Focus on Research

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

CTR Evaluating Super Corridor as Part of National Highway System

In 1991 Congress authorized the U.S. Department of Transportation (USDOT) to develop a nationwide network incorporating the recently completed Interstate system, a number of high priority corridors, and connections to intermodal centers (e.g., railroads, seaports, and airports). In sketching their plan for this network, dubbed the National Highway System (NHS), USDOT urged transportation agencies to maintain the prospects for economic growth within the continental U.S. and to provide acceptable levels of personal mobility for state travelers.

An NHS in Texas presents transportation planners with unique challenges. In addition to providing efficient mobility for travelers, the plan must ensure effective freight and commercial mobility within specific industrial regions (if they are to grow and prosper). These regions include the Texas triangle (an area defined by Dallas/Fort Worth, San Antonio, and Houston) and the I-35, I-10, and U.S. 59 corridors serving U.S./Mexico trade flows. Of all trade moving overland between the U.S. and Mexico, over 80 percent travels through Texas, of which 74 percent is carried by trucks along distinct highway corridors. While the development of an NHS will address many of the mobility issues, the process still lacks a coherent approach to the development (design, construction, implementation, operation) of priority corridors.

Research Study 0-1326, *Preliminary Economic Evaluation of the Super Corridor Concept,* will analyze the potential for super corridors to complement the emerging NHS in Texas. These super corridors differ from existing Interstate links in that they will be designed, constructed, and operated as multimodal facilities, complete with the latest information, monitoring, and incident technologies. The researchers will specifically analyze two approaches to such super corridors: retrofitting an existing interstate link, and creating a stand-alone corridor.

The prefeasibility needs study will recommend implementation schedules for both the retrofitting scheme and the stand-alone super corridor scheme. Both schedules will detail the timing required for planning and constructing the various facility configurations. (The problems associated with any modification of the Interstate while it remains in use is critically important for the retrofitting option.)

A multimodal ground corridor will provide a range of benefits, including increased mobility, greater economic opportunities for communities along the corridor, and increased safety. Environmental issues will also be explicitly addressed in this process. This study started in June 1994 and will conclude in August 1996.

Area 1 — PD: Alvin R. Luedecke, Jr., P.E., TPP
Researchers: Rob Harrison and Mark Euritt, CTR

Study To Improve Railroad Grade Crossing Safety

Because of the increased accident potential at railroad grade crossings, the Texas Department of Transportation (TxDOT) currently investigates applicable human and mechanical factors associated with driver/railroad interaction. As part of this effort, Research Study 0-1469, *Enhanced Traffic Control Device and Railroad Operations for Highway-Railroad Grade Crossings,* will assess driver behavior and causes of driver error, evaluate warning device activation technologies, review railroad operating practice, conduct a statewide grade-crossing accident study, develop and enhance traffic control devices, and compile a comprehensive plan for highway-railroad safety awareness.

TxDOT will use the results of this study to improve traffic control devices and will distribute materials to educate the public on safe driving habits. By better educating drivers, bicyclists, and pedestrians, this research will improve highway-railroad grade crossing safety in Texas. This project started in September 1994 and will end in August 1996.

Area 3 — PD: Darin Kosmak, P.E., TRF
Researchers: Drs. Dan Fambro, P.E., TTI, and Zaher Khatib, P.E., Prairie View A&M

Texas Department of Transportation

Research and Technology Transfer Office, in cooperation with the FHWA

Researchers Focusing on Tests To Predict Scour Rates

The scouring action of rivers and streams can undermine the stability of bridge structures, endangering the traveling public. Since Texas has approximately 25,000 bridges constructed over waterways, knowing which bridges are in scour-prone soils and, therefore, require special inspection, is important to keep safety standards high and special inspection costs reasonable. In addressing the damage caused by scour, the Texas Department of Transportation requires accurate scour predictions and improved design techniques capable of offsetting the effects of scour.

The objective of study 7-2937, *Scour Rates of Cohesive Soils,* is to develop a simple hydraulic/soil test (along with a practical analytical procedure) that can predict both the rate of scour and the final scour depth in cohesive soils. The apparatus to be used in the test is known as an erodibility function apparatus (EFA). The EFA consists of an electric motor and piston that push a cohesive sample out of a Shelby tube at a rate equal to the scour rate for the soil at a given water velocity. The soil is pushed out of the tube in such a way that the soil remains flush with the floor of the hydraulic flume. One Shelby tube will be placed perpendicular to the flow in the flume, in order to determine the scour rate due to tangential velocity. Another Shelby tube will be placed in the direction of flow to determine scour rate due to normal velocity.

By ensuring that the test can be performed by any district lab, the researchers will furnish TxDOT a means by which to contain costly repairs and improve public safety. This project runs from October 1994 through August 1997.

Area 4 — PD: Jay Vose, P.E., DES Researchers: Dr. Briaud and Dr. Ting, TTI

Study Investigating Bonding Materials for Traffic Equipment

The Texas Department of Transportation routinely uses bonding material to anchor data recording instruments to the pavement. Presently, there are over 1,000 sites in the state where two or more instrument sets are bonded to either asphalt or portland concrete pavement. Unfortunately, the bonding materials are not permanent, and the numerous bond failures that have resulted have proven costly in terms of return trips, lost data, and repairs. Also, once unbonded, these data recording devices can represent potential traffic hazards. Thus, TxDOT has made an effort to identify or develop polymers that can bond monitoring equipment more reliably to asphalt and concrete.

Project 1-2039, *Investigation of Bonding Materials for Traffic Monitoring Equipment,* assisted TxDOT in identifying polymers that could reliably bond traffic instrumentation to portland cement concrete and asphalt concrete. Additionally, the project researchers developed and conducted a laboratory testing program to characterize important properties of polymers, conducted a field testing program in coordination with TxDOT personnel, and, finally, prepared an implementation manual that includes bonding procedure specifications.

The use of these more effective polymers to bond monitoring equipment will reduce both data collection disruptions and the time required for repairs. With the project now completed, the study results will be implemented immediately. The department anticipates that the polymers recommended in the study will be used throughout the state for bonding traffic monitoring devices to pavements. This project started in1992 and ended in August 1994.

Area 2 — PD: Dean Barrett, TPP Researchers: Dr. David W. Fowler, P.E., and Dr. Ramon L. Carrasquillo, P.E., CTR

Focus on Research

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

Contact Kathleen M. Jones (512) 465-7947, Research and Technology Transfer Office, P.O. Box 5080, Austin, TX 78763-5080, for more detailed information.

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Texas Department of Transportation
Office of Research and Technology Transfer
P.O. Box 5080
Austin, TX 78763-5080

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