



Research Digest

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Texas Department of Transportation (TxDOT) Research

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Item 1

Comparative Study of Mechanical and Corrosion Resistance Properties of Bridge Post-Tensioning Strands

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

CTR 4562-3 • 2011

This report summarizes the exploration of new methods of protection for the strands used in post-tensioning of concrete bridges. Companion small-scale tests of strand or grout and strand were conducted. The tests included mechanical testing to determine modulus of elasticity, yield strength, and ultimate strength. In addition a number of passive corrosion exposure tests and accelerated active corrosion tests were run. These accelerated tests included both linear polarization resistance tests and potentiodynamic tests. Strand types investigated included conventional steel strand, hot dip galvanized strand, stainless steel strand, copper-clad strands, stainless-clad strands, and flow-filled epoxy-coated strand. The results indicated that the epoxy-coated strand dominated the others in corrosion resistance and met all mechanical property requirements. The stainless-clad and stainless steel strand were only slightly behind the epoxy-coated in corrosion resistance but need improvement in mechanical properties. The stainless-clad strand met the mechanical requirements for Grade 250 but not Grade 270.

This report is available for free download (2.5 MB):

http://www.utexas.edu/research/ctr/pdf_reports/0_4562_3.pdf

Item 2

Measuring Access to Transit Service in Rural Transit Systems: Feedback from the Workshops and Recommendations for Improving the DRT Accessibility Tool

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

CTR 5178-03-1 • 2011

This report discusses the application of the paratransit microsimulation patron accessibility analysis tool developed by the University of Texas researchers. The analysis tool is applied to four rural transit agencies in Texas. Workshops were held at these four agencies plus two other agencies. The workshops were undertaken to achieve the following three objectives: (1) Provide an overview of the demand response transit (DRT) accessibility tool developed by the research team and to demonstrate how it can be used as a proactive planning tool by the transit agencies, (2) Obtain feedback from the transit agencies on the results predicted by the DRT Tool, and (3) Identify recommendations for improving the DRT Tool.

This report is available for free download (2.3 MB):

http://www.utexas.edu/research/ctr/pdf_reports/5_5178_03_1.pdf



Research Digest

Item 3

School Traffic Workshop: Dealing with Texas-Sized Problems around Schools

TEXAS A&M UNIVERSITY. TEXAS TRANSPORTATION INSTITUTE (TTI)
TTI 5470-01-1 • 2012

This report summarizes the series of "Traffic around Schools" workshops conducted throughout the state of Texas to familiarize TxDOT employees and partner agencies with two key products from previous research projects (0-4286 and 0-5470) and other tools and guidance that are available for dealing with problems around schools.

The research team held half-day workshops in Austin, El Paso, Houston, Pharr, San Antonio, and Dallas that were attended by over 150 participants representing 36 agencies. The workshops were well received and helped to highlight and emphasize the importance of multi-agency/multi-disciplinary cooperation in the planning, design, and operation of school sites in order to provide safe and efficient transportation access. One of the focus areas of the project and associated workshops was how agencies can effectively deal with the use of reduced speed school zones around schools. Researchers solicited and synthesized feedback from workshop participants in order to be able to update existing guidance.

The research team developed three primary recommendations following the completion of this implementation project: (1) Extend workshop series to other areas and/or to audiences more focused on ISD personnel. (2) Pursue ongoing workshop support through the TxDOT Human Resources Division training section. (3) Pursue non-TxDOT sponsorship opportunities (e.g., Texas Education Agency Regional Service Centers). (4) Expand workshop content to a full day and increase interactivity by adding more group exercises, case studies, and the use of other interactive media such as video. (5) Pursue additional school-related research projects on speed issues around schools. (6) Speed compliance with beacons and without and speed/delay in school zones with no reduced speed.

