

TEXAS TRANSPORTATION

Researcher

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PAGE 2 *Railroad crossing disaster averted*

PAGE 3 *Governor signs transportation bill*

MULTIMODAL TRANSPORTATION SYSTEM

TTI research helps avert railroad crossing disaster

“Had it not been for the railroad monitor and quick actions by the communications personnel, this situation could have been not only devastating but possibly fatal. The railroad monitor installed by TxDOT and TTI proved to be invaluable, and avoiding this incident more than paid for any expenses incurred in this project.”

David Spilman, public safety communications supervisor, Sugar Land Police Department

Early on the morning of July 23, a truck hauling sodium hydroxide stalled on a highway-rail grade crossing in Sugar Land, Texas. Thanks to a new rail monitoring system, police dispatchers were immediately able to see that

a train was approaching the grade crossing at 44 miles per hour. The police dispatcher immediately alerted the railroad and police units to the situation. Dispatchers continued to monitor the train's location and speed as it drew closer to the disabled truck. Alerted in part by flares placed on the railroad tracks, the train crew was able to safely stop the train before a collision occurred.

The research that developed the warning system was sponsored and deployed by the Texas Department of Transportation (TxDOT) through a joint effort involving the Texas Transportation Institute (TTI) Houston Office and TransLink®, the intelligent transportation systems (ITS) research program at TTI. The Sugar Land rail monitoring implementation was funded under the ITS Priority Corridor Program. According to TTI Director Herb Richardson, “This example demonstrates the meaningful return on the investment of state and federal funds in transportation research. Support from the Texas Congressional delegation was critical in securing funding for TransLink® and the ITS Priority Corridor Program.”

Using the train detection/projection system developed by TransLink®, the Houston Office of TTI created a kiosk-based graphic display of train location and downstream arrival projections for use by City of Sugar Land fire and police. Wireless communications via cellular digital packet data (CDPD) connect field equipment to TTI's central system. The monitored railroad segment is 6.4 miles long and covers the immediate area around Sugar Land.

Kiosks displaying real-time train status and arrival-time projections are provided at two fire stations and at the police/fire communications center. According to Gene Goolsby, the TTI project manager, “This project is an excellent example of migrating TransLink® research to meaningful implementation. The near miss of July 23 dramatically demonstrates its value as a safety tool.”



Thanks to the rail monitoring system, police dispatchers were informed of an approaching train in time to remove a stalled vehicle.

Sodium hydroxide carried by the stalled truck is classified as an extremely hazardous chemical, and any possibility of a spill would have required a full evacuation of the area. Law enforcement officials say the warning system was the key to preventing a major and potentially fatal disaster.

“This incident illustrates both the benefits of transportation research and the team work needed to transfer research results into practice,” notes Gary Trietsch, district engineer for the TxDOT Houston District. “The involvement of all groups in sponsoring the research, supporting the field installation, and responding quickly to the available information contributed to stopping the train before it reached the stalled truck.” **R**

The railroad monitor is available to the public at <http://traffic.tamu.edu/rail/>.

Governor Perry signs transportation legislation at TTI

Texas Governor Rick Perry visited the Texas Transportation Institute's (TTI) Gibb Gilchrist Building on June 19 to sign a landmark transportation bill: House Bill (HB) 3588. The bill was authored

by State Representative Mike Krusee of Round Rock and sponsored in the Senate by Senator Steve Ogden of College Station. During his remarks at the signing, Ogden referred to the bill as "one of the greatest economic development efforts that our state has ever seen."

The bill contains many components relating to the construction, acquisition and financing of transportation facilities with the goal of improving transportation in the state. The bill will also enact the Trans Texas Corridor, a multimodal network of highways, toll roads, utility lines and rail across the state.

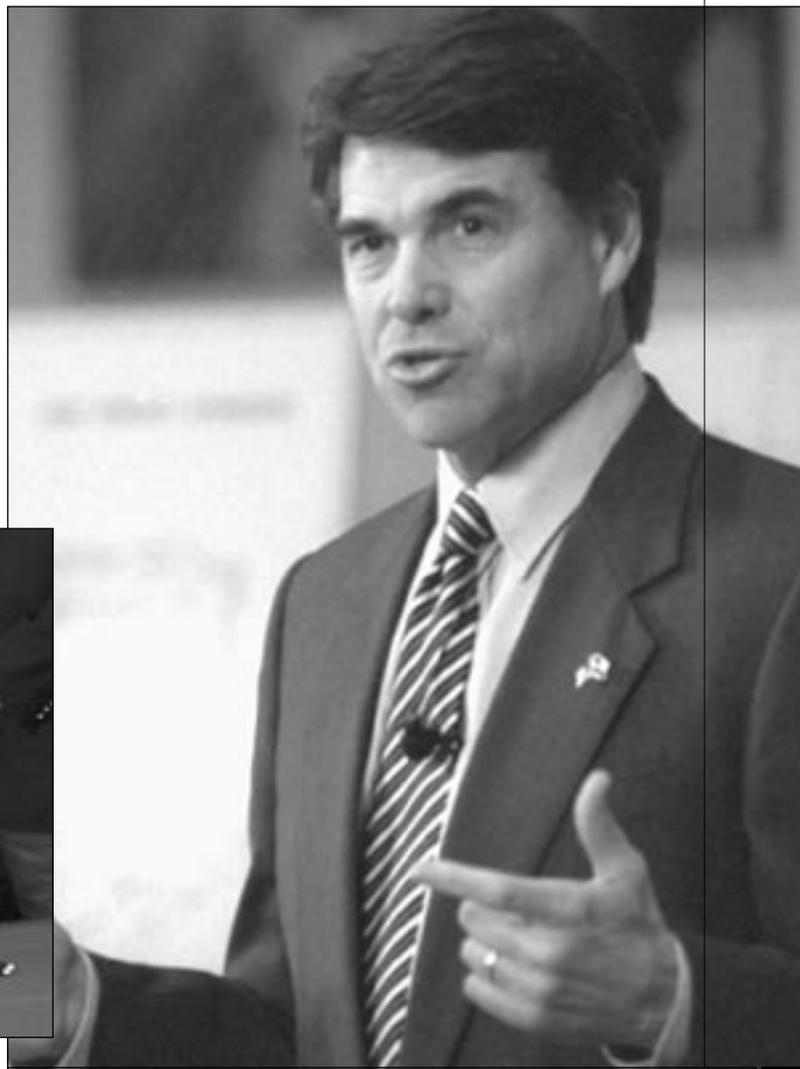
"This mobility package gives the Texas Department of Transportation (TxDOT) new oversight authority, new planning and development tools and innovative financing options to build the Trans Texas Corridor more efficiently and at a lower cost," said Governor Perry.

