



Research Digest

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In this Issue:

Southwest Region University Transportation Center (SWUTC) Reports

Table of Contents

Item 1. Protecting and Preserving Rail Corridors Against Encroachment of Incompatible Uses (SWUTC/08/0-5546-1)	1
Item 2. A Review of Warm Mix Asphalt (SWUTC/08/473700-00080-1)	1
Item 3. Addressing Cargo Security with Strategies Involving Private Sector (SWUTC/08/473700-00095-1)	2
Item 4. Compendium of Student Papers: 2008 Undergraduate Transportation Scholars Program (SWUTC/08-476660-00003-1)	2
Item 5. Who Uses Toll Roads? An Analysis of Central Texas Turnpike Users (SWUTC/08-476660-00065-1)	3
Item 6. Toward a Green Campus: A Transportation Strategy for Texas A&M University (SWUTC/09/167174-1)	3
Item 7. Transit Services for Sprawling Areas with Relatively Low Demand Density: A Pilot Study in the Texas Border's Colonias (SWUTC/09/167177-1)	4
Item 8. Private Sectors's Role in Public School Facility Planning (SWUTC/09/167263-1)	4
Item 9. Future Travel Demand and Its Implications for Transportation Infrastructure Investments in the Texas Triangle (SWUTC/09/167276-1)	5
Item 10. The U.S.-Brazil-China Trade and Transportation Triangle: Implications for the Southwest Region (SWUTC/09/167861-1)	5
Item 11. Design-Build Agreements: A Case Study Review of the Included Handover Requirements (SWUTC/09/167866-1)	6
Item 12. Analysis of Texas Biofuel Supply Chains Originating in the United States and Brazil (SWUTC/09/169201-1)	6
Item 13. Computer Simulation-Based Framework for Transportation Evacuation in Major Trip Generator (SWUTC/09/473700-00057-1)	7



Research Digest

Item 1

Protecting and Preserving Rail Corridors Against Encroachment of Incompatible Uses

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

SWUTC/08/0-5546-1 • 2008

Rail Corridor preservation and planning for the purpose of reducing or restricting incompatible development is an area of growing importance. This report provides an overview regarding encroachment and the elements that contribute to potentially incompatible development along rail corridors. The report reviews the legal tools that currently exist within Texas for corridor preservation and provides recommendations for new legislation, including draft legislation. The report then reviews the state of practice of corridor planning and preservation with mitigation against encroachment both in Texas and in selected other states around the country. The report pays special attention to incidents in which rail corridors are envisioned to host both freight and passenger services and the implications on land use. Finally, the report provides a review of costs associated to deal with encroachment, whether by planning, preservation, collaboration, or mitigation.

Full-text PDF of this report is available for free download from
<http://swutc.tamu.edu/publications/technicalreports/0-5546-1.pdf>

Item 2

A Review of Warm Mix Asphalt

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

SWUTC/08/473700-00080-1 • 2008

Warm Mix Asphalt (WMA) technology, recently developed in Europe, is gaining strong interest in the US. By lowering the viscosity of asphalt binder and/or increasing the workability of mixture using minimal heat, WMA technology allows the mixing, transporting, and paving process at significantly lower temperature. Using this new technology, asphalt mix can be produced as much as 100°F lower than traditional hot mix asphalt (HMA). Several benefits of lower mixing and compaction temperature include: less emission, savings in energy cost, longer construction season, less odor, and construction during non-peak periods. Despite the apparent benefits, some researchers are concerned about the long-term performance of this new mixture. In last few years, dozens of field test sections have been constructed through out the USA using different WMA technologies. It is too early to report the performance; but so far, no negative performance has been reported in the literature. In the last few years, several large national and state level research projects have been initiated to evaluate, validate, and implement this new technology.

