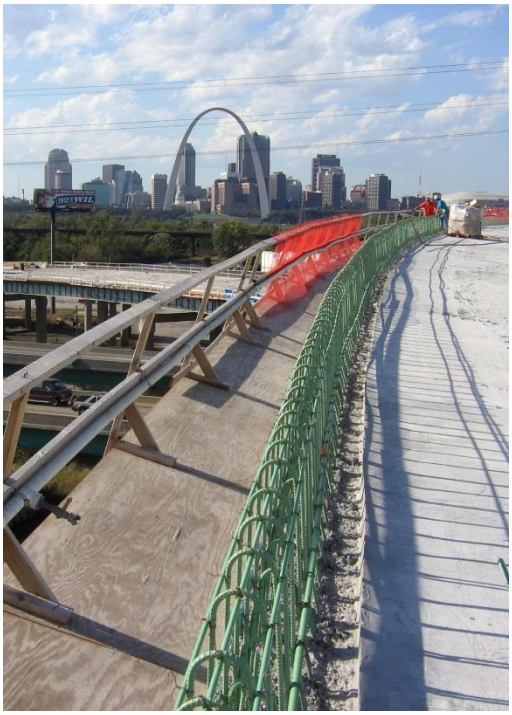
PROJECT PROFILE

Poplar Street Roadway Complex

Structural Evaluation and Seismic Retrofit | East St. Louis, IL



CLIENT

Illinois Department of Transportation (IDOT)

BACKGROUND

A system of elevated roadways connects the Poplar Street Bridge to several local, state, and interstate roads on the Illinois side of the Mississippi River. Built in the late 1960s, the elevated roadways feature concrete decks supported by steel beams and plate girders. Reinforced concrete columns founded on steel piles support the plate girders.

No consideration for potential seismic demands was given when this extensive system of elevated roadways was built. Another consulting engineering firm performed a preliminary evaluation of typical spans, identified substantial seismic deficiencies, and developed general retrofit recommendations. However, their cost estimates for addressing deficiencies exceeded available construction funds. IDOT subsequently retained WJE to conduct a comprehensive structural evaluation and design more economical retrofit measures to address any deficiencies.

SOLUTION

While assessing the strength of the superstructure elements, WJE found that they typically had excess capacity. Understanding the nature of earthquake demands, WJE engineers realized that reducing the excess strength at key locations would eliminate the structure's ability to transmit damaging loads to the foundation. This innovative concept eliminated most of the below-grade seismic deficiencies without the need for excavation. Making elements of the superstructure the "weak links" in their respective systems also made it possible to use simple, proven retrofit methods to achieve the needed degree of system ductility easily and inexpensively. Other noteworthy issues related to this project include the following:

- The successful contractor's retrofit bid was a small fraction of the previous consultant's preliminary retrofit cost estimate.
- After completion of this work, IDOT implemented similar retrofit measures on other portions of the structure.
- IDOT funded a research study to evaluate the efficacy of using the seismic retrofit approach WJE developed for bridges throughout the state. The study concluded that 80 percent of the structures examined could be brought up to new structure seismic performance levels by making minor changes in accordance with the WJE approach.

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS