

TYPES

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BASIC BRIDGE TYPES

GIRDER

BEAM

ARCH

TRUSS

CABLE-STAYED

SUSPENSION

Types of Bridges

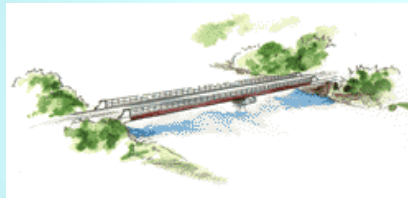


The type of bridge used depends on various features of the obstacle. The main feature that controls the bridge type is the size of the obstacle. How far is it from one side to the other? This is a major factor in determining what type of bridge to use.

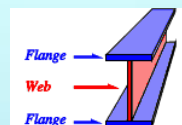
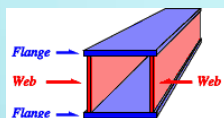
The biggest difference between the three is the distances they can each cross in a single span.

Types of Bridges

Girder Bridge



- Oldest and most common bridge type known. (Fallen logs were used).
- In modern girder bridges, steel I-beams are used, but they are subject to twisting and are not good for bridges with any curve to them.
- Box beams are stronger and used for curving or longer bridges.

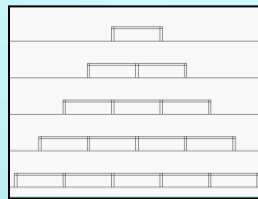
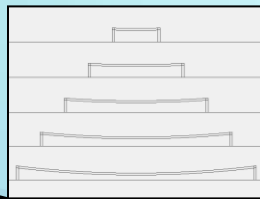


Types of Bridges

Beam Bridge



Consists of a horizontal beam supported at each end by piers. The weight of the beam pushes straight down on the piers. The farther apart its piers, the weaker the beam becomes. This is why beam bridges rarely span more than 250 feet.

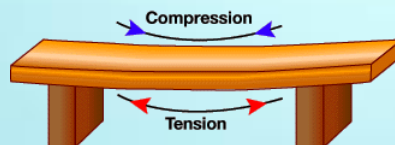


Types of Bridges

Beam Bridge

Forces

When something pushes down on the beam, the beam bends. Its top edge is pushed together, and its bottom edge is pulled apart.



Types of Bridges

Truss Bridge



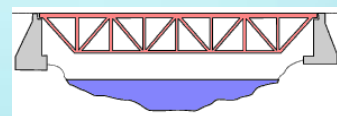
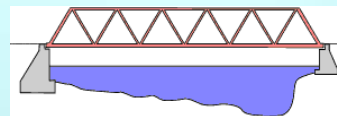
Forces

Every bar in this cantilever bridge experiences either a pushing or pulling force. The bars rarely bend. This is why cantilever bridges can span farther than beam bridges

Types of Bridges

Truss Bridge

- Because of the use of the triangular shape, trusses only sustain compression and tension forces and not bending!
- Can be built in small sections so are ideal in areas where large machinery wouldn't have access.
- The most common type is the Warren Truss
- For longer spans and for a stronger Warren Truss, vertical members are added. Notice that the roadbed can be above or below the truss.



Types of Bridges

Arch Bridges

The arch has great natural strength. Thousands of years ago, Romans built arches out of stone. Today, most arch bridges are made of steel or concrete, and they can span up to 800 feet.

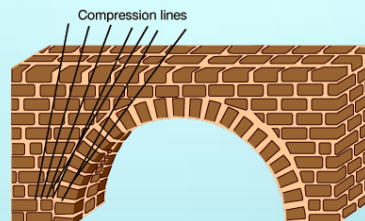
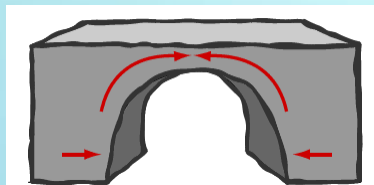


Types of Bridges

Arch Bridges

Forces

The arch is squeezed together, and this squeezing force is carried outward along the curve to the supports at each end. The supports, called abutments, push back on the arch and prevent the ends of the arch from spreading apart.



Types of Bridges

Arch Bridges

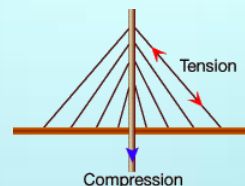


- Second oldest bridge type.
- Unlike girders, *can* be built from stone.
- Because no center pier is required, can be used to cross valleys and rivers without interfering with river traffic.
- Considered the most beautiful of bridge types.
- Many ancient arches are still standing today!

Types of Bridges

Cable-Stayed Bridge

The cable-stayed bridge, like the suspension bridge, supports the roadway with massive steel cables, but in a different way. The cables run directly from the roadway up to a tower, forming a unique "A" shape. Cable-stayed bridges are becoming the most popular bridges for medium-length spans (between 500 and 3,000 feet).



Types of Bridges

Cable-Stayed Bridge



- Really just a continuous girder bridge with towers above piers.
- The cables are flexible and affected by the wind.
- Longer spans require very complex computations and analysis.

Types of Bridges

Suspension Bridges

This kind of bridges can span 2,000 to 7,000 feet -- way farther than any other type of bridge! Most suspension bridges have a truss system beneath the roadway to resist bending and twisting.

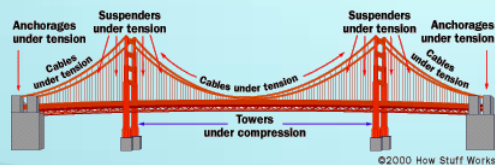


Types of Bridges

Suspension Bridges

Forces

In all suspension bridges, the roadway hangs from massive steel cables, which are draped over two towers and secured into solid concrete blocks, called anchorages, on both ends of the bridge. The cars push down on the roadway, but because the roadway is suspended, the cables transfer the load into compression in the two towers. The two towers support most of the bridge's weight.



Types of Bridges

Suspension Bridges



- Of all the types of bridges used today, the suspension allows for the longest spans.
- Similar to a cable-stayed bridge except there is one main cable that runs between the towers with hanger cables below it.
- The girder and roadbed are not resting on the piers as with other bridge types, but is hanging from the hanger cables.
- Vulnerable to wind.

How do the following affect the structures for each type of bridge?

- Forces
- Loads
- Materials
- Shapes

*Thanks for your attention
and success with your study!*