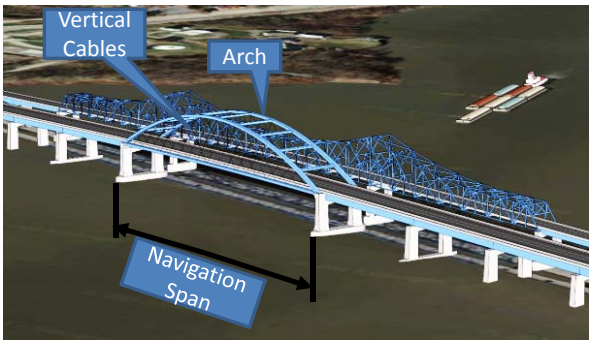
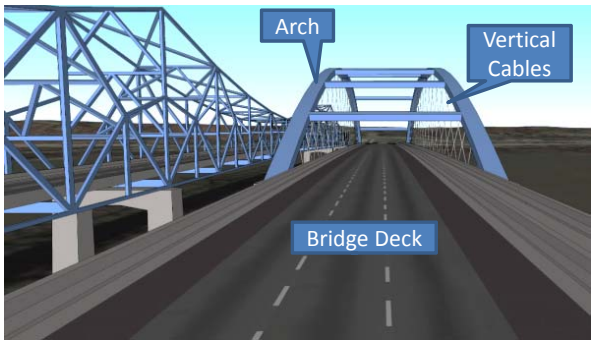
Illinois Department of Transportation

mcclugage BRIDGE project
Eastbound US 150

Bridge Type Alternatives Recommended to Study

DECK TIED ARCH



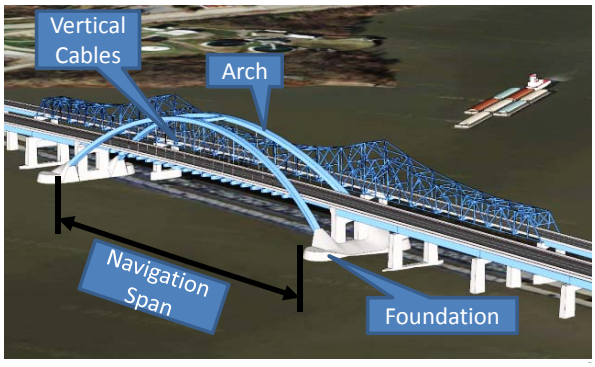


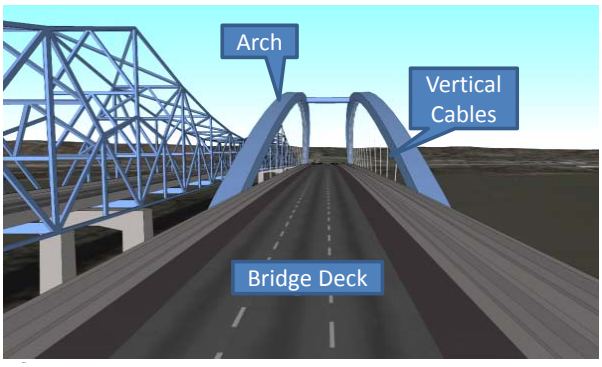
This bridge type spans the navigation opening using an arch that supports the roadway deck by using vertical cables. The entire arch is self-equilibrating, meaning the entire span may be lifted into place as a unit during construction. This bridge type is quite economical for the span length needed for this crossing.

Advantages
- Economical for this span length
- Minimal structure depth maintains roadway profile
- Can be built off-site and moved into place
- Construction with minimal navigation interference

Disadvantages
- Difficult to inspect underneath structure
- Deck replacement may be challenging if bridge deck is tied to structure

