



Research Digest

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Item 1

Intelligent Transportation Systems (ITS) Concepts for Rural Corridor Management

AZ DOT

FHWA-AZ-07-615 • 2007

The Arizona Department of Transportation (ADOT) SPR-570: Rural ITS Progress Study – Arizona 2004 provided 20 key recommendations for improved utilization of the rural ITS (Intelligent Transportation Systems) infrastructure. Two years later, in reviewing the outcomes of the 2004 study and the ongoing rural technology deployments, the Department identified several of the key concerns as still being unresolved. In general, ADOT has been successful in implementing the recommendations of the 2004 statewide review, but five areas of unmet needs of unfulfilled potential remain. These five gap areas are the primary focus of this new research project, to fully implement the potential of all of the recommendations from the 2004 study.

The five primary focus areas are: ITS Maintenance, Weather Information Systems, Highway Advisory Radio, Motorist Assist Patrols, and Information Sharing. The research team interviewed the project's stakeholders from Arizona's rural districts to identify recent changes in their ITS deployment, goals, and visions for future deployment, as well as current needs and desires since the previous 2004 study. The investigators also reviewed the current practices and concepts of rural IRS among other transportation agencies throughout the county. This included conducting personal interviews with recognized industry leaders, attending industry conferences, and performing extensive research in literature, products (both off-the-shelf and in-development), and on-line.

Based on the interviews and state-of-the-practice research components, the investigators developed a list of ITS concepts that might service the rural needs of the Department. Each of the five focus areas contains several concepts that address needs identified as original project goals, or new topics identified during the field interviews. Each discussion section provides a conceptual approach and application of ITS technology or state-of-the-practice development, a breakdown of benefits and challenges for implementation, implementation recommendations, and a breakdown of the engineer's option of cost. Each concept has been ranked by the project advisory group based on implementation priority. A potential process owner and potential resources for deployment are also identified.

Full-text PDF of this report is available for free download from

http://www.azdot.gov/TPD/ATRC/publications/project_reports/PDF/AZ615.pdf



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Item 2

Digital Signature Feasibility Study

AZ DOT

FHWA-AZ-08-534 • 2008

The purpose of this study was to assess the advantages and disadvantages of using digital signatures to assist the Department in conducting business. The Department is evaluating the potential of performing more electronic transactions (e.g., electronic bidding, procurement, Motor Vehicle transactions, etc.) Many of the Department's candidate transactions require one or more ink signatures before they can be processed. The basic challenge is that without a means to provide verifiable and binding electronic signatures, many transactions become Internet ineligible and cannot become part of the Department's e-service portfolio. E-Government relies on secure communication between two or more trusting parties. Digital signatures may provide the missing component that would allow certain transactions to be performed electronically.

A great deal of information was found addressing digital signature technology and a number of case studies were used by the researchers. In addition, the researchers conducted a review of Arizona and Federal statutes to assess the legal requirements pertaining to the veracity of digital and electronic signatures. A survey of other states' transportation departments was completed to determine what digital signature technologies are being used. 36 states responded to the survey. Most states have either implemented a form of digital signature technology or are in the process of doing so. Most have chosen to leverage the capabilities of third-party software providers and not internal development by their staff. Finally, the researchers leveraged case studies and interviews with a leading digital certificate/PKI vendor to establish a basic cost profile for developing an internal solution and leveraging a third-party solution. The three year cost of a third party solution was significantly less than building a solution internally.

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http://www.azdot.gov/TPD/ATRC/publications/project_reports/PDF/AZ534.pdf

Item 3

Should State DOTs Prefer Bicycle Lanes or Wide Curb Lanes?

AZ DOT

FHWA-AZ-08-598 • 2008

This report investigates collisions between bicycles and motor vehicles to ascertain their relationship (if any) to a Bicycle Lane or Wide Curb Lane for the purpose of informing State Departments of Transportation. A literature review describes progress of Federal legislation supporting bicycle travel and implementation of bicycle facilities, their application in various jurisdictions, agency liability, and the debate between advocates of Wide Curb Lanes and Bicycle Lanes. A survey of DOT officials nationwide reveals the importance of available space and input from municipalities in designing bicycle facilities. An examination of fatal bicyclist/motorist collisions in Arizona suggests strong relationships to human error and "failure to yield" infractions, and negligible relationships to road conditions or mechanical failure. Based on the evidence, this report cannot determine that a relationship exists between collisions, Bicycle Lanes, or Wide Curb Lanes. Further investigation of this topic is recommended.

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http://www.dot.state.az.us/TPD/ATRC/publications/project_reports/PDF/AZ598.pdf



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Item 4

Implementing a Statewide Rideshare and Vanpool Program in Arizona

AZ DOT

FHWA-AZ-08-610 • 2008

This research investigated the potential for a statewide ridesharing and vanpool program for Arizona. By performing a literature review, surveying other state DOTs and conducting a needs assessment, the research investigated the need for, logistics of, and funding options for a statewide ridesharing and vanpooling program. The product of this research is an implementation plan that includes four recommendations for the organization and deployment of ridesharing and vanpooling services in two target areas along with assessments to identify future priority areas and potential roles for AzDOT in fostering statewide services. The implementation plan has four recommendations for AzDOT:

1. Flagstaff- The team recommends that AzDOT assist with the start-up of a ridesharing initiative in the Flagstaff area. The team recommends that the Chamber of Commerce undertake employer outreach and help coordinate ridesharing services offered by the Metropolitan Planning Organization (MPO) and the local transit authority.
2. Kingman/Bullhead City/Lake Havasu City – The team recommends that a more detailed feasibility study be conducted for these three cities in Mohave County. While the need for ridesharing services is fairly apparent, the means to coordinate and provide these services are not.
3. Identification of Future Priority Areas- The team recommends periodic assessments be made with local chambers of commerce, key local agencies, and AzDOT district offices to determine if conditions warrant the offering of ridesharing services to address congestion and mobility issues in key corridors or areas.
4. Role of AzDOT in Fostering Statewide Services – Several supporting activities are available for AzDOT to undertake to facilitate the growth of carpooling and vanpooling in non-urban areas. First, AzDOT can support a statewide ridematching service similar to that provided by Valley Metro to Tucson and Flagstaff. AzDOT can also assist with new vanpool acquisition. Furthermore, AzDOT can provide technical assistance to areas interested in creating a new ridesharing program with guidance and funding for start-up. AzDOT can also convene ridesharing program managers from around the state for networking, training, and technical assistance.

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http://www.azdot.gov/TPD/ATRC/publications/project_reports/PDF/AZ610.pdf



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Item 5

Cost/Benefit Analysis of Electronic License Plates

AZ DOT

FHWA-AZ-08-637 • 2008

The objective of this report is to determine whether electronic vehicle recognition systems (EVR) or automatic license plate recognition systems (ALPR) would be beneficial to the Arizona Department of Transportation (AzDOT). EVR uses radio frequency identification technology tags (RFID) that would be placed on all registered vehicles so that RFID readers could read vehicles' plate numbers as they pass using the radio frequency signal emitted by the RFID tag. ALPR technology uses cameras and alphanumerical recognition software to read license plates as they pass.

This report concludes that at the present ALPR should be further researched and/or implemented by the State of Arizona. The reasons for this recommendation are because of: ALPR's previous applications, ALPR's lower up front cost, ALPR's ability to read out-of-state plates, ALPR's potential lower degree of public opposition, and the possibility that ALPR would have to back up an EVR system. All in all, these technologies are changing at a rapid rate and a change in any of these variables that generated this recommendation could change this recommendation.

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http://www.azdot.gov/TPD/ATRC/publications/project_reports/PDF/AZ637.pdf

Item 6

Assessing the Needs for Intermediate Diaphragms in Prestressed Concrete Bridges

LOUISIANA DEPARTMENT OF TRANSPORTATION

FHWA/LA.06/420 • 2008

Reinforced concrete Intermediate Diaphragms (IDs) are currently being used in prestressed concrete (PC) girder bridges in Louisiana. Some of the advantages of providing IDs are disputed in the bridge community because the use of IDs increases the cost and time of construction. There is no consistency in the practice of providing IDs among various states and codes of practice, and the overall effectiveness of IDs, as well as the need for them in prestressed concrete bridges, is unclear.

The objectives of this research were (1) to assess the need of reinforced concrete (RC) IDs in PC girder bridges and to determine their effectiveness, and (2) to search for a possible alternative steel diaphragm configuration that could replace concrete diaphragms if necessary.

The research team has examined and reviewed state-of-the-art technology and current practices from many sources of information on IDs. Through a survey questionnaire and review of the Louisiana Department of Transportation and Development (LADOTD) Bridge Design Manual, the research team obtained relevant information regarding the ID practices in Louisiana.

Full-text PDF of this report is available for free download from

https://www.ltrc.lsu.edu/pdf/2008/FR_420.pdf



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Item 7

Modeling Hurricane Evacuation Traffic: Development of a Time-Dependent Hurricane Evacuation Demand Model

LOUISIANA DEPARTMENT OF TRANSPORTATION

FHWA/LA.408 • 2006

Little attention has been given to estimating dynamic travel demand in transportation planning in the past. However, when factors influencing travel are changing significantly over time – such as with an approaching hurricane – dynamic demand and the resulting variation in traffic flow on the network become important. In this study, dynamic travel demand models for hurricane evacuation were developed with two methodologies: survival analysis and sequential choice model. Using survival analysis, the time before evacuation from a pending hurricane is modeled with those that do not evacuate considered as censored observations. A Cox proportional hazards regression model with time-dependent variables and a Piecewise Exponential model were estimated. In the sequential choice model, the decision to evacuate in the face of an oncoming hurricane is considered as a series of binary choices over time. A sequential logit model and a sequential complementary log-log model were developed. Each model is capable of predicting the probability of a household evacuating at each time period before hurricane landfall as a function of the household's socio-economic characteristics, the characteristics of the hurricane (such as distance to the storm), and policy decisions (such as the issuing of evacuation orders).

Three datasets were used in this study. They were data from southwest Louisiana collected following Hurricane Andrew, data from South Carolina collected following Hurricane Floyd, and stated preference survey data collected from the New Orleans area.

Based on the analysis, the sequential logit model was found to be the best alternative for modeling dynamic travel demand for hurricane evacuation. The sequential logit model produces predictions which are superior to those of the current evacuation participation rate models with response curves. Transfer of the sequential logit model estimated on the Floyd data to the Andrew data demonstrated that the sequential logit model is capable of estimating dynamic travel demand in a different environment than the one in which it was estimated with reasonable accuracy. However, more study is required on the transferability of models of this type, as well as the development of procedures that would allow the updating of transferred model parameters to better reflect local evacuation behavior.

Full-text PDF of this report is available for free download from

https://www.ltrc.lsu.edu/pdf/2008/fr_408.pdf



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Item 8

Handbook of Scour Countermeasures Designs

NJ DOT

FHWA-NJ-2005-027 • 2007

Scour critical bridges throughout New Jersey are retrofitted using different standards for countermeasures, depending on the bridge ownership. This handbook has been prepared with a goal to provide a unified guideline for design of scour countermeasures for both new and old bridges in New Jersey to city, county, and state engineers and bridge structural consultants. All important aspects specific to scour conditions in New Jersey have been identified through an in-depth review of NJ-DOT Phase II inspection reports of scour critical bridges. A detailed review of all available resources on scour countermeasure design, including HEC 11, 18, 20, and 23, CIRIA Manual (2002), NCHRP 24-07 report, scour countermeasures drawings by Maryland State Highway Administration and numerous research articles on scour countermeasure design, has been carried out to recommend effective countermeasures suitable to river conditions in New Jersey. Guidelines proposed for selected countermeasures are based on their effectiveness during past applications around the world, physical tests and the best design practice followed in the subject area. The handbook presents comprehensive guidelines on all aspects of various scour countermeasures, including constructability and environmental constraints specific to New Jersey. The design guidelines presented in this handbook supplement Hydraulic Engineering Circular and have been developed with an aim to provide the engineers all important aspects of scour countermeasure design for New Jersey conditions in a collective and systematic manner. The engineers should refer to specific HEC in case of more detailed information on specific aspects of scour countermeasure design discussed in this manual.

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<http://www.state.nj.us/transportation/refdata/research/reports/FHWA-NJ-2005-027.pdf>

Item 9

Portable Sign Crash Test

PA DOT

FHWA-PA-2007-023-510401-07 • 2008

Portable sign post structures currently in use by the Pennsylvania Department of Transportation, supporting signs less than 36 inches square at heights of 7 ft off the ground, are assembled using varying techniques and materials and do not meet crash testing standards established in NCHRP 350. This project was performed to review available crash-tested portable sign post structures and, based on this review, design and crash test a new model to meet the NCHRP 350 criteria and establish a standard PennDOT support design protocol. The objectives of the project were to: (1) search available literature to establish the state of the art for portable sign post structures in the United States for further study; (2) perform numerical modeling of selected sign posts' designs to present optimal designs for crash testing according to NCHRP 350; (3) develop a crash testing plan for sign posts recommended by PennDOT and have the plan approved by relevant PennDOT personnel; and (4) perform crash tests of selected sign post designs, report on the findings of the crash tests and develop standard drawings.

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<http://www.mautc.psu.edu/docs/PSU-2006-04.pdf>



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Item 10

Guidance on Environmental Documentation for Texas Rail Projects

TEXAS DEPARTMENT OF TRANSPORTATION (TXDOT)

MS 3136 • 2008

In order to meet the growing transportation demands of Texans in the 21st Century, the Texas Department of Transportation (TxDOT) is planning and developing multimodal transportation corridors. In June 2003, the Texas Legislature recognized the need for a multimodal emphasis in transportation planning. HB 3588 provided TxDOT with the authority to acquire, finance, construct, and maintain rail facilities. HB 3588 also directed TxDOT to determine if the department should acquire rail services proposed for abandonment.

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http://www.txdot.gov/publications/environmental_affairs/txrail.pdf

Item 11

Texas NAFTA Study Update: Final Report

TEXAS DEPARTMENT OF TRANSPORTATION (TXDOT)

MS 3137 • 2007

Texas has always been the principal gateway for trade between the United States and Mexico. In 1994, the North American Free Trade Agreement (NAFTA) was implemented between these historic trading partners, ushering in a new era of growth, and elevating the importance of the Texas highway and rail systems. Today, the Texas transportation system continues to be the single most important infrastructure link between the economies of the United State and Mexico. In 2003, the Texas highway system carried more than \$196 billion in trade between the United States and Mexico, roughly equivalent to 83 percent of the value of all U.S. - Mexico trade and 10 percent of all U.S. international trade for that year. Texas is the single largest state trading partner with Mexico, and its highway system supports NAFTA-related economic growth within the State- but Texas' highway system also supports the economies of other U.S. states that use the system to access gateways with Mexico. These are important consideration for state and national policy makers when determining financial allocations to highway maintenance and expansion and one of the primary reasons that the State of Texas commissioned this report, which serves as an update to TxDOT's 1998 study "Effect of the North American Free Trade Agreement on the Texas Highway System."

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http://www.txdot.gov/publications/transportation_planning/nafta_study.pdf



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Item 12

A Texas Motor Carrier's Guide to Highway Safety

TEXAS HIGHWAY PATROL DIVISION

MS-8121 • 2006

The Texas Department of Public Safety produces this pamphlet to provide basic compliance guidance to support Federal Motor Carrier Safety Regulations (FMCSR). Our goal is to secure safe transportation of passengers and cargo on the nation's highways, through the coordinated effort of Federal and State agencies along with voluntary safety compliance by Texas motor carriers and related trade associations to: reduce commercial vehicle accidents; reduce fatalities, injuries, and property losses involving commercial motor vehicles; and reduce the occurrence of hazardous materials transportation incidents. Safety compliance translates into saved lives, decreased injuries, and reduction of property loss.

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<http://www.txdps.state.tx.us/lw/publications/index.htm>

Item 13

Overview of State Highway Fund 0006 Revenues and Allocations, the Texas Mobility Fund, and the Texas Rail Relocation and Improvement Fund

LEGISLATIVE BUDGET BOARD

MS-8147 • 2008

This report is an overview of the State Highway Fund 0006. The Legislative Budget Board (LBB) is a permanent joint committee of the Texas Legislature that develops budget and policy recommendations for legislative appropriations for all agencies of state government, as well as completes fiscal analyses for proposed legislation. The LBB also conducts evaluations and reviews for the purpose of identifying and recommending changes that improve the efficiency and performance of state and local operations and finances.

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http://www.lbb.state.tx.us/Other_Pubs/Overview_Highway_Fund_0508.pdf