

Focus on Research

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

Maintenance Mixtures Improved

Pothole and surface repair of asphalt pavements is one of the most commonly performed maintenance operations for TxDOT, especially in areas where cold winters and warm, wet springs contribute to accelerated pavement break-up. Although winter patching is difficult (because of the cold temperatures, water-logged base courses, and excessive stiffness of the patching materials), the department must undertake these operations in response to public demands for high-quality roads. Research Study 0-1377 will provide TxDOT with a means for assuring the quality of cold-applied, asphalt-stabilized maintenance mixtures.

Specific objectives of this study are to:

- determine how aging affects stockpiled maintenance mixtures;
- develop materials modifications and/or stockpiled maintenance mixtures;
- develop a laboratory test procedure with artificial aging that can be used to measure and predict workability of maintenance mixtures that have been stockpiled for several months; and
- work with TxDOT in the preparation of specifications and test methods that can be successfully implemented.

Area 2 — Technical Panel Chairman: Harry Thompson, P.E., Lufkin District

Researcher: Joe Button, P.E., TTI

Study Investigating Updated Mowing Procedures for TxDOT

A 1986 Center for Transportation Research study on mower-thrown-objects (MTOs) recommended alternative mowing equipment, changes in mowing standards, and modifications to bat-wing rotary mowers. One particular recommendation that has been implemented in current mowing specifications concerns mowers moving against the traffic. Mowing against traffic with a mower of the bat-wing, Terrain-King-type lessens the impact speed of any MTO on traffic because both the MTO and the traffic are traveling in the same direction. Mowing against traffic may not always be possible, however, or even the best option, since blade rotation and design affects the direction objects are thrown and since newer, different mower designs that were not covered by the 1986 study are being used by contactors in Texas.

Study 0-1441 will consider (1) the effects of newer designs and different rotations on the direction of MTOs; and (2) the cost-effectiveness and prudence of specifying "deadheading" (a mowing practice in which

mowers move in only one direction) versus the reduction in MTO accidents brought about by dead-heading.

The recommendations will assist contractors in identifying the safest way to mow using their particular equipment. The project runs from September 1993 to August 1994.

Area 3 — Technical Panel Chairman: Richard Kirby, P.E., Maintenance and Operations Researcher: Dr. Kurt Marshek, CTR

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Study to Match Repair Materials with Concrete Damage

Repairs are necessarily part of any attempt to extend the service life of aging concrete structures. Yet current knowledge regarding structural repair is based mostly on trial and error, with no standard procedures established for selecting or recommending materials or procedures. Consequently, engineers must often make repairs according to a manufacturer's recommendations, rather than from a thorough analysis of required performance.

Study 0-1412 will develop an evaluation procedure for the selection of repair materials and techniques for a given type of concrete damage. Such a procedure will allow engineers to select repair materials whose properties

match the required performance of the member in service.

...this project should eliminate much of the guesswork involved in structural concrete repair.

The project should provide a repair strategy and an evaluation program for the selection of concrete repair materials and methods. Benefits to TxDOT should include, among other things, improved performance of repaired concrete structures and reduced lane closure times associ-

ated with concrete repairs.

Overall, the test procedures, selection methodology, prequalification and performance testing of repair materials, and material specifications provided by this project should eliminate much of the guesswork involved in structural concrete repair.

The project started September 1993 and will continue through August 1996.

Area 4—Technical Panel

Chairmen: Lee Lawrence, P.E., Materials and Tests, and Charles Stone, P.E., Construction and Maintenance

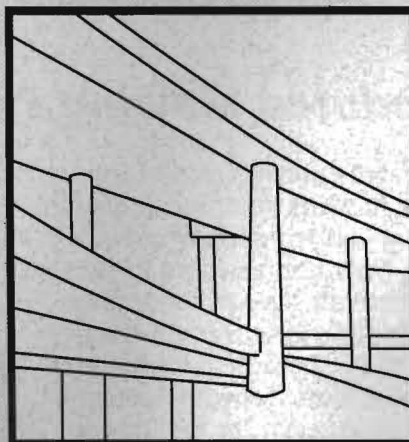
Researchers: Drs. Ramón Carrasquillo, David Fowler, and James Jirsa, CTR

Precast Techniques Enhance Bridge Aesthetics

Over the past several years, precast techniques have proven extremely successful in the construction of bridge superstructures. Compared with cast-in-place methods, which are often time consuming and costly, precast techniques provide easy assembly, exhibit concrete uniformity, and yield aesthetically pleasing structures—a result of their use of high-quality form surfaces and textures.

The advantages of precast methods have prompted the department, whose bridge substructures are constructed mostly by cast-in-place methods, to investigate greater use of precast methods. Thus, Research Project 0-1410 will study the potential for upgrading the visual aesthetics of bridge substructures by using precast, post-tensioned elements for

columns and bents. Conceptual plans and visual guidelines will be developed, followed by design guidelines and plans for demon-



stration projects.

The findings of this project should improve substructure aesthetics, reduce material costs (through use of hollow sections

and high-strength concrete), and reduce construction time (resulting in less traffic disruption and fewer associated accidents).

In addition, the specific guidelines developed under this study will direct the design of the next generation of standard TxDOT bridges. The result will be a "building block" precast system—that is, one characterized by a uniformity of individual elements and a diversity of applications.

The project started September 1993 and will continue through August 1997.

