



## An Introduction to Bridge Design

## Types of Bridge

- Beam Bridges
- Box Girder Bridges
- Arch Bridges
- Truss Bridges
- Suspension Bridges
- Cable Stayed Bridges

## Beam Bridges



- ☺ Cheap & easy to manufacture
- ☹ Not very beautiful
- ☹ Beam needs careful design

## Box Girder Bridges



## Box Girder Sections



- ☺ Cheap and cheerful
- ☺ Easy to manufacture
- ☹ Not very beautiful
- ☹ Girder needs careful design

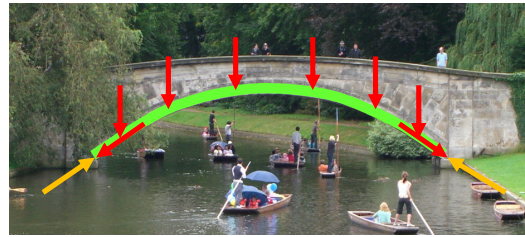
## Supporting Beams

- To improve the performance of a simple beam bridge the beam has to be supported
- There are three basic ways to do this:
  - > Arches
  - > Trusses
  - > Cables

## Arch Bridges



## Arches



The banks carry the load and keep the ends of the bridge from spreading out

## Arch Bridges



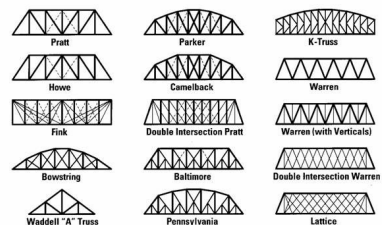
## Arch Bridges

- ☺ Very strong if well designed
- ☺ Can be very beautiful
- ☹ Tend to be very heavy
- ☹ Need very strong abutments

## Truss Bridges



## Truss Bridges



- Are mostly empty space, but very effective
- Solid components (beams, arches etc.) are replaced by triangulated assemblies of thin (usually metal) members

## Truss Bridges

- ☺ Very good strength to weight performance
- ☺ Possibility of lots of repeated parts reduces manufacturing costs
- ☺ Can be incorporated into almost any design
- ☺ Can be very beautiful
- ☹ Lots of parts to be manufactured

## Suspension Bridges



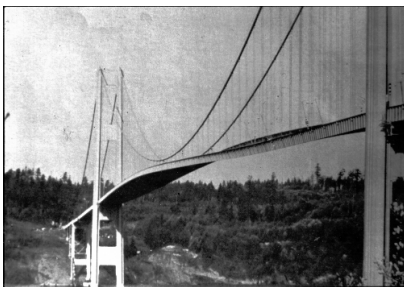
## Suspension Bridges



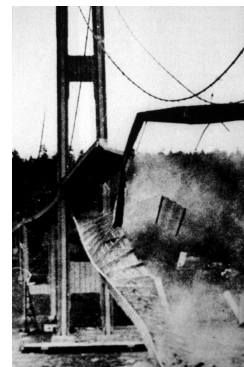
## Suspension Bridges

- ☺ Aesthetic, light and strong
- ☺ Can span distances far longer than any other kind of bridge
- ☹ The most expensive bridges to build
- ☹ Susceptible to "wobble" if badly designed

## Suspension Bridge Wobble



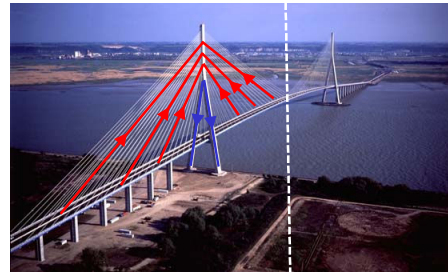
## Suspension Bridge Wobble



## Cable Stayed Bridges



## Cable Stayed Bridges



## Cable Stayed Bridges



Parallel attachment pattern



Radial attachment pattern

## Cable Stayed Bridges

- ☺ **Undeniably beautiful**
- ☺ **Require less cable**
- ☺ **Are easier and faster to build**
- ☹ **Need stronger towers**