



Research Digest

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TxDOT Research Publications, Aug.-Oct. 2012

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Item 1

Experimental Results on Soil-Geosynthetic Interaction Stiffness

UNIVERSITY OF TEXAS AT AUSTIN. CENTER FOR TRANSPORTATION RESEARCH (CTR)

CTR 4829-01-3 • 2012

This report summarizes small pullout test results conducted as a part of TxDOT Project 5-4829 to assess the performance of a newly developed small pullout box as well as the associated $K(sgi)$ model. The parameter $K(sgi)$ quantifies the stiffness of the soil-reinforcement interface under low displacements, which makes it suitable for evaluating the performance of geosynthetic products in base-reinforced pavements. Seven different types of geosynthetics, including six biaxial geogrids and one geotextile, were tested with three different soil types. Results of each test are summarized in two-page laboratory report format.

CONTENTS

- Introduction
- Scope of Testing Program
- Experimental Data Obtained in the Testing Program
- Discussion and Preliminary Observations
- Appendix A. Laboratory Reports: Soil-Geosynthetic Interaction Stiffness

This report is available for free download (18.1 MB):

http://www.utexas.edu/research/ctr/pdf_reports/5_4829_01_3.pdf

Item 2

Strut-and-Tie Model (STM) Examples for Bridges

UNIVERSITY OF TEXAS AT AUSTIN. CENTER FOR TRANSPORTATION RESEARCH (CTR)

CTR 5253-01-P2 • [2012]

This CD-ROM contains six PowerPoint presentations (.pptx files) produced during TxDOT research implementation project 5-5253-01. The combined presentations provide an introduction to strut-and-tie modeling (STM) (When and why and step-by-step design procedure), proposed STM provisions (code language), 5 STM design examples of bridge components, and rules of thumb for STM.

CONTENTS

- Introduction to Strut-and-Tie Modeling [90 slides]
- Example 1: Five-Column Bent Cap of a Skewed Bridge [94 slides]
- Example 2: Cantilever Bent Cap [72 slides]
- Example 3a: Inverted-T Straddle Bent Cap (Moment Frame) / Example 3b: Inverted-T Straddle Bent Cap (Simply Supported) [158 slides]
- Example 4: Drilled-Shaft Footing [99 slides]
- Rules of Thumb [4 slides]

This report is available for free download (56.5 MB):

<http://library.ctr.utexas.edu/digitized/zipfiles/5-5253-01-p2.zip>



Item 3

Pavement Repair Guidelines for Longitudinal Joints

UNIVERSITY OF TEXAS AT AUSTIN. CENTER FOR TRANSPORTATION RESEARCH (CTR)
CTR 5444-01-1 • 2012

Implementation Project 5-5444-01, “Pilot Implementation of Pavement Repair Guidelines for Longitudinal Cracks and Joints,” applies the lessons and recommendations from the previous Texas Department of Transportation (TxDOT) funded Center for Transportation Research (CTR) Research Project 0-5444, “Rehabilitation Procedures for Longitudinal Cracks and Joints Separation in Concrete Pavement,” which investigated the causes and repairs of longitudinal joint separations and faulting.

This report is available for free download (5.4 MB):

http://www.utexas.edu/research/ctr/pdf_reports/5_5444_01_1.pdf

Item 4

Laboratory and Field Performance Measurements to Support the Implementation of Warm Mix Asphalt in Texas

TEXAS A&M UNIVERSITY. TEXAS TRANSPORTATION INSTITUTE (TTI)
TTI 5597-01-1 • 2012

An objective of this study was to monitor the performance of more than 10 warm mix asphalt (WMA) projects in the state. Several WMA technologies were included in the study (foaming, Advera, Evotherm, Rediset, Sasobit) and it was determined that performance of the warm mix was comparable to hot mix. In addition, mix from two warm mix projects were subjected to different curing times and temperatures and then evaluated for mixture volumetrics and performance properties. Results from this study lend support to the current procedures TxDOT has adopted.

This report is available for free download (3.5 MB):

<http://tti.tamu.edu/documents/5-5597-01-1.pdf>

Item 5

Surface Treatment Binder Construction Toolkit

TEXAS TECH UNIVERSITY. CENTER FOR MULTIDISCIPLINARY RESEARCH IN TRANSPORTATION (TECHMRT)
TechMRT 5893-P1 • 2012

This document contains description of the recommended test protocol for determining the dilution ratio of the plant emulsion at the construction site, recommended test protocol for determining the viscosity of the plant emulsion at the construction site using shell cups, and description of a spreadsheet algorithm that provides a guideline for making key decisions related to chip seal construction at the job site.

This report is available for free download (2.2 MB):

http://www.depts.ttu.edu/techmrtweb/Reports/Products/0-5893_P1_82012.pdf

Item 6

Developing a Testing Device for Total Pavements Acceptance

UNIVERSITY OF TEXAS AT AUSTIN. CENTER FOR TRANSPORTATION RESEARCH (CTR)

CTR 6005-2 • 2012

During the second year of Project 0-6005, significant progress was made towards building the Total Pavement Acceptance Device (TPAD). The TPAD will be a multi-function device that will be used to profile continuously along pavements at speeds in the range of 5 to 10 mph. The test functions will include those associated with Rolling Dynamics Deflectometer (RDD), ground penetrating radar (GPR), DMI and high-precision differential GPS, and surface temperature measurements, as well as digital video imaging of the pavement and right-of-way conditions. The specifications, bid documents, bid acceptances, and purchase of the TPAD mobile platform and the TPAD transportation equipment (tractor and trailer) were completed by the CTR team. Construction of the TPAD is well underway and the acceptance testing will be done in early Year 3. Progress was also made in developing (1) improved rolling sensors and associated data analysis methods commensurate with the target testing speeds and (2) a second-generation integrated data acquisition and display system which records all test functions on the same time and distance baselines.

This report is available for free download (7 MB):

http://www.utexas.edu/research/ctr/pdf_reports/0_6005_2.pdf

Item 7

Developing a Testing Device for Total Pavements Acceptance. Third-Year Report

UNIVERSITY OF TEXAS AT AUSTIN. CENTER FOR TRANSPORTATION RESEARCH (CTR)

CTR 6005-4 • 2012

During the third year of Project 0-6005, significant progress was made towards building the Total Pavement Acceptance Device (TPAD). The TPAD will be a multi-function pavement evaluating device that will be used to profile continuously along pavements at speeds in the range of 3 to 7 mph. The test functions will include those associated with Rolling Dynamics Deflectometer (RDD), ground penetrating radar (GPR), Distance Measurement Instrument (DMI), and high-precision differential GPS, and surface temperature measurements, as well as digital video imaging of the pavement and right-of-way conditions. The TPAD mobile platform and dedicated hauling equipment, a tractor and trailer system, were delivered to CTR in late fall 2010. Acceptance testing for the TPAD mobile platform was initiated in winter 2010 and continued through summer 2011. Acceptance testing involved evaluating (1) the speed control, (2) the static load control, (3) the dynamic load control, (4) the portable load calibration system, and (5) the DMI. Some improvements were identified that were completed by the manufacturer. Progress was also made in developing (1) improved rolling sensors and associated data analysis methods commensurate with the target testing speeds and (2) a second-generation integrated data acquisition and display system that records all test functions on the same time and distance baselines.

This report is available for free download (8.2 MB):

http://www.utexas.edu/research/ctr/pdf_reports/0_6005_4.pdf



Research Digest

Item 8

Developing a Testing Device for Total Pavements Acceptance

TEXAS DEPARTMENT OF TRANSPORTATION (TXDOT). RESEARCH AND TECHNOLOGY IMPLEMENTATION (RTI)
6005-VSR • 2012

This video summarizes RTI Research Project 0-6005 which produced a state-of-the-art Pavement Acceptance Device (TPAD) that will provide TxDOT with enhanced testing capabilities for accepting new pavements and evaluating existing pavements.

This video is available for free on YouTube:

<http://youtu.be/Zrok2kCdsig>

Item 9

Study of the Potential Impacts of Highway Construction on Selected Birds with Emphasis on the Golden-Cheeked Warbler: Final Report 2008-2011

TEXAS A&M UNIVERSITY. DEPARTMENT OF WILDLIFE & FISHERIES SCIENCE
TTI 6263-1 • 2012

This report summarizes the 2008-2011 field seasons for the Highway 71 impact assessment of highway construction noise and activity on golden-cheeked warblers (*Setophaga chrysoparia*). Researchers examined if construction activity and noise altered the reproductive success and behavior of birds, with an emphasis on the golden-cheeked warbler. Researchers found that ambient noise levels were significantly higher in 2011 than 2010 across study sites, and decreased significantly as distance from ROW increased. Ambient noise levels were louder 512 m from the ROW in the construction site when compared to levels at 256 m and 512 m in the pre-construction site. Pairing success was significantly lower in the control site in 2010 than any other site and year combinations. Fledging success was significantly lower in 2009 than in other years, across all study sites. There was no indication that birds directly reacted to construction noise or that they altered their singing or nesting behavior. Researchers found no effect from study site, distance from the ROW, or year on warbler reactions to construction noise playbacks.

This report is available for free download (3.3 MB):

<http://tti.tamu.edu/documents/0-6263-1.pdf>



Item 10

Rigid Pavement Database User and Administrator's Guide

TEXAS TECH UNIVERSITY. CENTER FOR MULTIDISCIPLINARY RESEARCH IN TRANSPORTATION (TECHMRT)
TechMRT 6274-P1 • 2012

TxRPDB (Texas Rigid Pavement Database) provides an enterprise platform for sharing design and structural information as well as performance data for concrete pavement in Texas. This manual provides step-by-step instructions to access rigid pavement data via the TxRPDB website as well as detailed instructions for the database admin to control and manage the database and upload new data. Technical information regarding database developments, database architecture and development of web interface are discussed as well.

CONTENTS

- Secure User Access
- Data Access and Download
- Query Interface
- Test Data File Nomenclature
- Admin Controls and Data Upload
- Database Design and Architecture
- Data Storage
- Website Development
- Technical Specifications

This report is available for free download (2.2 MB):

<http://www.depts.ttu.edu/techmrtweb/Reports/Products/0-6274-P1.pdf>

Item 11

Guidance for Estimation of Time of Concentration in Texas for Low-Slope Conditions

TEXAS TECH UNIVERSITY. CENTER FOR MULTIDISCIPLINARY RESEARCH IN TRANSPORTATION (TECHMRT)
TechMRT 6382-P1 • [2012]

"Formal guidance for estimation of time of concentration (critical storm duration) for watersheds characterized as having limited topographic slope is provided in this product. Limited topographic slope watersheds are those watersheds having main-channel slopes less than about 0.3 percent or 0.003 dimensionless. Cleveland and others (2011) explains that this choice of threshold slope is intended to provide a smooth transition from typical to low slope conditions... The authors emphasize that there is ambiguity in the meaning of low slope watersheds and the primary objective of this project is for objective mitigation for conditions in which the engineer computes $S_0 \rightarrow 0$ (slope effectively vanishing). The guidance described in this product is an adaptation and extension of the supplement in Roussel and others (2005, pp. 33-34). That supplement is extended here to watersheds with limited topographic slope. Such watersheds are predominant in the High Plains and Coastal Regions of Texas." --p. 1

This report is available for free download (1.5 MB):

www.depts.ttu.edu/techmrtweb/Reports/Products/0-6382-P1.pdf

Item 12

Evaluation and Development of Pavement Scores, Performance Models and Needs Estimates for the TxDOT Pavement Management Information System: Final Report

TEXAS A&M UNIVERSITY. TEXAS TRANSPORTATION INSTITUTE (TTI)

TTI 6386-3 • 2012

This project conducted a thorough review of the existing Pavement Management Information System (PMIS) database, performance models, needs estimates, utility curves, and scores calculations, as well as a review of District practices concerning the three broad pavement types, asphalt concrete pavement, jointed concrete pavement, and continuously reinforced concrete pavement. The proposed updates to the performance models, utility curves, and decisions trees are intended to improve PMIS scores and needs estimates so that they more accurately reflect District opinions and practices, and reduce performance prediction errors. Researchers hope that implementation of these PMIS modifications will improve its effectiveness as a decision-aid tool for the Districts. Appendices H, J, and K contain calibrated PMIS performance model coefficients for asphalt concrete pavement (ACP), continuously reinforced concrete pavement (CRCP), and jointed concrete pavement (JCP), respectively; they are recommended for use in the existing PMIS performance models (summarized in Chapter 4). Appendices M and N contain new revised utility curves and coefficients for ACP, CRCP, and JCP pavement distresses. Appendices T, U, and V contain revised ACP, CRCP, and JCP decision trees for needs estimates determination. Appendix Z contains a recommended priority index that can be used for programming projects for preservation, rehabilitation, and reconstruction.

CONTENTS

- Introduction
- Compare District Rehabilitation and Repair Needs to PMIS Results
- District Ratings of Specific Sections and Comparison to PMIS Data
- Calibration of TxDOT's Asphalt Concrete Pavement Performance Prediction Models
- Calibration of TxDOT's Continuously Reinforced Concrete Pavement Performance Prediction Models
- Calibration of TxDOT's Jointed Concrete Pavement Performance Prediction Models
- Proposed Changes to Asphalt Concrete Pavement Utility Curves
- Proposed Changes to Continuously Reinforced Concrete Pavement Utility Curves
- Proposed Changes to Jointed Concrete Pavement Utility Curves
- Proposed Changes to Asphalt Concrete Pavement Decision Trees
- Proposed Changes to Continuously Reinforced Concrete Pavement Decision Trees
- Proposed Changes to Jointed Concrete Pavement Decision Trees
- Recommendations
- References
- APPENDIX A-Z

This report is available for free download (9.9 MB PDF, 33.4 MB ZIP):

<http://tti.tamu.edu/documents/0-6386-3.pdf>

<http://tti.tamu.edu/documents/0-6386-3-CD.zip>



Item 13

Asset Management Guidebook for Safety and Operations

TEXAS A&M UNIVERSITY. TEXAS TRANSPORTATION INSTITUTE (TTI)
TTI 6390-P1 • 2012

A primary product of this research was the Asset Management Guidebook that TxDOT division and district personnel can use to help them define, develop, and implement asset management across all levels— particularly as it relates to establishing performance measures for safety and operations. The guidebook is a stand-alone product and contains easy-to-use, practical guidelines that TxDOT personnel can use to identify the best approach to asset management on three possible levels if feasible and practical: (1) total asset management for large urban areas encompassing multiple counties, (2) asset management of critical functions on a smaller regional scale—such as maintenance of roadside components excluding the pavement, and (3) asset management for specific types of assets—such as pavement markings or light emitting diode (LED) signal indications—that may be based on warranty specifications. The research team also recommends that they present to TxDOT district engineers the results of the project to facilitate the dissemination of this research and present the potential benefits of asset management for safety and operations in the organization and the effective use of all of its resources.

This report is available for free download (1.5 MB):
<http://tti.tamu.edu/documents/0-6390-P1.pdf>

Item 14

Accommodating Oversize and Overweight Loads: Technical Report

TEXAS A&M UNIVERSITY. TEXAS TRANSPORTATION INSTITUTE (TTI)
TTI 6404-1 • 2012

Adequate management of oversize/overweight (OS/OW) permit loads throughout the state of Texas is critical to maintaining a vibrant state economy. The growth in the number and size of permit loads in recent years is clear evidence that new tools and new techniques are needed to match this growth without causing undue delays to permit applicants. Problems such as increasing prevalence of reroutes due to maintenance and other district activities along with potential damage to the highway infrastructure from permit loads led to this research project. A related initiative was development of a new automated routing program--Texas Permit Routing Optimization System. Research objectives were to: Identify the most common OS/OW dimension and weight groups. Identify criteria for assigning these OS/OW groups to existing road networks. Identify criteria for assigning current and projected OS/OW groups to the future road network upgraded to meet future demand. The research project resulted in a statewide map recommending primary and alternate OS/OW route networks for the most common origins and destinations based on historical Motor Carrier Division data. Keeping strategic routes open for OS/OW loads and minimizing the number of reroutes along the way will reduce the impedances and unknowns in this critical segment of the motor carrier industry.

This report is available for free download (20.6 MB):
<http://tti.tamu.edu/documents/0-6404-1.pdf>

Item 15

Accommodating Oversize and Overweight Loads: Instructor and Student Guide

TEXAS A&M UNIVERSITY. TEXAS TRANSPORTATION INSTITUTE (TTI)

TTI 6404-P2 • 2012

This CD-ROM contains a PDF of the instructor and student guide designed to guide the instructor in conveying information at the district level concerning Research Project 0-6404 “Accommodating Oversize and Overweight Loads.” The specific information focuses on the Bryan District but could be adapted to other districts. As part of Research Project 0-6404, the research team processed and mapped a massive dataset of OS/OW permit routes into a GIS format. This instructor and student guide presents the objectives of the project along with some of the findings in tabular and graphical formats. It also briefly covers the methodology used to gather and process the information gathered from the MCD and industry stakeholders.

This report is available for free download (8.3 MB):

<http://tti.tamu.edu/documents/0-6404-P2.pdf>

Item 16

Low Cost Wireless Network Camera Sensors for Traffic Monitoring

UNIVERSITY OF NORTH TEXAS. DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

UNT 6432-1 • 2012

Many freeways and arterials in major cities in Texas are presently equipped with video detection cameras to collect data and help in traffic/incident management. In this study, carefully controlled experiments determined the throughput and output quality of various communication configurations. Configurations entailed antennas at several cost levels and it was determined that the least expensive antennas were adequate only for one-hop systems. Via a survey to which 20 districts responded, incidents, volume, and speed were found to be the functionalities most in demand for autonomous surveillance systems. Most systems are monitored by human operators. An alternative to operator-based video monitoring is video analytics. An autonomous traffic monitoring system from a vendor was tested. A demonstration surveillance system was developed and delivered to TxDOT.