The legislation also earmarks funds for state trauma centers that treat traffic-related injuries. The bill is expected to raise \$1 billion over the next five years for the trauma centers by increasing fines for habitually bad drivers. Another component of the bill authorizes TxDOT to build rail lines and spurs to relieve rail congestion.

"Governor Perry is the first governor in modern times to understand the importance of investing in transportation infrastructure in this state not only for today, but for tomorrow and the future," said Texas Transportation Commissioner Ric Williamson. **R**



(L-R) Rep. Mike Krusee, Sen. Steve Ogden, Rep. Fred Brown, Gov. Rick Perry, Rep. Dianne White Delisi, Transportation Commissioner Ric Williamson.
(bottom left) Gov. Perry signs HB 3588.



TTI's Multimodal Freight Transportation Program

The Multimodal Freight Transportation Program at the Texas Transportation Institute (TTI) comprises the Center for Ports and Waterways (see page 4), Rail Research, the Association of American Railroads (AAR)

Affiliated Lab, the National Pipeline Safety Consortium and Intermodal Trucking. The program focuses on issues associated with specific freight modes as well as issues associated with the interconnection of modes.

RAIL RESEARCH

Rail Research studies, develops and applies new and emerging technologies to help solve rail industry problems. The program conducts rail-related studies for the Association of American Railroads as well as for state, national and private sponsors. The center serves as a focal point within Texas for research aimed at improving rail transportation and the interaction of rail with other transportation modes.

Researchers conduct studies into such areas as municipal freight planning, the feasibility of intercity passenger rail, multimodal investment modeling and intermodal freight movement. In addition, rail researchers are studying methods to integrate intelligent transportation systems (ITS) technologies into grade crossing safety devices, and utilize the same technology to integrate railroad information into advanced traffic management systems. The program is located at TTI's headquarters in College Station and can draw on multidisciplinary talent, including human factors, economics, structures, materials and aerodynamics. "Our goal is to produce implementable research that has immediate application in today's world," says Center Director Steve Roop.

TTI's Rail Research Program is host to the bi-annual National Highway-Rail Grade Crossing Safety Conference. This conference brings together the nation's crossing safety experts to present information on the latest innovations and technologies in grade crossing safety.

AAR AFFILIATED LAB

In 1995 AAR established an Affiliated Laboratory Program at Texas A&M University. Housed in TTI, the affiliated laboratory conducts proof-of-concept research to develop technologies that promote rail industry growth. **R**

Responding to rail industry needs with innovative solutions

As an AAR Affiliated Laboratory, TTI's Rail Research program is tied into the rail industry and the industry's primary technology focus. Projects have included:

- Development of TransDec, a software program that gives transportation planners the ability to analyze a wide range of potential projects with all the varying considerations that occur in the real world. (See page 15 in Researcher 39.2.)
- A study that addressed the potential for implementing a rail planning process in TxDOT.
- Innovative research with Harris County to explore the possibility that regional mobility could be enhanced by cooperative planning between private sector resident railroads—Union Pacific, Burlington Northern Santa Fe and TexMex—and public agencies resulting in mutually beneficial infrastructure improvement funding opportunities. (See page 6.)

2003 NATIONAL HIGHWAY-RAIL GRADE CROSSING SAFETY CONFERENCE

New Partnerships in Crossing Safety

November 2-5, 2003
Sheraton Gunter Hotel
205 East Houston Street
San Antonio, Texas 78205

Hosted by TTI's Rail Research Program and AAR Affiliated Laboratory, the nation's crossing safety experts will present information on the latest innovations and technologies in grade crossing safety. For more information regarding the conference, please contact:

REGISTRATION & EXHIBITS

ITEC—Office of Conference Management Services

P: 979-862-1219

F: 979-862-1225

Toll-free: 888-550-5577

E-mail: OCMS@tam.u.edu

PROGRAM CONTENTS

Jessica Franklin

P: 979-845-5817

F: 979-862-2708

E-mail: J-Franklin@ttimail.tamu.edu

MORE INFORMATION

Steve Roop
(979) 845-8536
s-roop@tam.u.edu



Established in 1995 by the Texas State Legislature, the Center for Ports and Waterways (CPW) is a consortium of universities staffed with experts in maritime issues who work together as a team in research, technology development and education activities. In addition to the extensive resources and capabilities of the Texas A&M University System—available through the lead agency, the Texas Transportation Institute (TTI)—CPW consortium members include:

- Lamar University
- Texas A&M University at Galveston
- Texas A&M University at Corpus Christi
- The University of Texas at Brownsville
- Texas A&M University at College Station

Researchers at these universities represent all perspectives of engineering, economics, transportation, marine biology, geosciences and other marine-related disciplines. This multidisciplinary expertise enables the CPW to develop practical and cost-effective solutions to the challenges that face the maritime industry.

In 1998, the CPW was also designated by the Maritime Administration as a National Maritime Enhancement Institute for research, technology transfer and training.

In 2001, a Multimodal Freight Transportation Program (MFTP) was formed at TTI to provide oversight and coordination among the Center for Ports and Waterways, the National Pipeline Research Center, and the Association of American Railroads (AAR) Affiliated Labs program, as well as aspects of highway freight transportation. This structure ensures that the research conducted by the CPW is integrated with other aspects of freight transportation. Port and waterway issues are analyzed within the context of a freight system, resulting in findings and recommendations that work in the real world.

The CPW's broadly based program includes research, education and technology transfer on a multitude of topics, including:

- marine and maritime technologies,
- planning and policy,
- public awareness,
- economics,
- environment, and
- virtually any research that fosters productivity and competitiveness in the maritime/marine industry.

This research is conducted at all governmental levels: local, state, regional and national. Many topics involve issues at multiple levels.

The Center for Ports and Waterways



The director of the CPW also serves as the National Ports and Harbors Specialist for Texas Sea Grant, a part of the College of Geosciences at Texas A&M University. The Sea Grant program provides additional resources for both research and outreach (technology transfer) on a national level. This unique “blending” of organizations allows the CPW to address issues from several different perspectives.

“The CPW is involved in many facets of the marine transportation industry,” says Center Director Jim Kruse. “For example, current projects include an analysis of ocean observation systems in the Gulf of Mexico, an analysis of cross-Gulf (US-Mexico) shipping ventures over the last decade and what can be done to promote their success and participation in a study of infrastructure needs for the Gulf Intracoastal Waterway. We are also involved in issues related to invasive species being transported by ballast water. The broad range of talent we have in the consortium allows us to assemble a research team that is uniquely qualified to address the issue at hand.” 

MORE INFORMATION

Jim Kruse
(713) 686-2971
j-kruse@tamu.edu



Easing the **burden** and examining the **options**

Enhancing intermodal freight movement in Texas

The Federal Highway Administration (FHWA) reports that over 15 billion tons of freight valued at \$9 trillion moved over the nation's highways in 1998. The combination of passenger and freight growth is contributing to an already

portation Program at TTI and project leader. "The increase in truck traffic results in capacity delay, pavement damage and issues involving air quality as diesel trucks in large numbers are major contributors to pollution."

With the extensive highway network connecting the major metropolitan market and with an array of intermodal and partnership solutions, the research

■ **SCENARIO ONE** ■

Improve Existing Rail Lines

The first scenario analyzes the range of investment options for identified capacity improvements along the existing rail route between Dallas and Laredo owned by Union Pacific Railroad (UP). Servicing the Interstate 35 corridor, this line represents the most significant route for international rail movements between the U.S. and Mexico. Dick Davidson, chairman and chief executive officer of the UP Corporation, states that UP currently removes the equivalent of 5,000 truckloads to and from Mexico

per day—"a rate that could easily be doubled for a significantly smaller investment of taxpayer dollars than the billions contemplated for highway infrastructure."

■ **SCENARIO TWO** ■

Utilize What's Out There

Scenario two involves examining the proposed Burlington Northern Santa Fe Railway (BNSF) trailer-on-flat-car intermodal service on its underutilized rail line between Houston and Dallas, which roughly parallels Interstate 45. BNSF believes that in the first year alone approximately 90,000

truckloads could be moved by rail instead of over highways.

■ **SCENARIO THREE** ■

Employ Non-Traditional Methods

The third scenario represents a new line of thinking about rail transport in Texas: transporting the truck, trailer and driver by rail over the El Paso-Dallas Corridor (Interstate 10/ Interstate 20). This ferry service allows the truck driver to rest while the train is in transit.

overwhelmed highway system that is experiencing skyrocketing maintenance and construction costs.

FHWA predicts that by the year 2020, Texas' key trade corridors between the major metropolitan areas and the international gateways will carry over 10,000 trucks per day. One option to remove trucks off the highway is for the private railroads to carry additional shipments, in particular intermodal shipments. However, as a capital- and labor-intensive industry, railroads are struggling to earn the cost of capital to maintain and operate their extensive networks with the current traffic levels.

The Texas Transportation Institute (TTI) is in the process of completing a project, sponsored by the Texas Department of Transportation (TxDOT), that examines strategic public investment through public-private partnerships. Such partnerships in the rail freight network in Texas could produce a means to reduce the massive investment needs of the highway network.

"This is a project that speaks to one of TxDOT's overriding concerns, which is the level of truck traffic on highways and its domination in intercity corridors," says Dr. Steve Roop, head of the Multimodal Freight Trans-

team chose to evaluate three scenarios, shown in the accompanying box.

In addition to evaluating the three scenarios, the research team is providing guidance for overcoming the challenging institutional, legal, financial and political impediments to forming effective public-private partnerships. The research team hopes that its findings will offer viable options for moving trucks off the highways and transporting freight across Texas using rail.

"If we could divert a significant percentage of freight traffic from truck to rail, it would save a lot of money on highway rehab, especially on primary routes such as I-35, I-45 and I-20 where the truck volumes are so high. It would also improve safety for truck drivers and motorists by having truckers move freight shorter distances, and reducing their fatigue," says Wilda Won, the TxDOT rail planning supervisor who is directing the project. ■

MORE INFORMATION

Steve Roop
(979) 845-8536
s-roop@tamu.edu



RELATED PROJECT: Project 0-4565, Public-Private Partnerships for Enhanced Intermodal Rail Service in Texas.

RURAL RAIL TRANSPORTATION DISTRICTS

Research improves roles and operations in Texas

Besides being a classic symbol of American industrialism, railroads in rural areas provide a critical means of transporting freight, such as agricultural goods, to larger cities. However, The Stagger's Act of 1980 deregulated the railroad

industry and paved the way for rail companies to more easily close down non-profitable rail lines in rural areas.

To counter the abandonment trend resulting from the Stagger's Act, legislation passed in 1981 allows for the creation of rural rail transportation districts (RRTDs) by a county or counties. RRTDs are districts that have the power to purchase existing rail lines that may be threatened with abandonment, to purchase and operate existing rail lines, or to build new railroad and intermodal facilities.

There were at least 16 RRTDs in Texas in 2001, but little was known on the state level about their activities, as no agency was directly responsible for their coordination.

To remedy the situation, the Texas Department of Transportation (TxDOT) asked the Texas Transportation Institute (TTI) to conduct a historical study of RRTD development in Texas and document the current status of individual RRTDs from the time they were first authorized.

"One of the things we discovered early on in the study led us to consider writing a guidebook," says Curtis Morgan, associate transportation researcher at TTI, who led the project. "We found that little information on railroad operations, including the abandonment process and costs associated with taking over a line, was available to RRTD board members."

The first year of the project, the researchers completed two products: a guidebook for formation and evaluation of RRTDs and a geographical information system (GIS) database showing the location of the state's RRTDs and its rail network. The guidebook was designed to serve as a primer on RRTDs and rail transportation that could be used by TxDOT personnel, county commissioners, newly appointed RRTD board members and others interested in learning more about the powers and duties of a RRTD and its board.

The second year of the project explored the establishment of a more formal framework or method through which TxDOT could work closely with RRTDs.

TTI's research found several factors that have prevented RRTDs from fully meeting the role envisioned for them by the state legislature when they were first authorized. The factors include:



The informational guidebooks produced by TTI researchers are designed to assist RRTDs in purchasing rail lines that may be threatened with abandonment.

