

## Design Problem

The city engineer of Hardin, Kentucky has decided to replace the bridge that crosses Clarks River on Highway 402. The old bridge, known as “The Blue Bridge” will be demolished and replaced with a more modern structure. The Town Engineer is satisfied with your work done to this point, so he would like to employ you to design the new Hardin Highway 402 Bridge. When completed, the bridge will be dedicated and named the George M. Goethals Memorial Bridge.



## Design Requirements

The Hardin city engineer worked closely with civil engineers from the Kentucky Department of Transportation to develop the following design requirements for the bridge:



- The new bridge will be constructed on the abutments from the old structure. **These existing supports are 44 meters apart.**
- The bridge must carry two lanes of traffic.
- The bridge must meet the structural safety requirements of the AASHTO bridge design code.
- The bridge will be made of steel.
- **Because of the limited project budget, it is essential that the new bridge cost as little as possible.**

## Assignment

You are a structural engineer employed by Thayer Associates to design the main trusses for the George M. Goethals Memorial Bridge. Your responsibility is to design trusses that are safe, that satisfy all of the other design requirements, and that cost as little as possible.



## Evaluation

- **Time Management**
- **Following Rules/ Procedures/ Instructions**
- **Cost**
  - Designs will be ranked from lowest to highest cost. Based on the ranking of bridges, cutoff points will be established for grades of an A, B, C, D, or F.

## Optimizing Tips

- Build the bridge with one type and size of material
- Perform a load test then optimize the size of failing members
- Members subjected to compression should be made of hollow steel tubes
- Members subjected to tension should be made of solid bars
- Optimize the materials to reduce production cost