This report is available for free download (6.2 MB):

<http://tti.tamu.edu/documents/0-6432-1.pdf>

Item 17

TxDOT Video Analytics System User Manual

UNIVERSITY OF NORTH TEXAS. DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

UNT 6432-P1 • 2012

The TxDOT video analytics demonstration system is designed to monitor traffic conditions by collecting data such as speed and counts, detecting incidents such as stopped vehicles and reporting such incidents to system administrators.

CONTENTS

- System Overview
- Assumptions
- Interface

This report is available for free download (1.7 MB):

<http://tti.tamu.edu/documents/0-6432-P1.pdf>



Item 18

Training Strategies and Materials Prepared for TxDOT Project 0-6568: Use of Flashing Yellow Operations to Improve Safety at signals with Protected-Permissive Left-Turn (PPLT) Operations

TEXAS SOUTHERN UNIVERSITY (TSU)

TSU 6568-P1 • 2012

"TxDOT project 0-6568 "Use of Flashing Yellow Operations to Improve Safety at Signals with Protected-Permissive Left Turn (PPLT) Operations" has developed guidelines for implementation of FYA PPLT displays including general guidelines on the FYA PPLT operation and guidelines on the installation of FYA signals. To facilitate the implementation of the guidelines developed by this project, training strategies and materials have been developed for providing a training session for TxDOT signal operations and TMC personnel. This document consists of two parts. Part I "Training Strategies" provides details on the purpose, method, scheduling and location for the training. Part II "Training Materials" provides a list of the developed training materials along with the printouts of these training materials." --p.1

This report is available for free download (2.4 MB):

<http://tti.tamu.edu/documents/0-6568-P1.pdf>

Item 19

Best Construction Practices Video [Flexible Base Acceptance Testing]

TEXAS A&M UNIVERSITY. TEXAS TRANSPORTATION INSTITUTE (TTI)

TTI 6587-P2 • 2012

The video on this CD-ROM presents a brief overview and potential specification revisions to TxDOT Specification Item 247 "Flexible Base" to address the issues of compacting at water contents significantly different from optimum, acceptance test timing, and method of acceptance testing in the construction of flexible base layer.

This report is available for free download (website with link to video download):

<http://tti.tamu.edu/publications/catalog/record/?id=35075>

Item 20

Materials Selection for Concrete Overlays: The Final Report

UNIVERSITY OF TEXAS AT AUSTIN. CENTER FOR TRANSPORTATION RESEARCH (CTR)

CTR 6590-2 • 2012

Concrete overlays have been a rehabilitation method for many years. It has been extensively utilized and studied in other states, but Texas is still at an initial stage of fully implementing the method. The large volume of concrete highways in Texas makes bonded concrete overlays, unbonded concrete overlays, and whitetoppings very viable options. However, there is a lack of educational guidelines for pavement engineers for concrete overlay construction. This research presents the information gathered from literature review, condition survey, and evaluation of existing concrete overlays in Texas. Also, a laboratory research was performed for recommendations for materials selection and construction for concrete overlays. From these, guidelines for materials selection and construction method developed that will assist in future concrete overlays in Texas are presented.

This report is available for free download (14.5 MB):

http://www.utexas.edu/research/ctr/pdf_reports/0_6590_2.pdf

Item 21

Interim Report: Binder Rheology and Performance in Warm Mix Asphalt

UNIVERSITY OF TEXAS AT AUSTIN. CENTER FOR TRANSPORTATION RESEARCH (CTR)

CTR 6591-2 • 2012

Since the introduction of warm mix asphalt (WMA) in the United States, a variety of different technologies and processes have been developed and used to achieve proper mixing and compaction at reduced temperatures compared to conventional hot mix asphalt. A better understanding of the effect of WMA additives and reduced aging on rheology of asphalt binders is a crucial step towards the successful implementation of WMA. This report presents the preliminary findings from a study conducted to investigate the influence of chemical WMA additives and reduced aging on the viscosity, stiffness, susceptibility to permanent deformation, fracture resistance, and thermal cracking resistance of asphalt binders. Short-term aged WMA binders have reduced stiffness compared to conventional binders due to the reduced mixing temperatures. However, preliminary results indicate that certain WMA additives tend to exacerbate the reduced stiffness of WMA while other WMA additives tend to compensate for this effect. In most cases, long-term aged WMA binders had a similar stiffness but similar or reduced strength compared to conventional binders at intermediate temperatures. Also, the long-term aged WMA binders had similar or slightly reduced resistance to low-temperature cracking compared to conventional binders. In most cases, the use of WMA with recycled asphalt rendered the asphalt binder slightly more susceptible to low-temperature cracking.