- very little uniformity or consistency in the activities of the RRTDs,
- irregularly scheduled board meetings with lapsed board appointments, and
- lack of dedicated state or federal funding sources for rail line preservation and/or construction.

Besides publishing two guidebooks, the researchers have recommended that: (1) TxDOT, RRTDs and the state legislature work together for rail line preservation in the state; (2) RRTD legislation be modified/clarified; and (3) each TxDOT district appoint a RRTD liaison. **R**

MORE INFORMATION

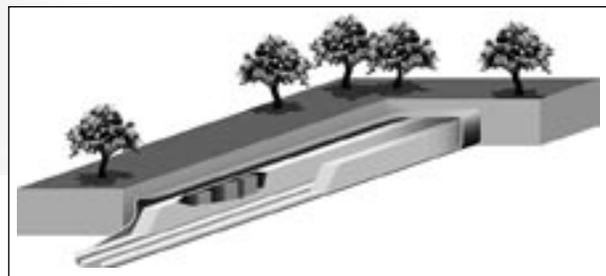
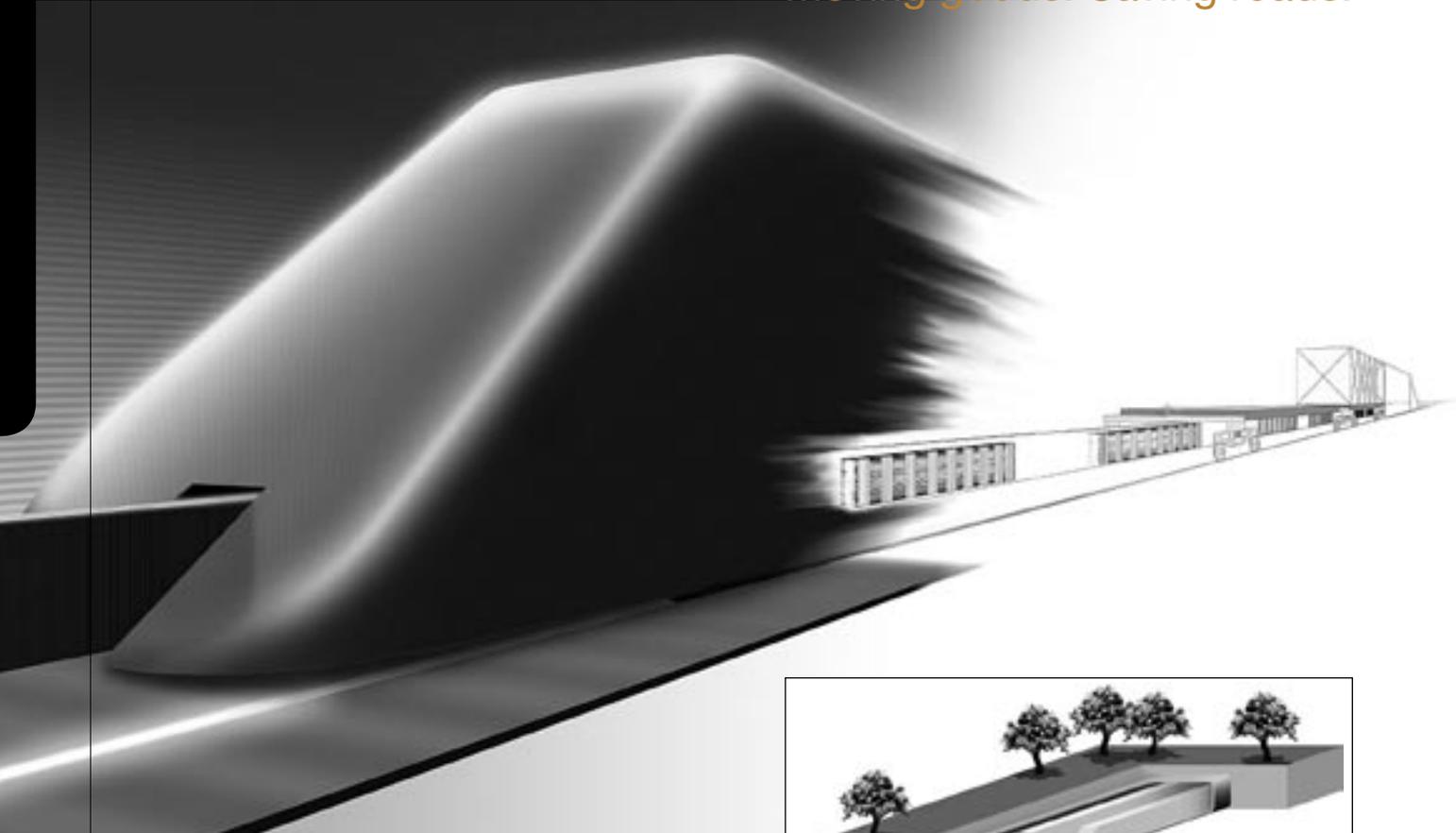
Curtis Morgan
(979) 458-1683
curtis-m@tamu.edu



RELATED MATERIALS: **Report 4007-1**, *Texas Rural Rail Transportation Districts: Characteristics and Case Studies*; **Report 4007-2**, *Texas Rural Rail Transportation Districts: New Roles and Relationships*; **Research Product 4007-P1**, *Texas Rural Rail Transportation Districts: Informational Guidebook for Formation and Evaluation*; **Research Product 4007-P2**, *Texas Rural Rail Transportation Districts: GIS Information Manual*.

THE FREIGHT SHUTTLE

Moving goods. Saving roads.



(above left) Contemporary freight shuttle concept;
(above) The initial idea was an underground freight pipeline.

What if someone developed a system for moving freight that saved money for Texas and the trucking industry, cut pollution and accidents, preserved roads and was profitable to operate? These are just some of the potential benefits that initiated research sponsored by the Texas Department of Transportation (TxDOT) and conducted at the Texas Transportation Institute (TTI) to examine an innovative freight system.

WHAT ABOUT A FREIGHT PIPELINE?

