Research Program

FY 2011

Addendum

Research and Technology Implementation Office

The Texas Department of Transportation

Program Book Addendum
As of 1/24/11

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0-6622 - Implementation of a Texas-Mechanistic Empirical Thickness Design System (TexME)

Start Date - 11/05/2010 ***End Date*** - 08/31/2013

Abstract

Objective: Update performance models and testing procedures to allow mechanistic-empirical prediction of pavement performance for flexible pavement types using newer materials.

Since the mid 1990's there have been many improvements in base materials and asphalt mixes. However, TxDOT performance models have not been updated to reflect those improvements, so it is impossible to determine benefits from improved base materials or superior asphalt mixes. The development of new performance models based on fundamental material properties will enable Texas pavement designers to take full advantage of new materials. As part of this study, researchers will:

- improve on models and testing procedures developed in 0-5798 and develop additional performance models and testing procedures that allow mechanistic-empirical prediction of pavement performance for Texas flexible pavement types and environmental conditions.
- integrate performance prediction models for all flexible pavement types including surface-treated pavements, and incorporate traffic load spectra, and the enhanced integrated climatic model (EICM) into program specification documents that can be used to update and enhance the FPS 19 design system implemented in the 1990's,
- conduct case studies in two districts to demonstrate and document the advantage of the ME-based design process for Texas conditions,
- establish comprehensive material testing facilities at TxDOT's Cedar Park campus, and
- conduct workshops on the materials testing procedures and the ME design process using a prototype workstation-based application.

Project Director

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Total Project Budget	*Research Universities*	*FY 2011 Budget*
$728,210	Texas Transportation Institute	$159,528
	University of Texas at El Paso	$35,000

0-6658 - Continued Development and Analysis of the Flexible Pavements Databases

Start Date - 11/09/2010 ***End Date*** - 08/31/2015

Abstract

Objective: Researchers will collect materials and pavement performance data on a minimum of 100 highway test sections around the State of Texas to calibrate and validate mechanistic-empirical (M-E) design models.

Data collected in this study to calibrate and validate mechanistic-empirical (M-E) design models will also serve as an ongoing reference data source and/or diagnostic tool for TxDOT engineers and other transportation professionals. Some of the M-E models to be calibrated under this research project include the Flexible Pavement Design System (FPS) design procedure, the Texas M-E (Tx-ME), the Texas Overlay design system, and the Mechanistic-Empirical Pavement Design Guide (MEPDG). To accomplish the objectives tasks include:

- selection of field test sections across the State,
- extensive laboratory and field testing,
- literature review of M-E models and evaluation of existing databases,
- M-E model calibration and validation, and
- demonstration workshop of the data collected.

Project Director

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Project Advisors

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Total Project Budget	*Research Universities*	*FY 2011 Budget*
$1,831,711	Texas Transportation Institute	$161,342
	University of Texas at El Paso	$60,700

0-6663 - Evaluation of Pavement Rutting and Distress Measurements

Start Date - 10/04/2010 ***End Date*** - 08/31/2012

Abstract

Objective: To assess the accuracy and repeatability of new automated distress data measurement systems.

The Texas Department of Transportation (TxDOT) has developed a state-of-the-art 3-D system for rut measurements. The development of a system to more accurately measure and quantify roadway cracking is also currently underway. These systems will allow the assessment of road performance at both the network- and project-levels and potentially eliminate the need for manual visual assessments to rate pavement distress. Furthermore, the improved accuracy of these systems, which can measure distress while traveling at highway speeds, will eliminate any subjective elements in visual rating and can lead to more consistent and reliable data.

Based on preliminary reports from other State agencies, the improved accuracy of these systems under development may also significantly impact the Pavement Management Information System (PMIS) currently used by TxDOT. Consequently, current algorithms and utility functions used in PMIS will require revision to reflect the improved accuracy of these new systems.

To ensure the rational adoption of the new systems, this project will conduct an independent assessment of the accuracy and repeatability of the new automated distress data measurements. The TxDOT system will be compared to other similar systems from a variety of different vendors to identify the best system for automated distress that can be implemented by TxDOT. The project will have two phases. Phase I will evaluate the rut measurements and Phase 2 will evaluate automated distress data measurements including longitudinal, transverse, and alligator cracking, failures, spalled cracks and punchouts.

Project Director

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Project Advisors

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Research Supervisor

Mike Murphy, CTR

Total Project Budget	*Research Universities*	*FY 2011 Budget*
$492,867	Center for Transportation Research	$219,705

0-6667 - Synthesis of Best Practices for the Placement of Long and Short Patches for Ride Quality

Start Date - 11/24/2010 ***End Date*** - 08/31/2011

Abstract

Objective: Researchers will conduct a synthesis of best practices for the placement of long and short patches for improving ride quality.

TxDOT routinely constructs patches using in-house labor or contractors as a way to maintain the ride quality of roads. The ride quality of our roads changes due to swelling clays, settlement of subgrade soils, or deterioration of base materials. The quality of these patches varies widely among districts. There is a need to compile best practices among districts for these types of patches so their quality can be improved not only to improve ride quality on our roads, but also to improve their durability. Research also will include the assessment of the quality of patching materials used in these operations.

Project Director

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Research Supervisor

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Total Project Budget	*Research Universities*	*FY 2011 Budget*
$50,000	University of Texas at San Antonio	$50,000

0-6668 - Synthesis of Microsurfacing Successes and Failures

Start Date - 11/29/2010 ***End Date*** - 08/31/2011

Abstract

Objective: This synthesis project will compile information on advances to mix design and application of microsurfacing in order to evaluate whether the new improvements to mix design, specifications and construction guidelines have made this product more successful.

Microsurfacing is an effective road maintenance process that has been used in the last 20 years with many successful applications, as well as with failures or early deterioration. There is a need to take another look at the process using microsurfacing at the state, national and international level to evaluate if this is still a valid solution for maintenance applications. This synthesis project will compile information on advances to mix design and application of microsurfacing in order to evaluate whether the new improvements to mix design, specifications and construction guidelines have made this product more successful. Through interviews of users, site visits and the compilation of experiences, this study will evaluate the performance of microsurfacing in the Texas Department of Transportation (TxDOT), as well as other state DOTs. New mix design procedures and construction guidelines will then be reviewed in order to summarize findings. The project reports will include recommendations on the future use of microsurfacing in TxDOT and scope of what research will be needed in Texas to apply this material successfully.

Project Director
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Project Advisors
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Research Supervisor
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Total Project Budget	***Research Universities***	***FY 2011 Budget***
$49,931	Texas State University - San Marcos	$49,931

0-6669 - Synthesis of Best Practices for Emergency Operations

Start Date - 12/17/2010 ***End Date*** - 08/31/2011

Abstract

Objective: The research objective is to develop a winter weather operations manual that can be used by TxDOT districts vulnerable to weather related emergencies.

In recognition of a growing need to identify actionable practices relative to winter weather operations, it has become increasingly important to ensure that these practices can be effectively employed as well as protect the health and safety of employees working in extreme conditions.

Researchers will perform a synthesis of the best practices related to winter weather operations, highlight transferable best practices, and document this information in an operations manual that will help maintenance crews better understand how to work in weather related emergencies.

Project Director

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Total Project Budget	*Research Universities*	*FY 2011 Budget*
$50,000	Prairie View A&M University	$25,000
	Texas Transportation Institute	$25,000

0-6671 - Synthesis of Hydrologic and Hydraulic Impacts

Start Date - 11/18/2010 ***End Date*** - 08/31/2011

Abstract

Objective: Researchers will conduct a synthesis study and develop a set of best practices concerning the interpretation and application of drainage impacts.

