



RESEARCH PROJECT CAPSULE [12-1ST]

March 2012

TECHNOLOGY TRANSFER PROGRAM

Data Collection and Evaluation of Continuity Detail for John James Audubon Bridge #2

JUST THE FACTS:

Start Date:
January 3, 2012

Duration:
24 months

End Date:
January 2, 2014

Funding:
State: TT-Reg

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POINTS OF INTEREST:

Problem Addressed / Objective of
Research / Methodology Used
Implementation Potential

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PROBLEM

NCHRP Report 519 introduced a procedure for the design of a continuity detail that has been used extensively in the construction of the John James Audubon (JJA) Project bridges. LTRC funded Project 08-1ST to evaluate the performance of the continuity detail, which has never been used in Louisiana before. Data was collected for a period of over two years through Project 08-1ST from a monitoring system comprised of vibrating wire gage sensors and a data logger via a remote retrieval protocol. Data collection ended in December 2010. LTRC Report 477 was recently published with the findings from this project, which revealed that the detail used in this bridge is affected by thermal gradients. One of the girders in the monitored segment cracked in the vicinity of the continuity diaphragm (See Figure 1). The crack initially started at the top of the girder's bottom flange in the vicinity of the continuity diaphragm at Bent 24 and did not extend more than a couple of inches downward. With time, the crack extended through the entire bottom flange. Its width also increased from when it was originally measured.

OBJECTIVE

The main objective of this project is to continue data collection from an already existing monitoring system with the goal of evaluating the performance of the positive moment detail that is employed in bridge #2 of the James Audubon Bridge project under long-term effects. The ultimate goal of the project is to provide DOTD with information on the performance of this detail, which is widely used in the John James Audubon Project bridges. Furthermore, assessment of a repair that took place to one of the girders in the monitored segment will be conducted.

METHODOLOGY

The same methodology used throughout LTRC Project 08-1ST will be used in this project. Raw data will be downloaded from existing sensors. Necessary data correction will then be performed to eliminate thermal effects on sensor readings and outliers. Finally, the corrected data will be post-processed and appended to the existing data that was generated through LTRC Project 08-1ST.

The following tasks have been identified by the research team to accomplish the goals of the project:

Task 1: Reinstate Monitoring System and Data Collection

The monitoring system has been off line since December 30, 2010. In this task, a new contract with a cellular carrier will be established to bring the system back on-line. The system will be tested to ensure the operability of all the system components and the quality of the data. Adjustments to the system, if needed, will be sought from the vendor who installed the system originally. Data collection will start right after system verification. The data will be collected and stored by the research team using the especially built routines that were developed as part of LTRC Project 08-1ST.

Task 2: Visual Inspection of Monitored Segment

In addition to bridge site visits on a per need basis, the research team will schedule two visits per year to conduct a visual inspection of the monitored bridge segment. Emphasis will be on the

repaired girder end; however, other girders in the monitored segment will also be inspected. Access to the bridge will be provided by DOTD/LTRC, including facilitating a manlift at the bridge site.

Task 3: Data Processing, Analysis, and Interpretation

Raw data collected as described in Task 1 will be post-processed and analyzed using the same methodologies adopted in Project 08-1ST. New data will be appended to existing records that were produced in Project 08-1ST. Analysis and interpretations of the data will be conducted by considering the entire record with special emphasis on the 24-month renewable period covered in this proposal.

Task 4: Transferring Control to LTRC

Upon request and provided that LTRC will provide sufficient resources (a server, cellular, and data plan), the PI will transfer control over the monitoring system to LTRC personnel at the end of the contracted monitoring period.

Task 5: Reporting

A comprehensive final report documenting the entire research effort will be submitted towards project completion. Interim reports will be submitted to convey the project's progress and findings to the PRC as necessary.

IMPLEMENTATION POTENTIAL

The findings from this project will further help DOTD understand the actual behavior of the positive moment continuity detail. This information is needed for performing load rating of bridges built using the new detail. It will also help assess the adequacy of the repair conducted to one of the girders in the monitored segment. Finally, the 24-month monitoring period will help capture any similar weaknesses that may arise.



(a) May 5, 2009 (at Bent 24)



(b) October 22, 2010 (at Bent 24)

Figure 1
Crack propagation at the same location (frontal and side views)