

## **ABSTRACT**

### **I-74 MISSISSIPPI RIVER BRIDGE: A STATE OF THE ART DESIGN**

The existing I-74 Mississippi River Bridge connecting Bettendorf, Iowa with Moline, Illinois is a vital component of the transportation corridor in the Quad Cities. The twin suspension bridges, a national historic landmark, will be replaced with dual 795' Steel Basket Handle True Arch bridges consisting of a total of twelve vehicular traffic lanes (eight lanes and four full size shoulders) and a bicycle/pedestrian trail.

The new arch bridges will provide the high degree of elegance that was desired by the community. The design team tackled complex arch design issues such as buckling behavior of the minimally braced arch rib, evaluation of dynamic wind loads, mitigation of wind vibration affects, and a detailed construction analysis of both arch spans. The bicycle/pedestrian trail will be asymmetrically cantilevered off the eastbound arch bridge before converging into a monolithic bridge deck on the girder approach spans.

A structural health monitoring system (SHM) will monitor corrosion, load distribution, and movements. Motorized travelers and an extensive walkway system will provide easy access for inspection and maintenance. In addition to the basket handle arch, other aesthetic features will include an overlook on the arch bicycle/pedestrian trail with a glass oculus, eccentrically intertwined Y-shaped pier columns, and special LED lighting.

The presentation will discuss the unique design challenges and features of the signature structure, highlighted above, such as the arch state-of-the art structural design and analysis, the SHM system, the built-in inspection and maintenance system, and the aesthetic features.

Keywords: Arch bridges, complex design, structural health monitoring, inspection access, bridge maintenance, and aesthetics.

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