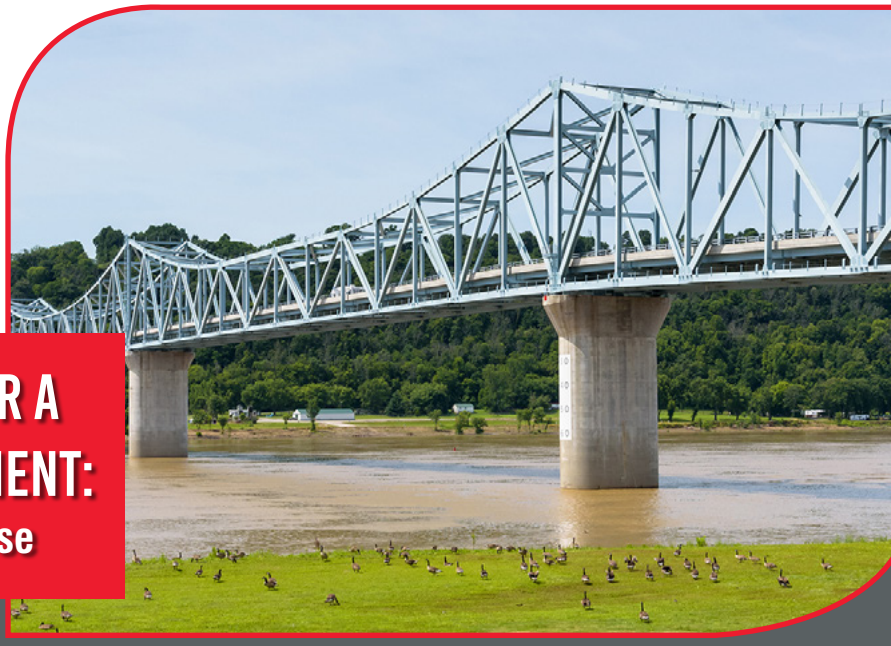
DEEP FOUNDATIONS INSTITUTE

SUBSURFACE CHARACTERIZATION COMMITTEE PRESENTS



MAJOR MOBILITY MITIGATION FOR A MAJOR RIVER BRIDGE REPLACEMENT:

Milton-Madison Bridge Foundation Reuse

Indiana DOT, Kentucky Transportation Cabinet, USDOT

Madison, Indiana and Milton, Kentucky (Ohio River Crossing)

SCOPE OF FOUNDATION WORK

Technology used, reason for the reuse:

The old Milton-Madison bridge was a structurally deficient, functionally obsolete 80-year-old bridge with more than $10 million spent on recent repairs. A superstructure replacement option was selected to provide a 75-year service life while taking advantage of structurally sound piers and greatly reducing mobility impacts associated with a full bridge replacement. Reuse of the existing pneumatic caisson foundations facilitated the superstructure replacement option.

Methodology to determine existing capacity:

Testing of the existing piers and caissons was extensive and included

- Coring with downhole camera
- Sonic logging
- Petrography
- Compressive strength and modulus testing
- Chloride testing

Axial resistance of the caissons provided plenty of reserve capacity. For overturning resistance, finite element analysis was performed. The overturning analysis utilizes resistance of the soil above rock, which required implementation of scour countermeasures.

Retrofit construction activities conducted:

The excellent condition and high load-carrying capacity of the existing caissons resulted in relatively minor retrofit activities for the caissons. The retrofit activities were limited to expolying new reinforcing steel into the existing foundations. In addition, potential overturning due to scour was addressed via scour prevention measures (riprap and geotextiles).

Conclusions on other side...

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CONCLUSIONS

Cost Savings:

The Milton-Madison Bridge is one of two Ohio River bridges between Cincinnati and Louisville. Maintaining the existing alignment was ideal because it eliminated the need to acquire right-of-way and significantly streamlined the environmental approval process. By reusing the existing pneumatic caissons, $50 million in direct cost savings were achieved. In addition, by combining foundation reuse with sliding in a new bridge, the closure time was limited to less than one year, compared to 4 to 6 years for a conventional major river bridge replacement. Reducing the road closure duration from 4 to 6 years was greatly consequential, considering the hours-long detour required during closure, resulting in major indirect cost savings.

Three Cost Saving Statistics:

1. $50 million in cost savings
2. Reduced closure time from ~5 years to less than one.
3. Major mobility mitigation, considering detours of approximately 100 miles.

FOR MORE INFORMATION

Hetrick, K., A. Stover, C. Gannon (2014), "Milton-Madison Bridge Project," Webinar Powerpoint.

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