This report is available for free download (8.3 MB):
<http://tti.tamu.edu/documents/5-5470-01-1.pdf>

Item 4

Applying the Systems Engineering Approach to Video Over IP Projects: Workshop

TEXAS A&M UNIVERSITY. TEXAS TRANSPORTATION INSTITUTE (TTI)
TTI 5942-01-1 • 2011

In 2009, the Texas Transportation Institute produced for the Texas Department of Transportation a document called Video over IP Design Guidebook. This report summarizes an implementation of that project in the form of a workshop. The workshop was developed and presented as a pilot in Austin in 2010 and taught an additional four times in 2011 in Fort Worth, Lubbock, Houston, and San Antonio.

This report is available for free download (222 KB):
<http://tti.tamu.edu/documents/5-5942-01-1.pdf>



Item 5

Analysis of Roadway Departure Crashes on Two-Lane Rural Roads in Texas

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

TTI 6031-1 • 2011

This three-year research effort was undertaken to identify factors that influence the number and severity of roadway departure crashes on rural two-lane highways in Texas and provide engineering countermeasures to reduce this type of crash. The study objectives were accomplished by analyzing crash, traffic flow, and geometric data between 2003 and 2008 and conducting site visits at 20 sites having the highest crash rates at four TxDOT districts.

The study results showed that the proportion of roadway departures varied from 25 percent to 52 percent for all crashes occurring on the rural two-lane highway network. Proportionally more crashes occur on horizontal curves than on tangents and during nighttime. Distracted driving and speeding were found to be important contributing factors.

To help reduce the number and severity of roadway departures, the research team proposed several medium-to-low-cost countermeasures that can realistically be implemented by TxDOT. These countermeasures were grouped into three categories: targeted for horizontal curves, general applications, and new and innovative treatments. For each treatment, the information focused on the general characteristics, key design features, safety effectiveness, cost (when available), and additional resources where the reader can find more detailed information about the treatment. More than 25 treatments were described for reducing roadway departure crashes.

This report is available for free download (4.9 MB):

<http://tti.tamu.edu/documents/0-6031-1.pdf>



Item 6

High RAP Mixes Design Methodology with Balanced Performance

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

TTI 6092-2 • 2011

The use of reclaimed asphalt pavement (RAP) and recycled asphalt shingles (RAS) can significantly reduce the increasing cost of hot-mix asphalt paving, conserve energy, and protect the environment. This report presents a comprehensive study focusing on methodologies to improve the performance of high RAP content mixes. Firstly this report addresses one major concern—RAP variability. It was found that in Texas the RAP materials are consistent and have low variability in terms of aggregate gradation and asphalt content, within individual stockpiles. The authors evaluated the impact of RAP on optimum asphalt content (OAC), rutting/moisture resistance, and cracking resistance. OAC generally increases with more RAP (and RAS) usage, but the increase in OAC is small when the RAP content is below 20 percent; increasing RAP content always improves rutting/moisture resistance as measured in the Hamburg wheel tracking test (HWTT). However, in the laboratory cracking resistance always reduces with increasing RAP content, especially when RAP content is 30 percent and above and also when RAP/RAS combinations are used. Additionally, the use of 10–15 percent RAP, without lowering virgin binder PG grade has a small impact on rutting/moisture and cracking resistance, but the influence, especially on cracking resistance, is much more significant when higher levels area used.

A balanced RAP mix design approach is proposed in this study. In the proposed balanced mix design approach the final asphalt content is selected after optimizing the mix density, HWTT, and Overlay Test (OT) requirements. RAP handling in the process of mix design is critical, especially the mixing and compaction temperatures for high RAP mixes. It was recommended that the mixing and compaction temperatures used for the virgin binder be used for the RAP mix as well. Finally, the balanced RAP mix design procedure is demonstrated and validated through the construction of field test sections containing different levels of RAP. One of the interesting findings is that cracking requirement in terms of OT cycles should vary, depending at least on climate (cold vs. hot), traffic (heavy vs. light), and existing pavement condition (overlay over cracked pavements vs. new construction). For asphalt overlays over severely cracked pavements, a minimum OT requirement of 300 cycles previously proposed was further validated with performance data from the RAP sections on IH40 near Amarillo, Texas. More work is needed to develop criteria for different climatic zone and different pavement conditions.