CONTENTS

- Literature Review
- Material Selection and Modification of Asphalt Binders
- Rheology of Binders in WMA Mixtures
- Conclusions and Discussion
- References

This report is available for free download (2.8 MB):

http://www.utexas.edu/research/ctr/pdf_reports/0_6591_2.pdf

Item 22

Test Plan [Revamping Aggregate Property Requirements for Portland Cement Concrete]

UNIVERSITY OF TEXAS AT AUSTIN. CENTER FOR TRANSPORTATION RESEARCH (CTR)

CTR 6617-P2 • 2012

This document contains a summary of the testing to be conducted under TxDOT project 0-6617. A description is provided for all tests, as well as an explanation of the property that is to be measured by each test. Collection status of aggregates and a short-term general testing timeline is also discussed in this document. This document is provided to fulfill the requirements of Task 4 of the project, and represents P2, a short report to summarize the Test Plan for the project. This document will be incorporated into the final comprehensive report that will be delivered at the end of the project. Questions or comments concerning this document should be directed to the research team at earliest convenience.

This report is available for free download (1.7 MB):

http://www.utexas.edu/research/ctr/pdf_reports/0_6617_p2.pdf



Item 23

Guidance on Extracting Value from TxDOT's Land Holdings

UNIVERSITY OF TEXAS AT AUSTIN. CENTER FOR TRANSPORTATION RESEARCH (CTR)

CTR 6634-1 • 2012

Many Departments of Transportation (DOTs), including the Texas Department of Transportation (TxDOT), have been challenged by inadequate funding from traditional federal and state fuel taxes, increasing construction costs, aging highway systems, traffic congestion, and recent natural disasters, compromising their primary mission to provide safe vehicle transportation routes with adequate capacity. Furthermore, environmental awareness and sustainability concepts have strengthened and sparked debates in Congress, culminating with several regulatory policies that affect transportation projects. This scenario has prompted DOTs to pursue innovative ways to reduce maintenance cost (at minimum), generate revenue (at maximum) by exploiting their assets, and meet the new regulations. Likewise, the Center of Transportation Research at The University of Texas at Austin undertook a comprehensive research study to identify and determine when, where, and under what circumstances TxDOT should pursue the implementation of Value Extraction Applications (VEA), and how to effectively recognize and involve key stakeholders. As a result, 11 VEAs were identified. In addition, a methodological framework--embedding a multi-attribute criteria analysis matrix as the decision making method--was devised to guide TxDOT through the process of identifying, evaluating, comparing, and selecting the most appropriate VEA. A list of stakeholders associated with each VEA and an analysis framework was provided to help TxDOT to identify and reach out to key stakeholders.

This report is available for free download (10.3 MB):

http://www.utexas.edu/research/ctr/pdf_reports/0_6634_1.pdf

Item 24

Maintenance Test Section Survey: Data Collection and Analysis

UNIVERSITY OF TEXAS AT AUSTIN. CENTER FOR TRANSPORTATION RESEARCH (CTR)

CTR 6664-2 • 2012

A Maintenance Test Section Survey (MTSS) was conducted as part of a Peer State Review of the Texas Maintenance Program conducted October 5–7, 2010. The purpose of the MTSS was to conduct a field review of 34 highway test sections and obtain participants' opinions about pavement, roadside, and maintenance conditions. The goal was to cross-reference or benchmark TxDOT's maintenance practices based on practices used by selected peer states. Representatives from six peer states (California, Georgia, Kansas, Missouri, North Carolina, and Washington) were invited to Austin to attend a 3-day Peer State Review of TxDOT Maintenance Practices Workshop and to participate in a field survey of a number of pre-selected one-mile roadway sections. It should be emphasized that the objective of the survey was not to evaluate and grade or score TxDOT's road network but rather to determine whether the selected roadway sections met acceptable standards of service as perceived by Directors of Maintenance or senior maintenance managers from the peer states.

