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Technologies to manage risk for infrastructure

Project Brief

Huey P. Long Bridge Truss Lift Monitoring

Client:

MTI Joint Venture (Massman Construction Co., Traylor Bros. Inc., and IHI Inc.)

Location:

Jefferson Parish, LA

Services Provided:

- Design and installation of a real-time wireless monitoring system to measure truss tilt and distortion during multiple twin-truss lifts
- Development of a unique long-range deflection measurement system using lasers to measure out-of-plane distortion

Value Provided:

- Confirmation that overstressing or buckling of the truss did not occur during the transport, lift, and setting operation
- Used real-time monitoring to control lift operation and reduced truss lifting operation from 22 hours to 10 hours
- Reduction in lifting time allowed for earlier than expected opening of navigational channels on the river and early opening of the bridge to traffic

Background & Project Challenges

The Huey P. Long Bridge in Jefferson Parish, Louisiana, is a four-span steel truss bridge that carries a two-track railroad line over the Mississippi River. Two lanes of US 90 are on each side of the central tracks owned by the New Orleans Public Belt Railroad.

The Contractor (with the help of their Engineer- HNTB) chose to build trusses on shore, transport to bridge, and lift and skid in place. Three different pairs of 2,700 ton trusses were built on shore, transported on barges, and simultaneously lifted 13 ft. and set in place during a weekend closure of the bridge and day closure of the navigation channel. The biggest concern to HNTB was out-of-plane distortion, primarily 'sweeping' of the truss. Since the truss would be lifted at the end points of the 528 ft. long truss, any tilting of the truss could initiate buckling. Therefore, the two most important parameters to measure were tilt and out-of-plane deflection of the truss.

Geocomp Role & Accomplishments

A real-time remote monitoring system was designed and installed to measure truss distortions to monitor for possible overstressing or buckling of the truss during the transport, lift, and setting operation.

All sensors were hard-wired to a data logger and transmitted to a laptop computer with multiple display panels under the bridge deck. Data was continuously transmitted, and updated approximately every 2 seconds. Data was under constant review by the design engineers and decisions made for controlling lift were based on real-time truss tilt/deflection measurements. To aid in the review of data, graphical representation of truss tilt and deformation was developed. For each truss a 'birds eye' view of the truss was displayed on separate screens to show 'sweeping' of the truss during the lifting and skidding operation.

"The monitoring system was vital to the lift operation. We were able to use it in real time and know exactly what was happening with the lift. It allowed us to make adjustments to the attitude of the truss "on the fly" without slowing down the operation. This could not be achieved with traditional survey methods. Once we confirmed that the monitoring system was giving us results that agreed with survey and visual inspection it gave us the confidence to know how the truss was behaving at any given time. The system also allowed us to monitor the truss while it was sliding laterally into position over the bearings, which was as critical if not more critical to monitor than the lift itself."
John Brestin, Vice President and Bridge Group Director, HNTB