This report is available for free download (1 MB):

<http://tti.tamu.edu/documents/0-6092-2.pdf>



Item 7

Characterization of Exhaust Emissions from Heavy-Duty Diesel Vehicles in the HGB Area: Final Report

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

TTI 6237-1 • 2012

The relative contribution of heavy-duty diesel vehicles (HDDVs) to mobile source emissions has grown significantly over the past decade, and certain vehicles identified as high emitting vehicles (HEs) contribute disproportionately to the overall HDDV emissions. It is critical for state and local transportation agencies in nonattainment areas such as the Houston-Galveston-Brazoria (HGB) area to address this component of the fleet to mitigate emissions effectively from the component.

For this study, a total of 30 HDDVs were selected from City of Houston (COH) fleet based on opacity testing for HEs and random selection for non-HEs. With the selected 30 vehicles, driving and idling emission testing were performed to characterize their emissions with respect to vehicle classes, types (HE or non-HE), and model years. The measured emission testing results were analyzed and compared with Motor Vehicle Emission Simulator (MOVES) estimates as well as among vehicle classes and types. In general, emissions of HEs were higher than non-HEs. Replacing HEs with non-HEs or vehicles complying with new emissions standards could reduce their emissions significantly. This report contains detailed results including gaseous, PM, and air toxic emissions testing results and MOVES estimates.

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

<http://tti.tamu.edu/documents/0-6237-1.pdf>

Item 8

Project Report on the Continued Development and Analysis of the Flexible Pavements Database

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

CTR 6275-1 • 2012

The original scope of TxDOT Research Project 0-6275 included continuing the development of the Texas Flexible Pavement database (TFPD) developed as part of Research Project 0-5513. The objective of 0-5513 was to deliver a database capable of hosting the data necessary for new pavement design models that would result in more reliable and economical pavement design. The objective of 0-6275 was to continue the data collection and data population of the flexible pavement databases and to calibrate the models (transfer functions) used in the new MEPDG as well as TxDOT's mechanistic design checks. In addition, this new project was to review the development conducted in 0-5513 to evaluate whether the database created covered the inference space of pavements in Texas and to make the necessary additions and changes. Therefore, the efforts of 0-6275 were primarily twofold. One aspect was geared towards extensive performance monitoring and material testing for better characterization of the experimental sections included as part of 0-5513 as well as new sections that were to be incorporated in the enhanced version of the TFPD. The other aspect of the study was to look into the calibration of the transfer functions in the newly developed MEPDG as well as Texas ME Design procedure being sponsored by TxDOT through the 0-5798 research study. It was understood that an effort to determine reliable bias correction factors would necessitate a large volume of project-specific-information for a number of pavement sections that are well spread out within the state such that differences in materials, traffic, construction practices and climate are captured. The TFPD supplemented by other databases like the DCIS and the LIMS will ensure that the data needs for the calibration exercise are met and fulfilled to the extent possible. When time series data were not available, the researchers utilized relevant data from the FHWA's Long Term Pavement Performance Studies (LTPP). This interim report summarizes the activities performed during the first 7 months of the project, when the current project was terminated. Therefore, this document reports on the work performed in Tasks 1 through 7.

This report is available for free download (1.3 MB):

http://www.utexas.edu/research/ctr/pdf_reports/0_6275_1.pdf



Item 9

Research on Asset Management for Safety and Operations

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

TTI 6390-1 • 2011

The Texas Department of Transportation (TxDOT) is challenged with managing a wide range of transportation safety and operations assets in order to respond to public and other outside interests. These assets include, but are not limited to pavements, pavement markings, raised pavement markers, structures, roadside signs, traffic signals, roadway illumination, traffic barriers, guard fences, attenuators, maintenance equipment, vehicles, intelligent transportation systems (ITS) equipment, traffic detection equipment, real estate, corporate data, and materials. Asset management is a comprehensive strategic approach to documenting and managing these assets, as well as using information gathered during the process to assist TxDOT in making cost-effective investment decisions. This project provided TxDOT with guidance on developing a well-designed asset management system as a critical component of the agency's approach to providing for the mobility of its customers, preserving the infrastructure already in place, planning for future improvements of that infrastructure, and being responsive and accountable to the public regarding the investment of their tax dollars. This guidance is in the form of a comprehensive Guidebook and a Screening Tool to help TxDOT quickly identify the best approach for managing assets. Such a system will be an integral part of TxDOT's ability to meet its goals of reducing congestion, enhancing safety, expanding economic opportunity, improving air quality, and increasing the value of transportation assets.

This report is available for free download (7.5 MB):

<http://tti.tamu.edu/documents/0-6390-1.pdf>

Item 10

Evaluating the Impact of Overweight Load Routing on Buried Utility Facilities

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

TTI 6394-2 • 2011

Overweight traffic movements can negatively affect pavement integrity and quality. However, it is less known to what degree buried utility facilities along and across the right of way are affected by these overweight loads, especially if the utility facility is aged, placed under an exception to the Utility Accommodation Rules (UAR), and/or subjected to repetitive loads. Routing decisions for repetitive overweight loads may be determined without consideration of cumulative impacts to utility infrastructure, particularly municipally owned lines that could be aged, accommodated under an exception, or of substandard materials. Given the growth in volume in overweight load (particularly mid-heavy and superload) permits, the adequacy of the UAR is unknown.

The objectives of this project were to (a) provide a review of technical design and engineering requirements for utility accommodation in Texas, (b) provide an assessment of potential impact of overweight loads on buried utilities, (c) provide recommendations for a business process for TxDOT overweight routing coordination, (d) provide recommendations for changes to TxDOT manuals, (e) provide an assessment of UAR adequacy to deal with overweight loads on buried utilities, and (f) provide recommendations for changes to the UAR.

This report is available for free download (8.8 MB):

<http://tti.tamu.edu/documents/0-6394-2.pdf>



Item 11

Development of the Transportation Revenue Estimator and Needs Determination System (TRENDS) Forecasting Model: MPO Sub-Models and Maintenance

TEXAS A&M UNIVERSITY. TEXAS TRANSPORTATION INSTITUTE (TTI)
TTI 6395-01-1 • 2011

This report summarizes the technical work performed developing and incorporating Metropolitan Planning Organization sub-models into the existing Texas Revenue Estimator and Needs Determination System (TRENDS) model. Additionally, this report explains the maintenance and monthly updates performed on the TRENDS model. The TRENDS model is designed to provide transportation planners, policy makers, and the public with a tool to forecast revenues and expenses for the Texas Department of Transportation for the period 2010 through 2035 based on a user-defined level of transportation investment. The user, through interactive windows, can control a number of variables related to assumptions regarding statewide transportation needs, population growth rates, fuel efficiency, federal reimbursement rates, inflation rates, taxes, fees, and other elements. The output is a set of tables and graphs showing a forecast of revenues, expenditures, and fund balances for each year of the analysis period based on the user-defined assumptions.

This report is available for free download (661 KB):
<http://tti.tamu.edu/documents/5-6395-01-1.pdf>

Item 12

Development of Guidelines for Pedestrian Safety Treatments at Signalized Intersections

TEXAS A&M UNIVERSITY. TEXAS TRANSPORTATION INSTITUTE (TTI)
TTI 6402-1 • 2012

For intersections with a permissive or protected-permissive left-turn mode, pedestrians cross during the permissive period. This operation requires the left-turn driver to yield to both opposing vehicles and pedestrians, prior to accepting a gap and completing the turn. Pedestrian crash risks are increased in these complicated driving conditions because left-turn drivers sometimes fail to yield to pedestrians.

This document summarizes the research conducted and the conclusions reached during the development of guidelines for pedestrian safety treatments at signalized intersections. The guidelines are focused on treatments that alleviate conflicts between left-turning vehicles and pedestrians. One treatment addressed in the document is the use of protected or protected-permissive left-turn operation. The guidelines are based on consideration of pedestrian safety and vehicle operation. These considerations include the road-user costs associated with pedestrian-vehicle crashes and vehicle delay. The guidelines were incorporated in the Traffic Signal Operations Handbook. The guidelines were also incorporated into a spreadsheet that was developed to accompany the Handbook. The Handbook was previously developed for Project 0-5629. It provides guidelines for timing traffic control signals at intersections that operate in isolation or as part of a coordinated signal system.

This report is available for free download (1.7 MB):
<http://tti.tamu.edu/documents/0-6402-1.pdf>



Item 13

Studies to Determine the Effectiveness of Automated Flagger Assistance Devices and School Crossing Devices

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

TTI 6407-1 • 2012

This report describes the methodology and results of analyses performed to determine motorist understanding, as well as the operational and safety effectiveness, of automated flagger assistance devices (AFADs) relative to the use of flaggers at lane closures on two-lane, two-way roadways. Based on the motorist survey and field study findings, researchers recommended the use of both types of AFADs (stop/slow and red/yellow lens) in Texas. Researchers did not make any specific recommendations regarding the red/yellow lens AFADs, since the research findings supported the current language in the 2009 Manual on Uniform Traffic Control Devices (MUTCD). For stop/slow AFADs, researchers recommended that a gate arm and alternative symbol supplemental signs be required to reduce violations and improve motorist understanding. In addition, researchers made various recommendations regarding the use of both types of AFADs.

This report also describes the methodology and results of analyses performed to determine the effectiveness of 1) five stop paddles with embedded lights compared to a standard, un-lit stop paddle and 2) a prototype, portable, remotely operated, in-street school children crossing sign with flashing light emitting diodes (LEDs) around the border of each sign face. Based on the research findings, researchers recommended the use of one of the following to improve the conspicuity of crossing guards without negatively impacting a motorist's ability to recognize the three critical characteristics of a stop sign (i.e., red background color, octagon shape, and white STOP legend): · A stop paddle containing flashing red lights arranged in an octagonal pattern at the eight corners of the paddle. · A stop paddle containing a series of steady-burn red lights around the border arranged such that the lights clearly convey the octagonal shape of the paddle. · A stop paddle containing a series of flashing red lights around the border arranged such that the lights clearly convey the octagonal shape of the paddle.

Researchers believed that crossing guards could use the prototype in-street school children crossing sign at school crossings to improve safety. Thus, researchers also made recommendations regarding its future use.

This report is available for free download (3.4 MB):

<http://tti.tamu.edu/documents/0-6407-1.pdf>



Item 14

Equipment Replacement Optimization

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

UT Tyler 6412-1 • 2011

TxDOT has a fleet value of approximately \$500,000,000 with an annual turnover of about \$50,000,000. Substantial cost savings with fleet management has been documented in the management science literature. For example, a 1983 Interfaces article discussed how Phillips Petroleum saved \$90,000 annually by implementing an improved system for a fleet of 5300 vehicles. Scaling up to the TxDOT fleet, the corresponding savings would be around \$350,000 in 2008 dollars. Similar savings were reported in a 2008 presentation by Mercury Associates.

TxDOT Research Project 7-4941 (1997), Equipment Replacement Criteria Based on LCCBA, created a SAS decision analysis tool to be used by the department in its equipment replacement process. While the 7-4941 analysis tool met project scope within the data limitations existing at the time of its delivery, an improved vehicle cost database will now allow a more normative decision support tool for fleet replacement optimization. In this sense, optimization means minimizing the life-cycle sum of maintenance cost and replacement cost (new equipment price minus resale value). The Department needs a system which recommends whether to retain or replace a unit of equipment, given that class of equipment's age, mileage, resale value, and the cost of replacement equipment. TxDOT categorizes, accounts for, and replaces equipment based on classes of equipment; the new automated fleet optimization system must use these class codes.