TxDOT's design, construction, and maintenance activities may have hydrologic and hydraulic drainage impacts. Whether these impacts need to be mitigated will depend on many factors, one of which is how they are defined and interpreted. Consequently, TxDOT engineers and officials often must deal with drainage issues affecting public or private lands and public highways. However, some of these personnel are unfamiliar with local, state, and federal drainage requirements, practices, and procedures. In addition, adverse impacts tend to be ignored in rural situations where land is considered undeveloped and avoided in urban situations where damages to property would be apparent. To assist TxDOT in making better decisions regarding the implementation of activities of hydrologic and hydraulic impacts, we will develop a set of best practices concerning the interpretation and application of drainage impacts. The pertinent information will be gathered from other state DOTs, and from state and local governmental regulators in Texas. The best practices will help establish which practices are used in hydraulic design, as well as what the drainage issues of greater concern in Texas are.

Project Director

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Total Project Budget	*Research Universities*	*FY 2011 Budget*
$50,000	University of Texas at San Antonio	$50,000

0-6672 - Intelligent Transportation System (ITS) Strategic Plan

Start Date - 10/25/2010 ***End Date*** - 08/31/2013

Abstract

Objective: Assist TxDOT with strategic planning for delivering ITS-related services in partnership with key stakeholders.

The Texas Department of Transportation (TxDOT) is facing unprecedented financial constraints while being asked to maximize the safety and mobility of the existing state transportation system. TxDOT's public agency partners are facing similar constraints delivering transportation services as well. The ability of TxDOT' s partners to support and lead aspects of operating and managing the transportation network varies by region of the state. At the same time, technology and communication are evolving as well as the private sector's ability to deliver data, equipment, and services. Within this environment, TxDOT needs to set a new direction for participating and delivering intelligent transportation systems. Recent efforts to solicit stakeholder input have produced data important to long range decision making, as well as promoting good will with the stakeholders. Strategic planning for ITS-related services has similar strong potential. Through effective listening to key stakeholders, TxDOT will be able to identify the highest priority needs with which stakeholders may be willing to assist, as well as low priority services that all agree can be discontinued. The focus can be directed to critical outcomes, regardless how delivered, rather than on legacy equipment or services that may or may not actually be beneficial. With the focus on the priority outcomes, TxDOT can then explore alternative approaches to accomplishing the goals. During the course of this project, the Texas Transportation Institute (TTl), will solicit input from key (but not all) stakeholders in each region that currently enjoys any meaningful level of ITS services. To the degree possible, these interviews will be done in small groups, organized to include people with common, not conflicting, interests. TTl will work to build consensus among participating agencies in the production of planning documents for ITS Strategic Solutions.

Project Director

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Total Project Budget	*Research Universities*	*FY 2011 Budget*
$1,112,022	Texas Transportation Institute	$225,495

0-6730 - Examining Engineering Costs for Development of Highway Projects

Start Date - 12/22/2010 ***End Date*** - 10/31/2011

Abstract

Objective: To assist TxDOT administration in determining the appropriate engineering staff levels for conducting business, researchers will examine engineering costs for TxDOT projects internally developed by staff and externally developed by consultants.

The Texas Department of Transportation's (TxDOT) focus is to act in the best interest of the citizens of Texas in every endeavor. TxDOT's administration is actively engaged in determining the appropriate engineering staff levels to conduct the business of the department in the most efficient manner possible while implementing various laws and regulations. TxDOT's administration realizes the valuable role both in-house staff and consultant staff play in the business of the state. Numerous studies, including one conducted by the Comptroller of Public Accounts in response to Rider 57 last session, have examined the question of engineering costs for TxDOT projects internally developed by staff and externally developed by consultants. Despite these numerous studies, the answer to the question of engineering costs remains clouded. This cloud results from several sources including a lack of readily available data, the fact that many projects are developed partially internally and partially externally and a lack of definition on what costs should be included for an complete analyses.

Project Director

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Research Supervisor

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Total Project Budget	*Research Universities*	*FY 2011 Budget*
$233,680	Texas State University - San Marcos	$187,862