



New I-70 Mississippi River Bridge St. Louis, Missouri

DBA Client:

Massman-Traylor-Alberici (MTA)
(A joint venture of Massman, Traylor Bros., and Alberici Enterprises.)

DBA Services:

- Provided design of a pre-bid Alternate Technical Concept (ATC) for the foundations employing fewer, larger diameter drilled shafts. This ATC was accepted and ultimately awarded.
- On-site observation of test shaft construction and inspection.

Project Highlights:

The New Mississippi River Bridge is being constructed just north of downtown St. Louis and will be a cable-stayed bridge with two delta towers in the river, one near each bank. DBA, working for MTA in the pre-bid phase, served to re-design the drilled shaft foundations contained in the baseline drawings which were produced by the owner's engineer.

The ATC resulted in fewer, larger diameter drilled shafts with significantly shorter rock sockets that count on both side and base resistance. The increased diameters of the drilled shafts are more efficient at resisting large lateral loads induced by vessel impact and seismic demand. Furthermore, the increased shaft diameter favors the inclusion of base resistance to resist axial demand, but requires diligent construction, clean-out, and inspection. A full-scale construction phase O-cell load test on a non-production shaft was included in the ATC to demonstrate that the side and base resistance exist at compatible strains, to verify the unit resistance values used for the design, and to take advantage of the higher resistance factors available for using a load test.

The test, performed by Loadtest, Inc., applied slightly greater than 36,000tons (bi-directional) to the shaft resulting in about 1/8in of upward movement of the shaft and about the same magnitude of downward displacement at the base. The 11ft diameter rock socket was drilled about 23ft deep into very hard limestone. Four 34in O-cells placed at the base of the socket were loaded to 150% of their rated capacity to achieve the load. The 36,000 tons was a new world record, besting the previous record of 32,000 tons set in 2005 in Korea.

The re-designed foundations utilize 11ft diameter drilled shafts socketed into the limestone. The socket lengths range from 16.5ft at Pier 12 to 22ft at Pier 11. *Photo Credits: DBA*



Owners:

Missouri Department of Transportation
(lead)

Illinois Department of Transportation