

Focus on Research

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"Focus on Research updates engineers and technicians on items of interest upcoming in active TxDOT research projects."

TECH Analyzes Bridge Design for Wind and Live Loadings

TxDOT needs analytical assessment and laboratory experiments to determine possible wind loadings and vibrational characteristics of four planned bridges. The four bridges will be located on US 59 in Houston, Texas. Each of them will be constructed at-grade over cut areas with clear spans of 70.2 m (230 feet). These long spans increase the bridges' susceptibility to vibration problems from wind and/or live loads. The design of the bridges consists of tied arches, but designs of components and appurtenances to the bridges are not yet final.

The main objective of Project 7-1982, *Dynamic Response — Tied Arch Bridges, US 59 Houston*, is to provide a complete assessment of the bridge design's sensitivity to wind and live loadings. The researchers have analyzed the bridge design under the expected wind loadings based on aerodynamic parameters and on bridge details furnished by TxDOT. They also built and tested a wind tunnel model of a typical bridge. Their analysis shows that the bridge (both completed and partially constructed) is stable and should not experience problems with wind loadings or dynamic vibrations. Dynamic deflections are not expected to create structural fatigue or driver discomfort.

Field testing of the bridges during and following construction will provide additional information to verify the results of the analyses and laboratory experiments.

This project started in October of 1993 and ended in August 1995.

RMC 5 — PD: John Stokes, HOU
Researcher: Kishor Mehta, TECH

Project Identifies Low-Cost Improvements to Reduce Congestion in El Paso

Traffic congestion — as well as population and economic activity — has increased in the El Paso area. New approaches are required to accommodate the growing demands on freeways, arterial streets, and international border crossings.

Project 7-2913, *Highway Planning and Operations for the El Paso District*, provides technical assistance to the El Paso District through a series of tasks. These tasks concern different traffic-related issues that affect the mobility and safety characteristics of the El Paso District road system.

Project emphasis is on a 16.1-km (10-mile) section of IH-10, the major east-west corridor in the city of El Paso. Extensive traffic data have been collected for fourteen diamond interchanges, including traffic counts, turning movement counts, and vehicle classification information. TTI and UTEP

A New Focus in TxDOT Research

Research Management Committees (RMCs)

Effective June 1, 1995

- RMC 1 Management and Policy
- RMC 2 Multimodal Transportation
- RMC 3 ROW, Hydraulics, and Environmental Conservation
- RMC 4 Roadway Planning and Design
- RMC 5 Structures
- RMC 6 Pavements
- RMC 7 Materials
- RMC 8 Construction and Maintenance
- RMC 9 Traffic Operations

have identified low-cost improvements that reduce congestion at a four-level interchange, and efforts continue to identify strategies for improving operations and safety at diamond interchanges.

This project started in June of 1994 and ended in August 1995.

RMC 4 — PD: Mary May, ELP
Researchers: Soheil Nazarian and Rafael Pezo, UTEP; Carol Walters, Tim Lomax, George Dresser, and Sally Godfrey, TTI

Getting the Low-Down with GPR

Maintenance staff need to know what's going on beneath the surface of a pavement in order to perform appropriate preventive maintenance. Ground penetrating radar (GPR) can measure the thickness of asphalt surfaces to +/- 2.54 mm (0.1 inch), and, since it is a nondestructive technology, its development for other applications will be useful.

Project 0-1341, *Using Ground Penetrating Radar for Pavement Evaluation*, objectives are to:

- ◆ Evaluate GPR's potential for locating voids beneath rigid pavement, measuring the thickness of rigid pavement, and identifying areas of stripping in hot-mix
- ◆ Demonstrate a field GPR system's ability in a series of pilot and in-service tests
- ◆ Assist TxDOT in implementing GPR technology
- ◆ Construct a series of test slabs for GPR evaluation and calibration purposes

GPR demonstration tests have been conducted in four districts to address thickness and stripping, base evaluation, and sinkholes and slab evaluation. In a large study on US 83 in the Pharr District, GPR was able to locate the presence of a deteriorated layer approximately 50.8 mm (2 inches) below the surface. In the Bryan District, more than 322

Implementing MLS

The Center for Transportation Research developed and fabricated the Texas Mobile Load Simulator (MLS) under Project 0-1924. This equipment is capable of simulating the load of 8,800 truck axles every hour on actual in-service or specially constructed roads anywhere in Texas. The problem is that there are no guidelines or standards regarding the conduct of testing to use this equipment to best advantage or to realize maximum benefit from its potential.

The major objective of Project 7-1978, *Mobile Load Simulator (MLS) Implementation Assistance*, is to develop safe, efficient operating procedures, guidelines, and techniques that augment the operating manual. Additional objectives are to provide technical assistance to TxDOT during implementation and testing of the MLS for flexible and rigid pavements.

If they are warranted, this project will provide and document further modifications to the MLS to increase efficiency, production, or simulation fidelity.

This project will facilitate testing and use of the Mobile Load Simulator. As changes are required or as difficulties occur, the research agency will work with TxDOT to resolve problems and implement solutions as quickly as possible. A guidebook will be developed during initial operating testing and will be finalized two months after the start of initial field testing.

This project started in September 1993 and ended in August 1995.

RMC 6 — PD: Michael Finger, DES

Researchers: B. Frank McCullough, Fred Hugo, and Michael T. McNerney, CTR

km (200 miles) of interstate system was tested; layer thicknesses and areas of stripping were located.

If the PD recommends full implementation, the Pavement Management Section of TxDOT's Design Division will purchase several GPR units. Data collection and analysis procedures will be developed for both network- and project-level evaluations. Full implementation will require training and continuing

education, preparation of field manuals, and long-term testing. This research builds on the work of two previous studies: 0-1233, *New Technologies for Pavement Evaluation*, and 7-1923, *Continued Development of the Texas Ground Penetrating Radar System*. Project 0-1341 started in September of 1992 and ended in August 1995.

**RMC 6 — PD: Carl Bertrand, DES
Researcher: Tom Scullion, TTI**

Focus on Research

The purpose of Focus on Research is to update engineers and technicians on items of interest in active or upcoming projects. The contents of the various articles do not necessarily reflect the official views of the FHWA or TxDOT.

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