] m, long [> 125] m)
- Method of supporting (simple, cantilever, continuous)
- Structural design of superstructure (slab, beam, arch, truss, cable-stayed, suspension)

Typical Span Length for Various Types of Superstructures

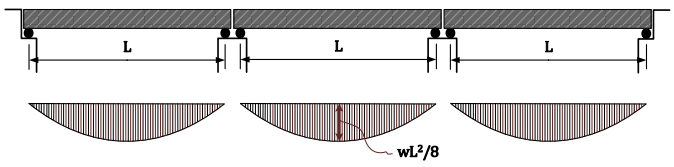
Structural Type of Bridge	Material of Construction	Range of Spans (m)
Slab	Concrete	6 – 12
Beam	Concrete	12 – 300
	Steel	30 – 300
Arch	Concrete	90 – 420
	Steel	240 – 550
Truss	Steel	90 – 550
Cable Stayed	Steel	90 – 1100
Suspension	Steel	300 – 2000



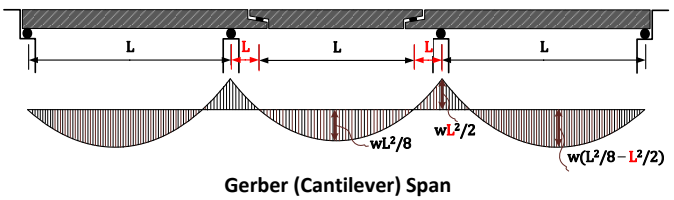
Simply Supported Span



Continuous Span



Series of Simply Supported Spans



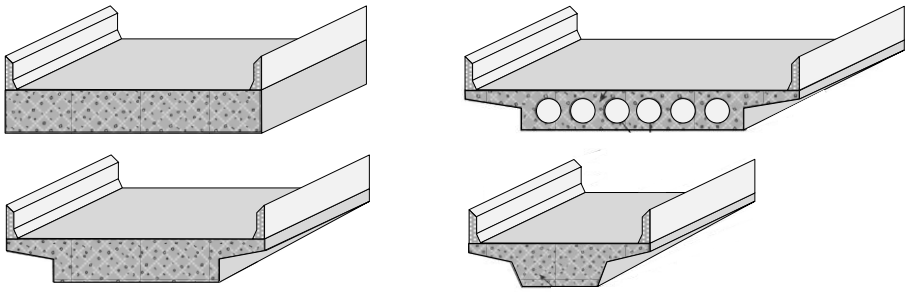
Gerber (Cantilever) Span

"A bridge is a monument to mankind's indomitable will to achieve. Bridges symbolize the ideals and aspirations of humanity".

D. B. Steinman and S. R. Watson
Bridges and Their Builders, Putman, New York, 1957

Introduction to Bridge Engineering

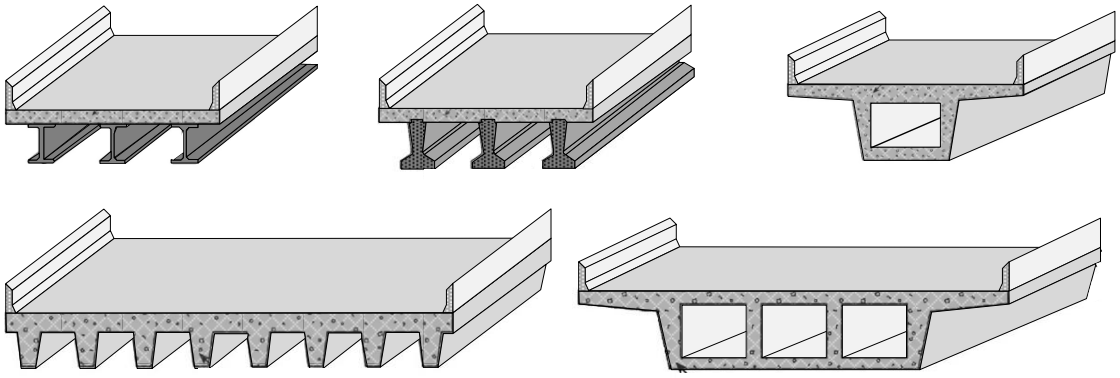

(Elevation)