Under the direction of Steve Roop, director of TTI's Multimodal Freight Transportation Program, an old idea was re-examined with the hope of reducing highway traffic congestion and increasing the efficiency and consistency of moving freight. The original concept, called a "freight pipeline," was conceived as an automated, underground rail-type system running parallel to I-35 between Laredo and Dallas, a major corridor through

which NAFTA (North American Free Trade Agreement) truck traffic currently travels.

Like all of Texas' highways, the I-35 corridor is experiencing enormous pressure from the increasing truck traffic.

Facing costly lane repairs and expansions, TxDOT asked TTI to consider the technical and economic feasibility of a reliable, low maintenance, automated freight system.

"We think this idea might benefit both freight movers and commuters," says Michelle Conkle, TxDOT's statewide planning supervisor in the Transportation Planning and Programming Division. "Offering additional mode choices could save commuters and freight movers travel time and money. Both TxDOT and the citizens of Texas would benefit from the potential reduction of construction and maintenance impacts on our natural environment."

Roop says a primary goal of the freight pipeline concept was to offer a viable alternative to hauling palletized loads of goods on trucks, which contributes to air pollution, pavement damage and congestion and sometimes poses a safety risk.

“We want this to be a win for TxDOT, a win for the citizens of Texas, and a win for the existing freight transportation industry,” Roop says.

SO, WHAT WAS THE BIG DEAL?

TTI’s freight pipeline concept, unveiled in 2000, was a subterranean freight system. Buried just under the Texas soil, palletized freight could be moved along a steel guideway as it traveled across Texas using electric power.

THE FREIGHT PIPELINE TURNS THREE AND...

What are the problems with digging a 450-mile underground channel from the U.S./Mexico border to Dallas? Two problems existed with the underground system—the extreme expense of digging a 450-mile channel and the lack of return on investment. The high risk of exceeding an already enormous digging cost could wipe out any return on investment to the public sector. And while this system would reduce pavement damage, noise and air pollution, and roadway collisions, there is little hope for private investors to profit from these benefits to the state transportation system. Additionally, the transfer of pallets between the pipeline terminals and trucks would have required an intensive trans-loading process. So, after three years of research, the team turned to another option—an “emergence” of ideas, so to speak.

...ROLLS INTO DAYLIGHT AS A FREIGHT SHUTTLE

Following Governor Perry’s lead for a Trans Texas Corridor network, TTI and TxDOT asked: why not just move the system topside? Freight can be distributed among the state’s cities by simply placing containers on the same guideway system using the type of container cranes now used at intermodal facilities. This recommended solution, called the “Freight Shuttle,” would operate within the Trans Texas Corridor above ground, exiting the system at each major city by moving below ground en route to local truck terminals. Operating the system above ground in the Trans Texas Corridor provides similar access restrictions and security as a buried pipeline, while allowing maintenance to occur much easier. And the rate of return, according to Roop, could approach 15 percent for investors over 25 years.

So what makes this system special? Individual containers can leave the city on demand, whereas a traditional train must wait until an entire group of rail cars is assembled, which simply is not time-competitive with the trucking industry.

“The benefits to TxDOT of an above ground system are numerous,” says Conkle, “but the most apparent are improved safety on our highways and reduced mainte-

nance costs for highway infrastructure. Moving people and goods safely is paramount to our organization.”

As the freight shuttle began to show a potential for profit and the ability to attract investors, TTI researchers also brought forward the advantages and dependability of the system. Wheel bearings are the only moving part on the vehicle. Electric sensors monitor bearing heat and life, so replacements are on hand when the vehicle glides to a stop. Parts are changed and the system gets back to work. Reliability of the system soars as maintenance time plunges. It is preventative maintenance enjoying its finest hour, something railroads struggle with.

Linear induction motors, powered by a surprisingly small amount of electricity, would eliminate the negative environmental and economic costs of diesel fuel and would zip thousands of pounds of microwaves, blue jeans and more along, not just the original 450 miles from Laredo to Dallas, but the entire “Texas Triangle” (Houston-Dallas-San Antonio). Using this technology, the demand for foreign oil becomes more elastic because electricity for this system can be generated with natural gas, nuclear power, coal or even hydroelectric power.

FREIGHT SHUTTLE AND INDUSTRY

Roop says the freight shuttle could be a natural complement to trucking and railroad operations. Currently, railroads cannot compete successfully on intermodal freight shipped less than 500 miles, so this system would give them the opportunity to participate in a new market. Also, trucking companies could move intercity freight at roughly 75 percent of current costs while avoiding problems with driver shortages, collisions and truck maintenance.

NEXT STOP?

Roop says the next task is to tackle the job of publicly advocating the benefits of a freight shuttle delivering goods for less cost, with less congestion, less environmental impact, and less pavement damage than traditional trucking. Conkle agrees.

“I think the effective marketing of this concept and the support of elected officials in Texas and Washington, D.C., will be key,” says Conkle. “These are critical factors in obtaining funding to plan, construct and operate an aboveground freight shuttle.” **R**

MORE INFORMATION

Steve Roop
(979) 845-8536
s-roop@tamu.edu



This research is documented in **Report 1519-3, Year 3 Report on the Technical and Economic Feasibility of a Freight Pipeline System in Texas**. For more information about the Trans Texas Corridor see: http://www.dot.state.tx.us/ttc/ttc_home.htm.

Marketing the transportation system

Planning notebook assists transportation agencies with market research

Selling transportation services like cereal, computers, movies and automobiles? Well, not exactly, but the use of market research is becoming more widespread among state departments of transportation, transit agencies and other public organizations.

These agencies are using a variety of market research techniques to better understand public perceptions about their products and services, to enhance performance monitoring and accountability and to match services to available resources. "Market research has become a key element of our business philosophy," notes Karla Rains, director of market research for the Minnesota Department of Transportation.

To help guide these efforts, the National Cooperative Highway Research Program (NCHRP) sponsored the development of a *Transportation Planning Research Notebook* for the American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on Research.

Texas Transportation Institute researchers developed the notebook as part of an NCHRP quick-response study.

The notebook focuses on market research techniques appropriate for application in transportation planning, policy making and performance monitoring. Techniques presented include:

- background research,
- focus groups,
- general interviews, and
- telephone, mail, intercept and online surveys.

The notebook describes each technique, highlights examples of use by transportation agencies, and provides follow-up contact information.

"We initiated an ongoing customer tracking assessment in 1997 using focus groups and telephone surveys," notes Dave Huft, research engineer for the South Dakota Department of Transportation. "We have continued these efforts every two years. The results are vital to our strategic planning process and performance measure initiatives. We were pleased to share our experience in the notebook."

Market research helps transportation agencies track public satisfaction levels, develop long-range plans, forecast travel patterns and analyze alternative improvements. These efforts are helping agencies focus on key services, reduce costs and plan for future investments.

"This notebook is a great help for transportation professionals interested in using market research," says Darwin Stuart, manager of market research at the Chicago Transit Authority. "Market research is very important in attracting new riders to transit and retaining current passengers. The notebook provides guidance for using a variety of techniques appropriate to all transportation agencies."

"Market research will continue to play an important role in helping transportation agencies focus on key products and services," says Rains. "Sharing information on the use of market research in the notebook benefits us all." 



MORE INFORMATION

Katie Turnbull
(979) 845-6005
k-turnbull@tamu.edu



The *Transportation Planning Market Research Notebook* is available from AASHTO.

COMPLYING WITH EASE

Manual puts transit managers in touch with the information they need

Thanks to research and development of an environmental compliance manual for small and rural transit operators, thumbing through endless environmental regulations and searching bulky environmental websites is almost a thing of the past. Environmental compliance, such as properly storing oil and other petroleum products in storage tanks, is one of the many responsibilities facing transit managers. Small and rural transit managers are often faced with wearing too many hats and juggling a wide variety of other responsibilities, so time is limited.

The Texas Department of Transportation (TxDOT) began looking for a way to put the most critical environmental information at the fingertips of busy managers and therefore give these transit operators the best opportunity for compliance. John Overman, an associate research scientist at the Texas Transportation Institute, developed the *Environmental Compliance Manual for Small Urban and Rural Transit Systems in Texas* in May of 2001. This year marks the first in a series of updates for the manual.

Joe Holland, public transportation coordinator for TxDOT's Austin District, says the manual is a useful tool to help boost compliance and achieve other benefits.

"By following the guidance provided in the manual, small urban and rural transit agencies will be able to operate public transportation systems that contribute to air quality goals, minimize adverse impacts to local watersheds and provide safe environments for transit workers," Holland says.

"The key benefit for transit operators," says Overman, "is that they have a quick resource to save some of their time and to help them quickly address and manage compliance issues before they arise. Prevention is always better than curing problems."

Overman says the manual will be updated periodically and that the material will shortly be available online for downloading (see: <http://tti.tamu.edu/product/catalog/reports/1859-2.pdf>).

According to Holland environmental compliance workshops will be conducted to introduce the manual and provide a forum for discussing the challenges of environmental compliance faced by public transportation service providers. **R**

The manual is organized by the following chapters:

- Introduction to environmental compliance
- Air quality: emissions, fuels, fleets and refrigerants
- Petroleum storage tanks
- Waste management
- Pollution prevention
- Storm water management
- Toxic substance control
- Employees and environmental compliance
- CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) liability and site assessments
- Contamination
- NEPA (National Environmental Policy Act)
- Appendices listing contacts and an environmental compliance checklist



The environmental compliance manual is designed to be a quick resource for transit operators on environmental compliance.

MORE INFORMATION

John Overman
(817) 277-5503
j-overman@tamu.edu



This research is documented in **Report 1859-2**, *Environmental Compliance Manual for Small Urban and Rural Transit Systems in Texas*. Also see **Report 1859-S**, <http://tti.tamu.edu/product/catalog/reports/1859-S.pdf>.



In the future, a seamless transit system could take you wherever you want to go in Texas. Your trip could be planned as easily as you'd use any online mapping tool, and best of all you could leave the driving to someone else.

A system where technology coordinates every mode of transit from bus and rail to taxi to vanpools and carpools is at the center of research performed at the Texas Transportation Institute by Laura Higgins, an assistant research scientist. With sponsorship from the Texas Department of Transportation (TxDOT), Higgins is working to develop a system that initially links potential transit system users with online maps and telephone information to get citizens traveling from point A to point B, when they want to get there and at an affordable cost.

"Web pages like Mapquest® have become more and more popular," says Higgins. "We want to provide something like that for public transit and to help increase transit use for traveling over longer distances."

Higgins studied sophisticated systems already implemented in California as a way to connect the potential transit traveler to the many and diverse transit options available. Travelers have the option of accessing web pages or telephone services and entering the intersection or landmark they wish to travel to, the day and/or time they wish to arrive and whether they wish to bring a bike along. Information systems such as these can help transit providers fill gaps in com-

munity transportation services and attract new riders through regional coordination of services.

"One of the biggest challenges in setting up a new online or telephone system for transit coordination is gathering data on the thousands of bus stops in metropolitan areas we want to connect, like San Antonio and Austin along the I-35 corridor," Higgins says. "As a step beyond that, we're hoping to get a transit clearinghouse established northward and southward along the corridor, with the ultimate goal to encompass the whole I-35 corridor."

The initial stage of developing such a system in Texas involved studying the Austin-San Antonio corridor, the Dallas-Fort Worth area and the Laredo area. Researchers then identified transit providers, rental car companies, taxicab companies and other potential participants in a regional transportation information system.

Stakeholders were interviewed to help create a database of provider names, contact information, services provided and other operational information. The interviews and data collected helped researchers develop guidelines for creating one-stop transit information systems.

Disabled citizens, a key stakeholder group, may find that this approach to coordinating transit services helps solve the difficulties they face traveling over long distances on public transit systems—often the only source of transportation for those unable to drive.

"There's great interest in bringing the field of social services into this one-stop coordination effort," says Higgins.

As for who might administer the online and telephone-based system, it is possible that a Metropolitan Planning Organization or even TxDOT may administer it. However, the most likely option is that TxDOT will seek a third-party provider to implement and administer the one-stop service. **R**

MORE INFORMATION

Laura Higgins
(979) 845-8109
l-higgins@tamu.edu



This research is documented in **Report 4233-1, One-Stop Transit Information: Guidelines for Regional Transit Information Systems in Texas**, and **Report 4233-S, One-Stop Transit Information**.

TxDOT—Regional Toll Authority

COOPERATION & COORDINATION

Research project develops guidelines

Interest in toll roads in Texas goes back to the 1840s, when the Republic of Texas authorized the Houston and Austin Turnpike Company to build a toll road between the two communities. It was not until the 1950s, however, with the passage of the Texas Turnpike Act, that the first toll road was built in the state. The Dallas-

Fort Worth Turnpike was opened in 1957 and operated as a toll road until the 1970s when it was turned over to the Texas Highway Department upon repayment of the bonds.