The objective of this project is to (1) determine the best optimization methodology; (2) evaluate commercial fleet management systems; (3) develop the model if this is cost-effective relative to purchasing a commercial model; and (4) validate the new model as needed using data available on TxDOT's current fleet. To accomplish this project, the research team will formulate the equipment replacement optimization problem as a Mixed-Integer Linear Programming (MILP) model, and propose both Deterministic Dynamic Programming (DDP) and Stochastic Dynamic Programming (SDP) approaches to solving the Equipment Replacement Optimization (ERO) problem. Certainly, this system will be user-friendly and designed so that it can be easily used by non-technical district personnel (to evaluate individual district units against a class) and by technical division personnel (Fleet Manager) to develop optimal aggregate classcode replacement cycles.

This report is available for free download (4.4 MB):

http://www.utexas.edu/research/ctr/pdf_reports/0_6412_1.pdf



Research Digest

Item 15

Use of Intelligent Transportation Systems in Rural Work Zones

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

TTI 6427-1 • 2011

This project defined an approach to integrating data collected and traveler information displayed in a work zone with a regional transportation management center and/or other state websites. The project conducted a literature review to define the state of the practice in work zone Intelligent Transportation Systems (ITS; smart work zones) and worked with the Texas Department of Transportation traffic managers to identify their safety and mobility needs in a work zone and where ITS can play a role. The research conducted a market review to find current product offerings that provide solutions to address the identified work zone needs. It also developed two levels of architecture for integrating work zone ITS data from these products into a regional transportation management center. The project also explored new uses of work zone information and made recommendations for operating existing ITS systems in concert with Smart Work Zones

This report is available for free download (3.9 MB):

<http://tti.tamu.edu/documents/0-6427-1.pdf>

Item 16

Verification of Texas Superheavy Load Criteria for Bridges

LAMAR UNIVERSITY

Lamar 6438-1 • 2011

This report evaluates TxDOT criteria for the superheavy loads that trigger bridge analyses to determine whether the criteria adequately protects Texas bridges. Researchers used solid modeling calibrated with a bridge test of a 3-span continuous steel girder unit of SH 159. The bridge testing measured girder end rotations with tilt loggers and load position using a sub-foot accuracy GPS. Solid modeling was done with ANSYS 12. The calibrated model was used to conduct a parametric study. Axle distribution factors of 0.28 and 0.45 were experimentally determined for interior and exterior girders respectively. Results of the parametric study showed that the Texas superheavy load criteria are valid for this bridge type. A study of service life extension showed that operational stress level loads applied as little as 5 percent of time to a particular structure will have a significant effect on the lifetime of the structure, and that the number of fatigue load-cycles per truck cannot be assumed to be one. A graphical version of the bridge review trigger (load-length curve with existing allowances and restrictions) might serve TxDOT and heavy-haul carriers better than does the gross vehicle weight triggers. Data collected long term of load frequency and load level from a relevant bridge would help TxDOT determine what effects stress level variations have on the life of Texas bridges.

This report is available for free download (48.3 MB):

<http://tti.tamu.edu/documents/0-6438-1.pdf>



Item 17

Modern Traffic Control Devices to Improve Safety at Rural Intersections

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

TTI 6462-1 • 2011

Engineers with the Texas Department of Transportation (TxDOT) frequently make changes to traffic control devices (TCDs) to improve intersection safety. To use available funds judiciously, engineers make incremental changes in order to select the least costly yet effective improvements. The goal of this project was to obtain a better understanding of modern TCD capabilities. Researchers conducted the following tasks: literature review, crash data examination, TxDOT district survey, laboratory survey, field study, and development of principles for selecting TCDs. Adding flashing lights to signs, either through beacons or embedded light-emitting diodes (LEDs), serves two purposes: to attract attention and to convey a message. The findings of this research demonstrate that while the lights do improve detection distance, legibility distance of the message suffers at night due to the glare of the lights.