(Section)

Slab Bridge


(Elevation)



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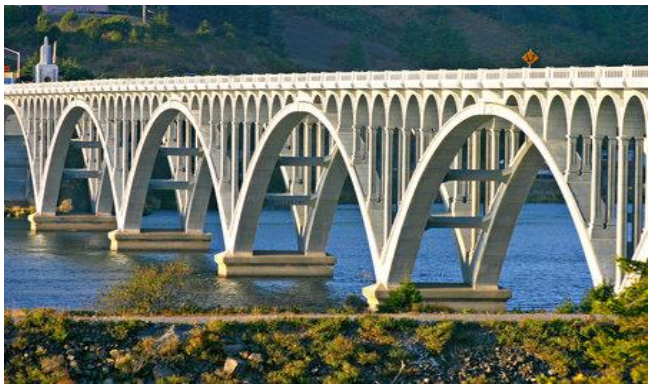
Beam Bridge

Introduction to Bridge Engineering




Arch Bridge


Truss Bridge

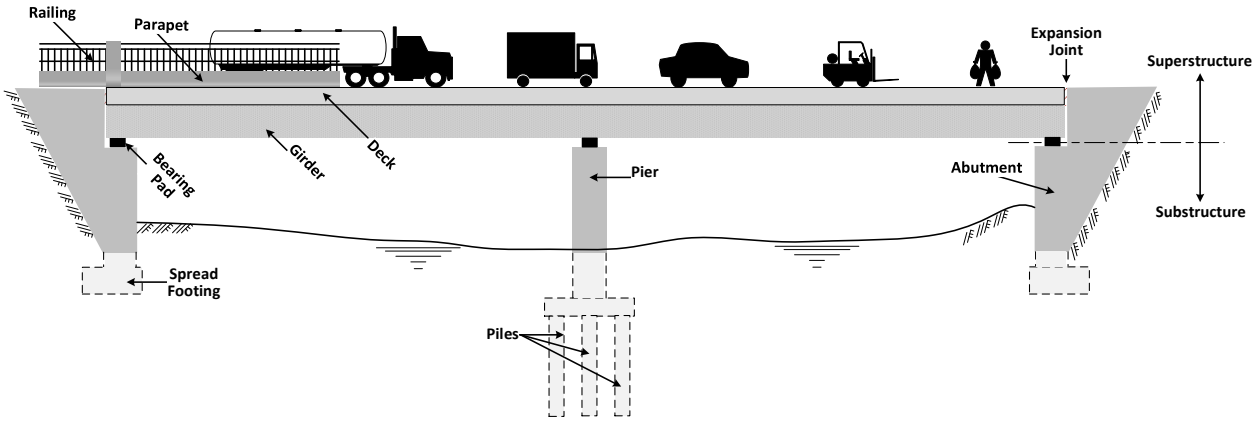

Cable Stayed Bridge


Suspension Bridge

Components of Beam Bridges

Especially, for beam bridge type, the following components can be appeared:

- ***Superstructure***: the upper visible part of the bridge and contains the roadway (carriageway) to transfer the moving loads above physical obstacle or traffic congestion. It consists of:
  - Slab (Deck)
  - Main Beams (Girders)
  - Transverse Beams (Diaphragms).
- ***Substructure***: the supporting system to transfer the superstructure loads as well its own weight plus external loads affecting it into the soil. It consists of:
  - Abutments
  - Columns (Piers)
  - Foundation (Spread Footings, Piles).
- ***Bearings***: the vibration isolators at contact areas between superstructure and substructure.
- ***Expansion Joints:*** the controlling system to eliminate thermal strains effects from the deck.



Typical Components of Beam Bridges

Typical Bearing System of Bridges

Typical Expansion Joints of Bridges