



Project Summary

Texas Department of Transportation

0-6100: Development of a Precast Bridge Deck Overhang System

Background

The concept of using interior and overhang precast panels for constructing bridge decks has been around for over 40 years. Challenges with the alignment of shear pockets in the deck and the shear connectors in the girders prevented the implementation of precast overhang panels. However, recent work rekindled interest in precast overhang panel systems.

The use of full-depth, precast, overhang panels has the potential to decrease construction times, improve safety, and decrease construction costs. However, because of the lack of data on the performance of these systems, research was needed to design and assess these systems for potential use. To realize the potential benefits from these overhang panel systems, these systems need to be assessed for flexural capacity and interface shear capacity. In addition, economical materials need to be identified to form the haunch area (the area between the top of the girder and the bottom of the precast panels) and to fill the haunch area. The haunch form material should be flexible to allow for the variations in haunch depth yet sufficiently strong to prevent leakage of the haunch fill material. The haunch fill material needs to be sufficiently fluid to flow through the shear pockets in the precast panels into the haunch area yet should provide good dimensional stability and strength.

What the Researchers Did

The researchers evaluated the flexural capacity and interface shear capacity of precast overhang panel systems. In addition, the researchers assessed various haunch form systems and haunch fill materials. Because initial results indicated the need for a large number of shear pockets to meet the shear demands, additional testing was performed to assess the shear capacity of a wide range of shear connector systems.

What They Found

The results from this research indicate that the precast overhang panels exhibit sufficient capacity when subjected to factored American Association of State Highway and Transportation Officials Load and Resistance Factor Design loadings.

Research Performed by:

Texas Transportation Institute (TTI),
The Texas A&M University System

Research Supervisor:

David Trejo, TTI

Researchers:

Monique Hite Head, TTI

Matthew D. Henley, TTI

John B. Mander, TTI

Thomas J. Mander, TTI

Reece M. Scott, TTI

Project Completed: 8-31-09

Initial testing indicated that the number of shear pockets needed in the precast panels and the number of shear connectors in each pocket was significant, possibly reducing the benefits of such a system. These initial results from this research (reported in report 0-6100-2) were used to construct the Rock Creek Bridge in Parker County, Texas, which was designed with these precast overhang panel systems.

The challenges and benefits of fabricating, transporting, and installing the precast panels was assessed as part of this research. It was determined that reducing the number of shear pockets would enhance the constructability and economy of the system and further testing would be advantageous. Further testing indicated that the number of shear pockets can be reduced.

In addition to the structural issues, the researchers investigated the materials systems to enhance the constructability of the precast overhang system, improve safety, and enhance the economy of the proposed system. A new haunch form material was identified—this form material is sufficiently strong yet is sufficiently flexible to allow for grading of the precast panels. Grout materials were evaluated for dimensional stability, strength, and flowability. Several prepackaged grouts were identified for use in the precast overhang panel system. However, these grouts are relatively expensive and, therefore, the research team assessed and evaluated two different grout mixtures that can also be used for filling the haunches.

What This Means

The potential for adding value to the design and construction of bridges by using precast overhang panels is significant. It is believed that the use of precast, overhang panels can reduce construction times, improve job-site safety, and reduce the construction costs of bridges. The findings from this research indicate that:

- precast overhang panels exhibit sufficient capacity to meet the factored design loads,
- some connection systems are available to achieve sufficient composite action and required shear capacity between the overhang panels and the girders, and
- grouts for filling the haunch area are commercially available or can be proportioned to achieve good fillability.

These findings indicate that the potential added value of using precast overhang panels for bridges in Texas can likely be realized.

For More Information:

0-6100-2 Development of a Precast Bridge Deck Overhang System for The Rock Creek Bridge

Research Engineer - Wade Odell, TxDOT, 512-416-4730

Project Director - Ricardo Gonzalez, TxDOT, 972-536-6253

Research Supervisor - David Trejo, TTI, 541-737-9304

www.txdot.gov

keyword: research



Research and Technology
Implementation Office
P.O. Box 5080
Austin, Texas 78763-5080
512-416-4730

This research was performed in cooperation with the Texas Department of Transportation and the Federal Highway Administration. The contents of this report reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the FHWA or TxDOT. This report does not constitute a standard, specification, or regulation, nor is it intended for construction, bidding, or permit purposes. Trade names were used solely for information and not for product endorsement.