Cautious engineering judgment should be used when adding lights to any word message sign beyond a Stop sign because the legibility distance for the words will be shorter than when lights are not present. For Stop signs, the unique color and shape of these traffic control devices prompts drivers' responses to them long before the word "stop" is actually read. The driving study found no difference in sign detection at night between those with an overhead flashing beacon and those where the ground-mounted sign has embedded LEDs. The detection distances observed for the signs with lights in this study were extremely long, over 2000 ft in most cases. The other general observation regarding the magnitude of the results is that for all of the Stop signs, both lit and unlit, the detection distance for sign recognition was always greater than stopping sight distance. So the existing static Stop signs are sufficiently visible for an alert driver under clear weather. The research project found that there appears to be a benefit to detection from dimming the LED brightness at night. The LED sign set on the high brightness setting was detected furthest during the day, while the lower setting was detected best at night. The research concluded with guidance principles to consider when selecting countermeasures for rural stop-controlled intersections.

This report is available for free download (4.2 MB):

<http://tti.tamu.edu/documents/0-6462-1.pdf>

Item 18

Literature Review of Current Practices in Dealing with Fluctuations of Maintenance Budgets

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

CTR 6623-1 • 2011

A literature review was conducted to investigate current budget cutting strategies used in routine roadway maintenance planning, including methods and techniques that are employed by other state and international transportation organizations (DOT's). Methods that quantify impact and increased risk factors from the reduction of routine maintenance activities were investigated. Methods developed based upon previous research were tabulated and evaluated by objective criteria such as cost savings, resource savings, and road user/stakeholder satisfaction. The researchers reviewed the data and identified the most effective risk analysis techniques, which served as the basis for the maintenance risk modeling under this project.

This report is available for free download (202 KB):

http://www.utexas.edu/research/ctr/pdf_reports/0_6623_1.pdf



Research Digest

Item 19

Performance Measures for Public Transit Mobility Management

TEXAS SOUTHERN UNIVERSITY (TSU)

TSU 6633-1 • 2011

Mobility management is an innovative approach for managing and delivering coordinated public transportation services that embraces the full family of public transit options. At a national level, there are currently no industry recognized performance indicators to measure and monitor performance of mobility management programs. This research looks at the state of mobility management practice throughout Texas, as well as national best practices in mobility management. Additionally, this research provides an overview of the varying roles of state departments of transportation in public transit mobility management efforts. The research also presents applied mobility management for agencies seeking to implement mobility management programs as well as a menu of performance measures that can be utilized based on the type and level of program implemented.

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

<http://tti.tamu.edu/documents/0-6633-1.pdf>

Item 20

Synthesis of TxDOT Uses of Real-Time Commercial Traffic Data

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

TTI 6659-1 • 2012

Traditionally, the Texas Department of Transportation (TxDOT) and its districts have collected traffic operations data through a system of fixed-location traffic sensors, supplemented with probe vehicles using transponders where such tags are already being used primarily for tolling purposes and where their numbers are sufficient. In recent years, private providers of traffic data have entered the scene, offering traveler information. The question that this research project answered was the following: Whether TxDOT could and should utilize the data offerings by private sector providers to supplement its own data collection efforts and, if so, how. The research also determined the following: What data are available from private providers (either free or for purchase). What other states are doing with data from private providers. Opinions of TxDOT decision makers on the utility of these data sources. How the data should be normalized, combined, and delivered for TxDOT or other public sector partner agency use. A recommended path for implementing the TxDOT response.

This report is available for free download (2.6 MB):

<http://tti.tamu.edu/documents/0-6659-1.pdf>



Item 21

Proposed TxDOT Strategic Research Program: Second Year Report

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

CTR 6661-2 • 2011

In February 2010, The Texas Department of Transportation (TxDOT) contracted with the Center for Transportation Research (CTR) at The University of Texas at Austin, the Texas Transportation Institute (TTI), and The Center for Multidisciplinary Research in Transportation (TechMRT) at Texas Tech University, to assist TxDOT in developing a Strategic Research Program (SRP). This report documents the work conducted from September 2010 to August 2011.

The scope of the proposed SRP is to prepare TxDOT for the transportation challenges likely to be faced in the next 10-30 years. The SRP complements the current technical research program by addressing transportation issues that the State Legislature and TxDOT Administration foresee affecting the efficiency and viability of the statewide transportation system. Research recommendations could require legislative action and/or internal departmental adjustments.