This report documents the results of a comprehensive review of worldwide information dealing with the following issues as related to warm mix asphalt: Current state of the art/practice of WMA; cost and benefits of WMA technology; plant modifications to accommodate WMA; mixture design; durability and performance; performance related testing; quality control; specifications; and construction guidelines.

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Item 3

Addressing Cargo Security with Strategies Involving Private Sector

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

SWUTC/08/473700-00095-1 • 2008

The public and private sectors contributing to goods movement agree that cargo security has not been addressed nearly as much as physical and vessel security. Addressing cargo security will require additional operational data that is not currently used in public sector security analysis and decision making. The two strategies presented to acquire operational data are freight advisory councils and cargo data collection portals that have been developed by Horizon Services Group. The report identifies four steps that freight advisory councils could implement to improve coordination for cargo security and provides an overview of the cargo data collection portal as envisioned by Horizon Services Group.

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<http://swutc.tamu.edu/publications/technicalreports/473700-00095-1.pdf>

Item 4

Compendium of Student Papers: 2008 Undergraduate Transportation Scholars Program

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

SWUTC/08/476660-00003-1 • 2008

This report is a compilation of research papers written by students participating in the 2008 Undergraduate Transportation Scholars Program. The ten-week summer program, now in its eighteenth year, provides undergraduate students in Civil Engineering the opportunity to learn about transportation engineering through participating in sponsored transportation research projects. The program design allows students to interact directly with a Texas A&M University faculty member or Texas Transportation Institute researcher in developing a research proposal, conducting valid research, and documenting the research results through oral presentations and research papers.

The papers in this compendium report on the following topics, respectively: 1) selecting warning signs using decision theory and systems engineering concepts; 2) estimating corridor travel time from arterial traffic volume; 3) evaluating the effectiveness of life cycle variables in travel demand modeling; 4) estimating cross median crashes on horizontal curves; and 5) driver workload and visual studies.

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Item 5

Who Uses Toll Roads? An Analysis of Central Texas Turnpike Users

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

SWUTC/08/476660-00065-1 • 2008

The report characterizes with the greatest detail both the passenger and commuter users as well as non-users of the Central Texas Turnpike System recently opened in November 2006 in Austin, TX. The process of analysis includes a review of literature of other tolling facilities in the nation, where focus is given on studies of similar nature regarding demographics of users both among passenger and commercial motorists. This background study also touches on the general environmental justice impacts of tolling facilities. The report continues by using survey data taken both prior to and after the construction of the turnpike system in regards to preference and usage by local residents. The last portion of the report concerns the analysis of actual transaction data from the Central Texas Turnpike System – where transactions are linked to account type, axle count and billing zip code. This actual data coupled with the stated preferences of the surveys provides a detailed look into the characteristics of a typical toll road user in the Central Texas area. These findings are presented and discussed in detail.

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Item 6

Toward a Green Campus: A Transportation Strategy for Texas A&M University

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

SWUTC/09/167174-1 • 2009

This research study produces a recommended sustainable transportation implementation plan for Texas A&M University (TAMU) to enhance the environmental performance of its campus transportation system. To achieve the goal, this study followed a historical design approach using existing documents and materials, along with the knowledge gained from interviews with campus transportation services and from site visits to a selected sample of universities whose size characteristics are similar to TAMU and who have successfully implemented sustainable transportation strategies. A series of data collection efforts was also conducted to provide a general picture of parking usage and parking users at TAMU.

The recommended implementation plan consists of an organizational framework of a sustainable campus transportation system as well as a series of specific strategies addressing different elements of such a system. It is concluded that TAMU needs to shift its approach to campus transportation from the current practice of providing to an approach based on controlling single-occupancy vehicular traffic to campus and improving its alternative transportation options, such as walking, biking, and transit.

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Item 7

Transit Services for Sprawling Areas with Relatively Low Demand Density: A Pilot Study in the Texas Border's Colonias

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

SWUTC/09/167177-1 • 2009

The colonias along the Texas-Mexico border are one of the most rapidly growing areas in Texas. Because of the relatively low-income of the residents and an inadequate availability of transportation services, the need for basic social activities for the colonias cannot be properly met. The objective of this study is to have a better comprehension of the status quo of these communities, examine the potential demand for an improved transportation service as well as evaluate the capacity and optimum service time interval of a new demand responsive transit “feeder” service within one representative colonia, El Cenizo. We present a comprehensive analysis of the results of a survey conducted through a questionnaire to evaluate the existing travel patterns and the potential demand for a feeder service. The results from the subsequent simulation analysis showed that a single shuttle would be able to comfortably serve 150 passengers/day and that the optimal headway between consecutive departures from the terminal should be between 11-13 minutes for best service quality. This exploratory study should serve as a first step towards improving transportation services within these growing underprivileged communities, especially for those with demographics and geometry similar to our target area of El Cenizo.

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<http://swutc.tamu.edu/publications/technicalreports/167177-1.pdf>

Item 8

Private Sector's Role in Public School Facility Planning

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

SWUTC/09/167263-1 • 2009

This report explores the role of private consultants in the school facility planning process. It focuses on such issues as school siting and local government and school district collaboration. As such, it seeks to demonstrate the importance of the school facility planning process and its significance in the community. The primary data for this report is in-depth interviews with a variety of school facility planning consultants. The questions asked in the interviews were broad and open-ended, and the data was studied qualitatively to determine similar experiences of all interview participants. The conclusion of this report presents key findings from the interviews, as well as from background information on the subject.

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Item 9

Future Travel Demand and Its Implications for Transportation Infrastructure Investments in the Texas Triangle

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

SWUTC/09/167276-1 • 2009

This study takes a megaregion approach to project future travel demand and choice of transport modes in the Texas Triangle, which is encompassed by four major metropolitan areas, Dallas-Fort Worth, Houston, San Antonio, and Austin. The model was developed based on three behavioral characteristics of human travel. First, as income grows, demand for more and faster mobility increases. Second, on average, individuals allocate 1-1.5 hours per capita per day for travel. Third, people allocate 10-15% of per capita personal income for transportation related expenses.

Measured by person-kilometers of travel (PKT), the total mobility demand in the Triangle region is projected to grow nearly four times from 480 billion in year 2000 to 1.8 trillion in year 2050. Per capita PKT is expected to increase from 32,700 to 61,000 for the same time period. The projections show that more than 70% of the year 2050 travel demand likely comes from highspeed travel at 600 km per hour. The study results call for serious consideration of investing in high-speed travel in the form of High Speed Rail (HSP) now in order to accommodate the future travel demand in the Triangle Region.

Full-text PDF of this report is available for free download from
<http://swutc.tamu.edu/publications/technicalreports/167276-1.pdf>

Item 10

The U.S.-Brazil-China Trade and Transportation Triangle: Implications for the Southwest Region

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

SWUTC/09/167861-1 • 2009

The advent of globalization and more integrated international trade has placed increased demands on transportation infrastructure. This report assesses the impacts of triangular trade between and among the United States, Brazil and China with an emphasis on the effects on the U.S. Southwest region. Triangular trade is viewed through a trade corridor analysis of the three sets of bilateral trading relationships. Special emphasis is given to the transportation services that delimit the capacity to carry out triangular trade with particular attention to the latest developments in services and schedules. While international trade trend analysis may point to China's explosive consumption of raw materials from the U.S. and Brazil, this report also signals the increasing Chinese presence in the U.S. and Brazil via outsourcing and industrialization, crowding out U.S. and Brazilian domestic industry, and inhibiting Brazilian competitiveness in the U.S. Notwithstanding these trends, a counterflow or reverse globalization is also beginning to appear where Brazil and China are making investments in each other and the U.S. in order to secure their raw materials and access consumer markets. Future analysis of transportation infrastructure demand in the U.S. Southwest region may need to be flexible to account for these developments, first visible through a trade corridor analysis of the movement of goods across complete supply chains.

