LTRC
RESEARCH
PROJECT CAPSULE

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08–1ST

TECHNOLOGY TRANSFER PROGRAM

Evaluation of Continuity Detail for Precast Prestressed Girders

JUST THE FACTS

Start Date:
December 1, 2007

Duration:
24 months

End Date:
November 14, 2009

Funding:
State

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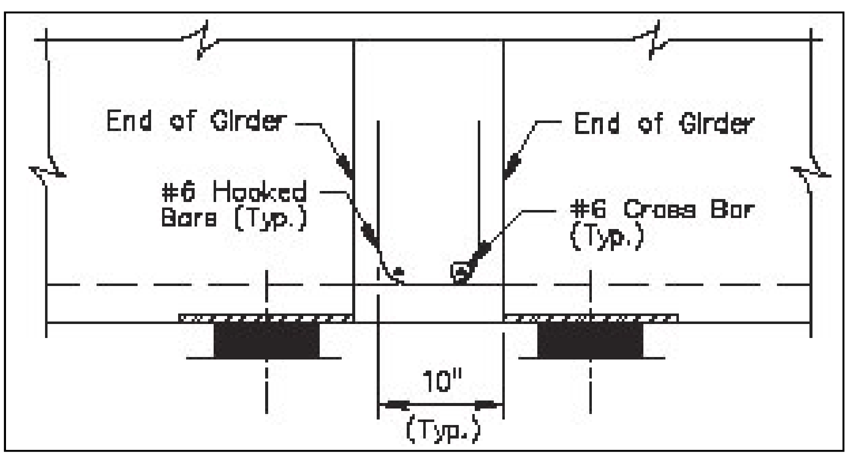
SPECIAL POINTS OF INTEREST:

- Problem Addressed
- Objectives of Research
- Methodology Used
- Implementation Potential

PROBLEM

The construction of a new bridge crossing the Mississippi River north of Baton Rouge is currently underway. The project, named the John James Audubon Bridge, is a true landmark. Its main span will be the longest cable-stayed bridge in North America. Furthermore, its approach spans will utilize a new continuity detail that has not yet been tried in Louisiana. The new detail addresses the development of positive moments in joints with continuity diaphragms and is based on the recommendations of NCHRP Project 12-53. Project 12-53 concluded in August 2003, and its findings were summarized in Report 519 (Miller et al. 2004).

In addition to allowing for the more efficient designs (longer spans, fewer strands, etc.), adequate design of the positive moment continuity may reduce the potential for problems associated with continuity diaphragms, such as cracking and spalling. The Louisiana Department of Transportation and Development (LADOTD) is planning to monitor the performance of the new detail. The monitoring is deemed necessary because of the relatively limited information about the performance of the chosen detail, especially under long term effects (e.g., creep, shrinkage, and temperature variations) and skewed bridge configurations. Furthermore, the new detail is different from the detail adopted in the current LADOTD design standards, which does not call for any positive moment reinforcement. Instead, it calls for the girder ends to be embedded in the diaphragms after being brushed with a bond breaker. The continuity diaphragm and deck are monolithically cast in place, surrounding the girder ends as well as its top.



Detail of reinforcement placement at positive moment connection (section view) (NCHRP 519 Report)

OBJECTIVES

The main objective of this project is to install a monitoring system for the purpose of investigating the performance of the continuity diaphragm detail, including the positive moment detail that is employed in the James Audubon Bridge Project, under long term effects. The purpose of the monitoring system is to:

1. validate the performance of the NCHRP 519 continuity detail,
2. assess the effects of differential shrinkage between the girder and the slab,
3. evaluate the performance of the skewed details of the connection, and
4. evaluate the performance of the detail in bridges with bulb tee girders.

The ultimate goal of the project is to provide LADOTD with a successful continuity detail for implementation in future projects based on a full understanding of the behavior of the continuity diaphragm connection detail.

METHODOLOGY

Achieving the goal of this project relies on devising a thorough monitoring plan to acquire all necessary data that must be interpreted to assess the performance of the positive moment continuity connection. An advanced electronic monitoring system is at the core of the monitoring plan. The system will be specifically designed for the bridge chosen by LADOTD. It will take into account its span configurations and skew. Five relevant parameters are identified for monitoring. They are: (1) strains, (2) end slopes, (3) temperature, (4) cracking, and (5) gaps.

The study will encompass the following six tasks:

Task 1: Design and submit a field instrumentation plan to monitor and evaluate the new continuity detail.

Task 2: Adjust instrumentation plan as per feedback from PRC.

Task 3: Acquire and install monitoring system.

Task 4: Collect, analyze, and interpret data.

Task 5: Test live load dynamic of bridge.

Task 6: Report.

IMPLEMENTATION POTENTIAL

The findings from this study will provide insight into the performance of the NCHRP 519 continuity diaphragm detail. Based on these findings, recommendations for implementation in future bridge projects will be provided. The recommendations will build on the lessons learned from this effort.