This report is available for free download (439 KB):

http://www.utexas.edu/research/ctr/pdf_reports/0_6661_2.pdf

Item 22

Seven TxDOT Strategic Research Briefs for FY 2011

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

CTR 6661-RB • 2012

This document contains seven research briefs developed for TxDOT's Strategic Research Program (SRP) in FY 2011, with a brief introduction summarizing the initiation of the SRP.

CONTENTS

Project Summary Report: Development of a Strategic Research Program for TxDOT --

SRP Brief 1: Using Telework and Flexible Work Arrangements as a Congestion Mitigation Strategy [CTR] --

SRP Brief 2: The Problem of Congestion and Mass Transit [TechMRT] --

SRP Brief 3: Determining a Comprehensive Freight Strategy for Texas [CTR] --

SRP Brief 4: Strategic Directions for Performance Management in TxDOT: Customer Satisfaction as a Key Driver of Success [Texas Tech; TTI] --

SRP Brief 5: The Future of Texas Freight: Roles, Forces, and Policies [TTI] --

SRP Brief 6: An Integrated Approach to the Maintenance and Rehabilitation of Pavements and Bridges [CTR] --

SRP Brief 7: The Interstate Shield: Time to Reconsider a Roadway Icon? [TTI]

This report is available for free download (7.2 MB):

http://www.utexas.edu/research/ctr/pdf_reports/0_6661_rb.pdf



Item 23

Microsurfacing in Texas

TEXAS A&M UNIVERSITY. TEXAS TRANSPORTATION INSTITUTE (TTI)
TSUSM 6668-1 • 2012

Microsurfacing is a unique pavement preservation tool in the arsenal of maintenance agencies. It is known to perform well when applied to the right pavement at the right time for the right distress. In order to ensure microsurfacing performs well, an agency must know what constitutes the right road, right time and right distress. Texas uses microsurfacing and wishes to answer these questions as well as uncover other factors leading to successful use of this treatment. This report describes the current state of practice of microsurfacing in Texas and compares it to best practices extracted from existing literature. A survey of DOT personnel, contractors and emulsion suppliers in Texas provides insight into the most crucial factors contributing to the success or failure of a microsurfacing. From the results of the survey, literature reviews, case studies and site visits, the research team analyzed material selection and mix design methods, construction practices, equipment practices and performance measures for microsurfacing. It was concluded that project selection is the most important contributor to a successful microsurfacing followed by construction practices. Reliance on contractors for input into proper project selection places the agency in a vulnerable position. A certification course to educate personnel is recommended.

This report is available for free download (4.6 MB):

<http://tti.tamu.edu/documents/0-6668-1.pdf>

Item 24

A Web-Based Pavement Performance and Maintenance Management and GIS Mapping System for Easy Access to Pavement Condition Information

UNIVERSITY OF TEXAS AT AUSTIN. CENTER FOR TRANSPORTATION RESEARCH (CTR)
CTR 9035-01-1 • 2011

State Departments of Transportation, including the Texas Department of Transportation (TxDOT), have been moving towards the development and implementation of pavement management systems that would enable monitoring of the performance of their roadways, as well as assist transportation officials with maintenance budget allocation and planning decisions. Various attempts made in the past focused on using the available performance databases as well as state-of-the-art concepts for the development of such systems. The unique characteristics of Texas, the most prominent of which is the vast size of the managed pavement network—79,696 centerline miles of highways including 49,829 bridges—have made some of the decision-support models and/or algorithms a challenge to implement. This report presents a new approach to the development of such a decision support system with its focus on maintenance management for TxDOT. The new system is web-based and provides functional capabilities that allow transportation officials and engineers to make informed decisions regarding their budget planning and allocation for pavement maintenance management, fully utilizing available historical data. The developed system has been successfully pilot-tested in the Dallas District of TxDOT.

This report is available for free download (780 KB):

http://www.utexas.edu/research/ctr/pdf_reports/5_9035_01_1.pdf