TRUE ARCH



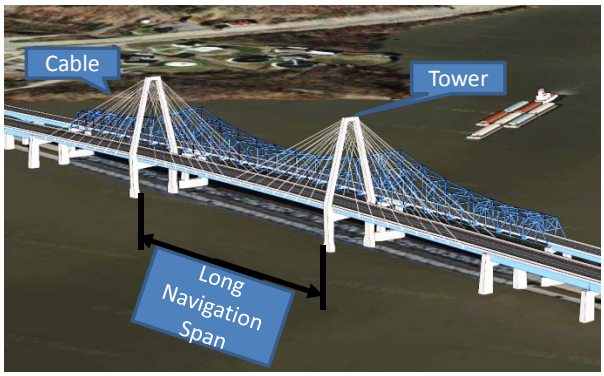


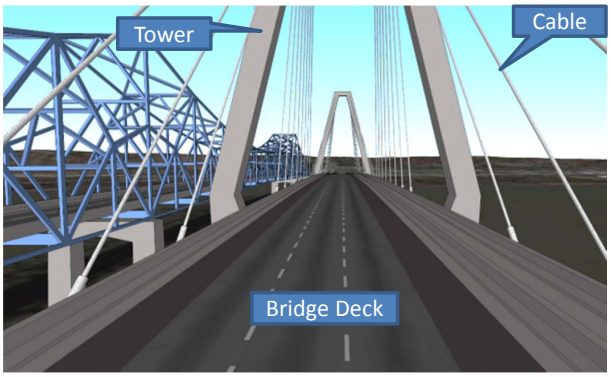
Similar to the Deck Tied Arch except the foundation supports the arch that supports the roadway deck. This design adds considerably to the size of the foundations. A temporary tie can be constructed for this bridge allowing it to be lifted into place during construction. The cost is somewhat greater than the Deck Tied Arch.

Advantages
- Minimal structure depth maintains roadway profile
- Ease of deck replacement
- Can be built off-site and moved into place
- Construction with minimal navigation interference

Disadvantages
- Design of foundation support is more complex than other bridge types
- Arch construction and connection to the foundation is challenging

CABLE-STAYED



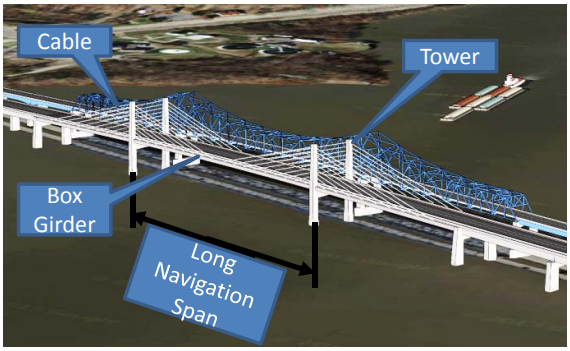


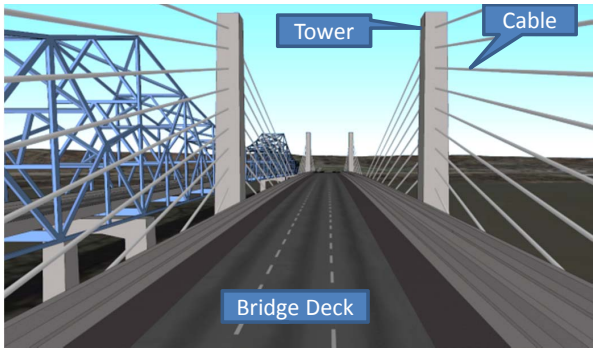
This bridge type is generally used for longer spans than can be achieved with either arches or girders. An example would be the Golden Gate Bridge in San Francisco, California. The roadway deck is supported by high strength cables that originate from towers. The cost is high compared to other bridge types.

Advantages
- Minimal structure depth maintains roadway profile
- Construction without navigation interference
- Ease of deck replacement

Disadvantages
- Highest cost
- Inspection more difficult than other bridge types
- Design of tower and cables is more difficult than other bridge types
- Most difficult bridge type to construct

EXTRADOS





This bridge type is a hybrid between a box girder bridge and a cable-stayed bridge. The towers are approximately half as tall as for a cable-stayed bridge. This form allows longer spans for more slender box girders, and can be more economical for spans in the range of the McClugage bridge than a pure box girder bridge. This option would potentially raise the roadway more than the arch options.

Advantages
- Construction without navigation interference
- Ease of deck replacement

Disadvantages
- Structure depth would raise roadway
- Design of tower and cables is more difficult than other bridge types
- Construction more difficult than other bridge types

THROUGH TRUSS

This is the type of bridge currently in service for both McClugage Bridge structures. This bridge form was quite common before the 1960s due to the efficient use of steel. Both single-span and three-span trusses are an option for this bridge type. Construction and maintenance of this bridge type involves more cost than for competing bridge forms, so the through truss is rarely seen in new projects.

Advantages
- Matches existing bridge
- Minimal structure depth maintains roadway profile
- Construction with minimal navigation interference

Disadvantages
- High cost
- Most complex bridge type to design
- Most difficult bridge type to inspect
- Deck replacement difficult

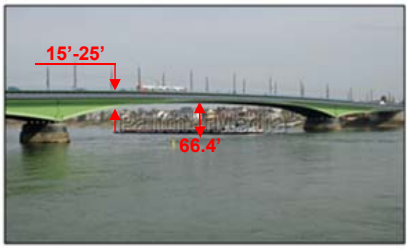
Preliminary Bridge Type Alternatives Not Carried Forward

Dual Deck

Concrete Segmental Box Girder

Steel Box Girder

Deck Truss



Haunched Plate Girder

These bridge types were eliminated due to structure depth, impacts to the interchanges and cost. The depth to support the bridge deck requires the roadway elevation to increase to maintain the river channel navigation clear height of 66.4'.