The pavement sections were selected such that the sample contained a wide range of conditions including Very Good (like new) to Very Poor (extensive cracking, rutting, and rough ride) and in immediate need of maintenance or rehabilitation. In addition to pavement conditions, the roadside and traffic marking maintenance conditions were evaluated by the researchers when making final section selection. It was also important to sample sections within each facility type; therefore, the sample contained sections from the interstate, national, and state systems as well as numerous Farm-to-Market roads. Two county roads were also included in the sample.

The MTSS participants traveled in six vans, and rated the one-mile sections traveling at highway speeds over a four-hour period. The results were recorded by the participants on survey sheets handed in at the end of the Survey. The evaluation was based on a simple 1.0 (Well Below Expectations) to 5.0 (Well Above Expectations) scale for each category. These results of the peer state rating were compared to the Texas Maintenance Assessment Program (TxMAP) annual ratings for these sections and the ratings of other participants, grouped according to their background and experience in highway maintenance assessment.

This report is available for free download (4.5 MB):

http://www.utexas.edu/research/ctr/pdf_reports/0_6664_2.pdf

Item 25

Synthesis of Hydrologic and Hydraulic Impacts: Technical Report

UNIVERSITY OF TEXAS AT SAN ANTONIO (UTSA). DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
UTSA 6671-1 • 2012

A substantial portion of the cost of highway projects (approximately 40%, according to one in-house TxDOT estimate) is for drainage infrastructure, which is intended to minimize and adverse hydrologic and hydraulic (H&H) impacts of the project. Yet, adverse H&H impacts are not well-defined, despite the cost invested in drainage structures for mitigation of such impacts. This report provides guidance towards defining adverse H&H impacts and recommendations for their mitigation. A minimalist approach towards defining and mitigating adverse H&H impacts would fulfill minimal legal requirements while taking into account the sovereign immunity enjoyed by state agencies such as TxDOT. A literature review and surveys of state Departments of Transportation as well as TxDOT districts suggest that this minimalist approach be discouraged in favor of an emerging "No Adverse Impact" approach. For better defining and mitigating adverse impacts TxDOT is to refine coordination with local floodplain administrators, optimize site visits by District Hydraulic Engineers and other designers because of centralization, continue to improve H&H modeling and documentation, disseminate best practices regarding drainage system design, and have ongoing training relating to particular H&H issues. Implementation of the recommendations may require a change in the status of the District Hydraulic Engineers.

This report is available for free download (3.5 MB):

<http://tti.tamu.edu/documents/0-6671-1.pdf>

Item 26

Best Practices for TxDOT on Handling Wildfires

TEXAS TECH UNIVERSITY. CENTER FOR MULTIDISCIPLINARY RESEARCH IN TRANSPORTATION (TECHMRT)
TechMRT 6735-1 • 2012

The State of Texas suffered record-setting wildfires in 2011. More than 30,000 wildfires occurred, burning nearly four million acres. Although not directly responsible for fighting wildfires, the Texas Department of Transportation (TxDOT) provides valuable support during fire-fighting operations. The purpose of this research was to document lessons learned during recent wildfire events and to better define the role of TxDOT in responding to wildfires leading to guidance on best practices. Researchers collected information from a number of agencies responsible for emergency operations during wildfire response, including the Texas Division of Emergency Management, the Texas Forest Service, The Texas Intrastate Fire Mutual Aid System, National Wildfire Coordination Group, and the Texas Interagency Coordination Center. Personnel from ten TxDOT districts were interviewed along with personnel from the Department of Public Safety, Texas Forest Service, Volunteer and Community Fire Departments, National Weather Service, and other City and County Officials. Questions used for the interviews covered categories of preparation, communication, responsibilities, and training. Many common responses were found, although several districts provided unique insights. Lack of reimbursement and concerns regarding safety during incident response were two main themes throughout the interviews. Best practices found during the study were collected, synthesized and presented to TxDOT employees in four regional workshops. These workshops were designed to address safety and effectiveness of TxDOT personnel in efforts to improve response to future wildfires.

This report is available for free download (12.5 MB):

<http://www.depts.ttu.edu/techmrtweb/Reports/Complete%20Reports/0-6735-1.pdf>

Item 27

Development of TTI's Asphalt Compaction Monitoring System

TEXAS A&M UNIVERSITY. TEXAS TRANSPORTATION INSTITUTE (TTI)

TTI 6992-1 • 2012

In recent years, the Texas Department of Transportation has made significant progress with the development and implementation of new technologies to measure the uniformity of new hot mix asphalt layer construction. Early studies focused on the development of the Pave-IR system for checking temperature uniformity during mat placement. In Project 0-6992, researchers took this check one step further by developing an accurate global positioning system tracking system for compaction rolling so that the compaction effort applied can be monitored for 100 percent of the new surface. Additional sensors were also included in the system, including two temperature sensors and an accelerometer, to monitor whether the roller is vibrating. The new system can be mounted on any roller in a matter of minutes, and it provides the roller operator with real-time color displays of: The number of passes of the entire mat. The compaction effectiveness (this study found that better compaction was found directly under the center portion of the roller than at the roller edges). The temperature at the first pass of the roller. This report presents details of the hardware and software developed in this study. The system was field tested on a number of new overlay projects in Texas. Those results will be reported in later reports from this study.