While toll roads are not new in the state, there is new interest in expanding their use to address traffic congestion and mobility concerns. Legislation passed in 2001 allows for the creation of Regional

Mobility Authorities (RMAs), with authority to construct and operate toll facilities. House Bill 3588, passed this year, provides RMAs with additional authority and creates new opportunities for toll facilities.

“We have worked cooperatively with the Harris County Toll Road Authority since the 1980s,” notes Gary Trietsch, district engineer for the Texas Department of Transportation (TxDOT) Houston District. “Recently, we have been collaborating in new ways, such as the managed lanes on the Katy (I-10 West) Freeway.”

“The opportunities for new partnerships among TxDOT, toll authorities, and RMAs pointed out the need for additional guidance on these types of projects,” says TxDOT engineer Trietsch, who served as project coordinator on the research project, “Developing Guidelines for TxDOT—Regional Tollway Authority Cooperation.”

Texas Transportation Institute researchers examined the interaction between toll authorities and TxDOT on existing projects and explored new and innovative approaches being used in other states. “The results of the Texas and national case studies were used to develop a draft set of guidelines addressing all aspects of project development,” says Delvin Dennis, deputy district engineer for the Houston District and the project director.

The guidelines are divided into the following eight sections: guiding principles, planning, environmental review, funding and financing, design, construction, monitoring and evaluation, and management and operations.

“They provide guidance rather than mandating a specific approach,” notes Dennis. “The guidelines are flexible to meet the unique characteristics and needs of different parts of the state, while providing a common direction for all groups involved in toll projects.”

Workshops were held in Austin and Houston, and representatives from TxDOT, toll authorities, the Central Texas Regional Mobility Authority (CTRMA), metropolitan planning organizations, transit authorities and other groups were invited to review the draft guidelines and to provide

additional suggestions. The draft guidelines were also sent out to individuals unable to attend the workshops.

“The guidelines will benefit the Central Texas RMA as we move forward with projects,” notes Johanna Zmud, CTRMA board member. “Participating in the workshop helped ensure that the RMA perspective was included in the guide.”

“We have a great working relationship with the Dallas and Fort Worth TxDOT Districts, as well as TxDOT Divisions,” says Katie Nees, deputy director of the North Texas Toll Authority and a member of the project monitoring committee. “The guidelines will help enhance our relationship with TxDOT, especially as we deal with new opportunities.” **R**



TTI researchers examined the interaction between toll authorities and TxDOT on existing projects and explored new and innovative approaches being used in other states.

MORE INFORMATION

Katie Turnbull
(979) 845-6005
k-turnbull@tamu.edu



More information is available in **Report 4055-1**, *Developing Guidelines for TxDOT—Regional Toll Authority Cooperation and Coordination*, **Report 4055-S**, and **Product 4055-P1**, *Guidelines for TxDOT—Regional Toll Authority Cooperation and Coordination*.

Estimating freight movement in urban areas

Boat, train, truck and plane—a shipment of widgets from Japan will often travel via all these modes to get to its final destination—your neighborhood hardware store. Unfortunately, the freight traffic from the transport of commodities within and between Texas' urban areas significantly contributes to increased congestion and vehicle emissions.

Texas is experiencing high growth in passenger and freight traffic as a result of population and job growth. Also, the implementation of the North American Free Trade Agreement nearly ten years ago has increased the state's challenge to manage freight movement entering and exiting the U.S. To meet these challenges, the Texas Department of Transportation (TxDOT) develops and uses a number of different computer models in planning and implementing transportation improvement projects.

A three-year research project, conducted by a team of researchers at the Texas Transportation Institute (TTI) and sponsored by TxDOT, is working to strengthen and expand the forecasting capabilities of urban area travel demand models, so that they can examine in detail intra-urban commodity and freight movements on a multimodal level.

"In the past, as with many states, we were predicting flows of passenger cars to ease congestion," says Associate Research Scientist Juan Villa at the TTI. "It's now critical to also examine the movement of trucks hauling freight and commodities within urban areas to predict needs and plan transportation infrastructure."

It is difficult to monitor commodity movements inside and between urban areas, let alone to plan for accommodation of freight movements. The complexity in the patterns of these shipments is considerable, with multiple origins and destinations as a function of the dynamics of business practices and business locations within a geographical region. Transportation engineers are already using one of the department's

most powerful modeling tools, the Statewide Analysis Model—known as "SAM"—to predict the movement of vehicles, including those carrying freight and commodities, into and out of Texas, through, and within regions of the state.

The challenge in this research project will be to discern the complex shipping patterns and business dynamics within urban areas to enable the modeling approach to capture a process that is dynamic and ever-changing, and, at the same time, governed by market and logistical forces. The TTI research will identify and employ those key facets of freight transportation that enable a valid replication of the intra-urban flow of freight.

Essentially, the research builds on SAM's current capabilities, specifically breaking down the movement of freight flows within urban areas. "We need to determine the type of freight being moved and where it's coming from. Once entering the urban areas, where does it go, and specifically, what modes are taken?" says TTI Assistant Research Scientist Sharada Vadali.

The final product will be the development of a post-processing model to integrate the freight and commodity modeling results of the SAM into the urban area travel demand models. The models developed will be based on local urban areas' capabilities with respect to estimating and forecasting input data for travel demand modeling—to ensure practical implementation and reasonable results.

"This research will be an invaluable planning tool for inventorying and forecasting commodity movements by different modes," says Mary Owen, TxDOT's Tyler district engineer. "It will offer another means to identify statewide transportation issues and potential solutions." **R**



Population and job growth and the implementation of NAFTA are all factors that have led to increased freight movement in urban areas.

MORE INFORMATION

Juan Villa¹
(979) 862-3382
j-villa@tamu.edu

Sharada Vadali²
(979) 845-3325
s-vadali@ttimail.tamu.edu



RELATED PROJECT: Project 0-4430, A Comprehensive Commodity Freight Movement Model for Texas.



PEDESTRIAN TRAFFIC

A transportation safety and health issue

Taken a walk lately? Many of us do every day, for exercise and to relieve stress. Others might walk to work, school or to the corner store.