Area 4—Technical Panel

Chairman: Norman Friedman, P.E., Design Division

Researchers: Dr. John Breen, Dr. James Jirsa, Daniel Leary, and Andrew Vernooy, CTR

State Toll Road Options Reviewed in CTR Study

The 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) contains provisions that should accelerate toll road construction. Specifically, ISTEA eases restrictions on the federal funding of toll roads and gives states greater latitude in mixing public and private highway construction funds. In response, TxDOT is focusing Research Study 0-1322 on implications of the toll road option for Texas.

As a first step, this study will inventory toll road experiences in the U.S. and in selected foreign countries. Then, using these experiences, the researchers will:

- identify the conditions that are necessary for successful toll road operations,
- identify infrastructure linkages where toll road provision would benefit highway users (including intercity links and truck-only facilities), and
- make recommendations to TxDOT regarding the provision of toll roads in Texas, including that now proposed as a consequence of the North American Free Trade Agreement (NAFTA).

Because toll facilities are fairly common in many other parts of the U.S., the researchers believe that the experiences of those agencies and firms can provide much insight. Texas Department of Transportation policy makers and planners can use the data and the researchers' critical analyses to debate state participation in toll road activities.

The project started in September 1991 and will run through August 1994.

Area 1—Technical Panel
Chairman: Peggy Thurin, P.E.,
Transportation Planning and
Programming
Researcher: Dr. Randy B.
Machemehl, CTR

Study Assesses Cities' Ability To Finance Street Repair

Across the U.S., cities are reducing expenditures for services and investments in core infrastructure because of a decline in local public revenue. As a result, city officials must cut, delay, or cancel street maintenance funding and arterial street improvements not funded from state or federal sources.

The main objective of Study 0-1307 is to assess over the next 10 years the ability of Texas cities to construct and maintain streets and roadways for which they are responsible. In their approach to this objective, the researchers selected a sampling of Texas cities having 25,000 or more residents; from this sampling they will compile data (from 1972 to the present) that relate to these cities' revenue sources, revenue collection trends, street and road expenditures, and annual shortfalls in street construction and maintenance. As the project evolves, the study team will develop an index of urban fiscal capacity and will calculate, among other indices of economic and fiscal health, the changes in the fiscal capacities of each city in the sample. Researchers will measure shortfalls in roadway expenditures along

with the degree to which these shortfalls affect local transportation.

The primary beneficiaries of the study will be TxDOT officials and Transportation Commissioners charged with evaluating future policy directions and new missions for the department. Urban and regional economists, urban transportation planners, urban policy makers, and urban public finance analysts will also benefit from the study findings.

Additionally, the research study will provide to TxDOT an overview of fiscal capacities trends in Texas urban areas, including the effects of those trends on local roads and streets. A review of such trends will, in turn, provide a means for forecasting trends relating to urban fiscal capacity, urban road performance, and urban street/transportation department spending priorities.

The project runs from September 1992 through August of 1994.

Area 1—Technical Panel
Chairman: Lewis Lefevre,
Office of Staff Services
Researcher: Dr. William A.
Luker, Jr., TTI

TTI Verifying Asphalt Aging Test

In its attempt to develop superior recycling agents and asphalts, Research Study 0-1314 is verifying the pressure oxygen vessel (POV) aging test so that the asphalts and recycling agents can be realistically evaluated. While the aging procedure appears promising, it must be validated with road-aged materials. Thus,

the objective in this study is to core roads for which we have the original asphalt and to compare those core samples with POV-aged material.

Supercritical fractionation is used to improve asphalt performance. The same procedures are

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Study Evaluates Reflective Pavement Markers

Research Study 7-1946 evaluates the performance of different types of reflective raised pavement markers (RRPMs). The project plan calls for the installation of RRPMs from five qualified manufacturers at four San Antonio District interstate locations (with the sites representing a wide range of traffic volumes). TxDOT will obtain samples of the RRPMs from the sites at varying times after installation. The Materials and Tests Division of TxDOT will perform the actual photometric measurements, with the Texas Transportation Institute (TTI) providing technical assistance.

The objectives of this study are to:

1. evaluate and document roadway/traffic conditions at four TxDOT-selected RRPM study sites;
2. monitor RRPM performance data collected periodically by the department throughout the evaluation process; and
3. prepare a final report on RRPM performance.

This research will provide RRPM performance data that will be of

immediate use in product procurement and in establishing replacement guidelines. Project findings will also enable TxDOT to purchase and maintain RRPMs in the most cost-efficient manner, providing at the same time a safe environment for motorists.

The project started in June 1992 and will end in August of 1994.

*Area 3—Technical Panel
Chairman: Lewis Rhodes, P.E.,
Maintenance and Operations
Researcher: G. L. Ullman, P.E.,
TTI*

TTI Verifying Asphalt Aging Test

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used to produce recycling agents containing those fractions that will lower the viscosity and improve the compatibility of the old material. Thus, another objective of this work is to systematically blend these fractions to gain further understanding of the relation of composition to properties. In all cases, the aging procedure is to be used to evaluate designed asphalts and recycling agent blends with hardened asphalt.

Project findings should assist in determining the best recycling agent to use for chemically restoring an asphalt's original properties. Assuming that the aging test can be verified, this project will identify which asphalts are better from an aging standpoint; it might also provide guidelines on how to correct those asphalts that age prematurely.

*Area 2 — Technical Panel Chairman: Darren Hazlett, P.E., Materials and Tests Division
Researcher: Dr. Jerry Bullin, TTI*

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, Office of Research and Technology Transfer, P.O. Box 5051, Austin, TX 78763-5051, if you need more detailed information on any one of these projects.



Texas Department of Transportation
Office of Research and Technology Transfer
P.O. Box 5051
Austin, TX 78763-5051