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Item 11

Design-Build Agreements: A Case Study Review of the Included Handover Requirements

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

SWUTC/09/167866-1 • 2009

Road infrastructure is a key component of any region's transportation system. It allows unprecedented levels of mobility, accessibility, and economic growth. On the other hand, the cost associated with inadequate road infrastructure can amount to billions of dollars.

In the U.S., the largest revenue source for the funding of transportation infrastructure is the federal and state fuel taxes. These taxes were conceived in the 1950s as an indirect charge to recover the costs of vehicle travel on the U.S. highway system. However, this tax has not increased with the inflation rate and given increasing maintenance and construction costs, and more fuel efficient vehicles, the vehicle per mile tax has become inadequate. State budget shortfalls affect the ability to maintain existing facilities properly and may lead to delayed maintenance which in turn may reduce the lifespan of roads, bridges, ports, and other infrastructures.

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Item 12

Analysis of Texas Biofuel Supply Chains Originating in the United States and Brazil

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

SWUTC/09/169201-1 • 2009

This 2009 study, funded by the Southwest Region University Transportation Center, investigates competing ethanol supply chains terminating in the State of Texas. Midwest corn ethanol and Brazilian sugarcane ethanol constitute two sources of the biofuel necessary for synthesis of the ten percent ethanol, ninety percent gasoline fuel blend, commonly referred to as E10. The updated 2007 Renewable Fuel Standard passed by Congress and signed into law by President George W. Bush in December 2007, promotes national availability of E10. As a follow up to the 2008 Bioenergy and Alternative Fuels Scoping Study, this report discusses the requisite equipment, time, and costs to transport ethanol to the Lone Star State from its Midwestern or Latin American sources. Federal biofuels policy along with new transportation technology, such as pipeline movement of renewable fuels, will largely determine whether domestic or international ethanol is more economically competitive in six Texas fuel markets. If Congress chose to repeal the \$0.54 per gallon domestic ethanol offset tariff, sugarcane ethanol pipelined inland from the coast could be more competitively priced than the corn variety as far west as the El Paso metropolitan area.

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Item 13

Computer Simulation-Based Framework for Transportation Evacuation in Major Trip Generator

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

SWUTC/09/473700-00057-1 • 2009

Since emergencies including both natural disasters and man-made incidents, are happening more and more frequently, evacuation, especially transportation evacuation, is becoming a hot research focus in recent years. Currently, transportation evacuation study focuses on evacuating people and property from large areas and does not address the problem of transportation evacuation in a small and dense area. This research is intended to identify the study framework of developing transportation evacuation plans in small and dense areas. Texas Medical Center (TMC), Houston, Texas, is selected as case study in this thesis. Incidents are assumed based on potential threats. Traffic information is collected through filed data collections in the TMC area, and evacuation scenarios with incidents and management improvements are coded and simulated in VISSIM, a microscopic traffic simulation model. Genetic Algorithm is one of the calibration methods for searching multiple parameters at the same time and is used in this thesis to calibrate parameters of driving behaviors in VISSIM by using field collected and simulation data. Based on the simulation results, potential improvements and measurement of effectiveness (MOE) of operations such as Reversed Lane (RL) and In-bound Shuttle (IS) are analyzed and evaluated. Simulation results show that the evacuation would be much more efficient if appropriate operational strategies are implemented. Proper management improvements such as Reversed Lane and In-bound Shuttle could greatly maximize the number of persons/vehicles evacuated in the area. The selected operational plan can efficiently evacuate all persons in the Texas Medical Center in suitable simulation scenario under a given incident assumption. The framework of developing transportation evacuation plan is tested and proven to be effective in the Texas Medical Center. The microscopic simulation based study process is targeted on small and dense areas and it can be used in any other similar areas. It is recommended that further work be conducted to form a comprehensive evacuation plan.

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