This report is available for free download (1.8 MB):

<http://tti.tamu.edu/documents/0-6992-1.pdf>

Item 28

Develop Practical Field Guidelines for the Compaction of HMA or WMA

TEXAS DEPARTMENT OF TRANSPORTATION (TXDOT). RESEARCH AND TECHNOLOGY IMPLEMENTATION (RTI)

TTI 6992-VSR • 2012

RTI Research Project #0-6992 developed practical procedures for monitoring field compaction of hot and warm asphalt mixes in order to improve the performance of Texas pavements and extend their service life. In this video, Jeremy Dearing, Transportation Engineer with the TxDOT Lubbock District, speaks about the current difficulties experienced in the field during compaction and how this project hopes to develop guidelines and offer solutions for contractors. Initial tests combined GPS and a temperature sensor on the roller to provide the roller operator with real time data to improve rolling pattern and speed.

This video is available for free on YouTube:

<http://youtu.be/0OfuRgHoxIg>



Research Digest

Item 29

User Guides for PPMM and GIS for PMIS: Final Report

UNIVERSITY OF TEXAS AT AUSTIN. CENTER FOR TRANSPORTATION RESEARCH (CTR)
CTR 9035-01-P2 • 2012

Part A: "The Pavement Performance and Maintenance Management (PPMM) is a web-based application that aims to use the existing data from the Pavement Management Information Systems (PMIS) database to monitor and analyze current pavement performance. PPMM comprises two primary tools: Section Tool and Network Tool." Part B: "This document introduces users to the steps involved with accessing the web-based dynamic information system and using its various features to access the information. The dynamic information system offers tools for viewing and querying the spatial and attribute data on the state highway network as retrieved from PMIS. Those tools can be used to perform spatial analysis tasks, such as selecting and buffering features, and to analyze information. The following sections will discuss how to use those tools to retrieve the information."

This report is available for free download (730 KB):
<http://library.ctr.utexas.edu/digitized/ctr/5-9035-01-P2.pdf>

Item 30

Full- and Partial-Depth Repair of Continuously Reinforced Concrete Pavement

TEXAS TECH UNIVERSITY. CENTER FOR MULTIDISCIPLINARY RESEARCH IN TRANSPORTATION (TECHMRT)
TechMRT 9045-05-P1 • 2012

This PDF contains the 202 slides from a presentation about full-depth and part-depth repair of Continuously reinforced concrete pavement

CONTENTS

- CRCP Behavior and Performance
- Overall Performance of CRCP in Texas
- Full Depth Repair of CRCP
- Partial-Depth Repair (PDR) of CRCP

This report is available for free download (32 MB):
<http://www.depts.ttu.edu/techmrtweb/Reports/Products/5-9045-05-P1.pdf>



Research Digest

Item 31

How to Prevent and Repair Lane Separations on Concrete Pavements

TEXAS TECH UNIVERSITY. CENTER FOR MULTIDISCIPLINARY RESEARCH IN TRANSPORTATION (TECHMRT)

TechMRT 9045-05-P2 • 2012

This PDF contains the 44 slides from a presentation about the causes of lane separation and repair techniques.

CONTENTS

- Importance of Tying Lanes Together
- Potential Causes of Lane Separation
- Construction Inspection Items
- Repair of Lane Separation

This report is available for free download (16.9 MB):

<http://www.depts.ttu.edu/techmrtweb/Reports/Products/5-9045-05-P2.pdf>

Item 32

Key Materials and Construction Issues of CRCP for Optimum Performance

TEXAS TECH UNIVERSITY. CENTER FOR MULTIDISCIPLINARY RESEARCH IN TRANSPORTATION (TECHMRT)

TechMRT 9045-05-P3 • 2012

This PDF contains the 199 slides from a presentation about punchout distress and other construction issues with continuously reinforced concrete pavements in Texas.

This report is available for free download (102 MB):

<http://www.depts.ttu.edu/techmrtweb/Reports/Products/5-9045-05-P3.pdf>