According to a study conducted by the U.S. Department of Transportation, 80 percent of American adults take at least one walk of five minutes or longer during the summer months. But in the past 10 years, more than 63,000 pedestrians died and more than a million others were hurt in pedestrian-vehicle crashes nationwide, despite efforts to improve safety.

Jody Naderi, a Texas Transportation Institute (TTI) researcher, recently completed the first phase of a Southwest University Transportation Center (SWUTC) study looking at ways to encourage safe pedestrian traffic along arterials.

There seems to be a definite correlation between the physical roadside environment and driver and pedestrian response. If drivers perceive the roadway is safe, it may lead to safer driving behavior. If pedestrians recognize the walkway as a safe place, it might encourage them to walk more and achieve proven health benefits.

The study is examining more than just sidewalks along the highway. It includes trails within greenways that parallel the roadway and the nature of the pedestrian network.

An important element of the study was the creation of a website containing 10-second video clips showing various pedestrian environments. After viewing an individual clip, subjects completed an online survey to help researchers understand the environmental variables that affect the nature of walking. The website also served as a reference for other pedestrian researchers.

Of the 50 case studies at six locations in the Bryan-College Station area, Naderi uncovered a single variable that encourages people to walk especially for health. That variable is called the “edge of space” or a combination of physical constructs that invite pedestrian traffic. The walkers need to perceive a well-defined “edge” or a place that was designed for them and increases their sense of safety.

The study results have been incorporated in the curriculum of Health Facility Design, Landscape Architecture and the Urban Design studios within The College of Architecture at Texas A&M University. Students researched pedestrian use, needs and pathway standards, and incorporated some of the findings into their designs.



The researchers studied the Northgate pedestrian area in College Station.

“They were able to investigate a problem and come up with a unique conclusion and then apply it to a specific design,” says Nancy Volkman, an associate professor in the Department of Landscape Architecture and Urban Planning at Texas A&M University.

“It’s been very beneficial because it was a real-life experience, and it should improve the students’ design work in their profession,” she says.

In addition to improving academics, these study results offer researchers, landscape architects, engineers and health practitioners a better understanding of the environmental variables that affect the nature of walking. **R**

MORE INFORMATION

Jody Naderi
(979) 847-8996
j-naderi@tamu.edu



PEDALING SAFETY

Giving cyclists, planners a tool for safer riding

Bicycling along roadways in Texas may put riders in touch with scenic vistas, but transportation planners and engineers at the Texas Department of Transportation (TxDOT) are far more concerned about vehicles along these roadways

getting *in touch* with cyclists. Responding to a need for increased bike safety along roadways, TxDOT included in its Texas Transportation Plan the need to develop bicycle “suitability maps” to assist cyclists in selecting safer, “bike-friendly” highways.

Headed by Shawn Turner, an associate research engineer at the Texas Transportation Institute, researchers undertook a project to gauge the suitability of roadways for cycling, using presence and/or width of bicycle facilities, vehicle traffic volumes and posted speed limits. Turner conducted a demonstration project to provide TxDOT information on the estimated cost of generating bicycle suitability maps for state highways using TxDOT geographic information systems (GIS) data.

“There are two uses for this kind of map,” Turner says. “The first use is for the cyclist who wants to ride a road in rural Texas. The map will help that rider find the state highway routes that have the lowest traffic and the widest shoulders.”

According to Turner the other primary use for a bicycle suitability map is to help engineers put an end to so-called “Visine Maps.”

“We traffic engineers tend to think of things in terms of green, yellow and red,” Turner says. “The highways shown in green on the maps are the most bicycle friendly; red roads are the least bicycle friendly. Like the Visine eye drops, we’re seeking to get the ‘red’ out of these roads. This means making transportation improvements on the roads that have the narrowest lanes or shoulders with the most amount of traffic.”

The initial suitability map project took place in TxDOT’s Bryan District, a 10-county area. Researchers gathered mapping data from TxDOT’s Transportation Planning and Programming Division (TPP) to determine highway centerlines, political boundaries, etc., and con-

tacted the Information Systems Division (ISD) for data including traffic volumes, roadway shoulder widths, and speed limits. Average daily traffic volume per lane and shoulder width were displayed on suitability maps created using GIS information, and highways were evaluated.

In the future, cyclists could access these maps and see in red, yellow and green the routes they might travel.



Approximately five percent of Texans traverse Texas roadways on bicycles.

Knowing where highways are wider and there is less traffic can help cyclists avoid riding into “red” roads.

Paul Douglas, state bicycle coordinator for TPP is positive about the work done thus far and says more suitability maps are on the horizon.

“This research has allowed TxDOT to develop our first bicycle route map,” Douglas says. “We did this for the Bryan District and we will be using what we learned to develop a map for the San Antonio District next.”

Turner says it is likely that the whole state will eventually be mapped for safer, more suitable bike routes, which is good news for the 3-5 percent of the Texas population who could use a bicycle route map for their cycling frequency and patterns.

“The largest benefit of these maps is a safety benefit,” Turner says. “These maps help cyclists find the safest routes, which reduces vehicle/bicycle crashes and saves lives.” **R**

MORE INFORMATION

Shawn Turner
(979) 845-8829
shawn-turner@tamu.edu



Airport management and pilot curriculum

Filling a need at Texas universities

It's been said that timing is everything. And this could be the worst of times or the best of times for Texas lawmakers and educators to be considering a four-year, comprehensive degree program for students seeking careers as professional pilots or in aviation management.

"We're in a period of volatility because of a slow economy, the September 11th tragedy and huge layoffs in the airline industry," says Jeff Borowiec, associate research scientist at the Texas Transportation Institute (TTI).

Borowiec is completing a two-year project sponsored by the Texas Department of Transportation (TxDOT). His research is examining aviation management and pilot training programs offered at universities across the country, as well as the issues associated with establishing a comprehensive four-year degree program at a university in Texas.

A handful of Texas community colleges and a few four-year universities offer limited educational opportunities for pilots. Students must leave the state to complete a four-year comprehensive education program.

"Our universities and community colleges have wonderful programs, but we're still fighting the notion that this is a vocational issue," Borowiec said. "There's no doubt in my mind that it's more than that because the aviation industry has grown to the level where students preparing to enter the field must learn more than maintenance and the basics of flying." The TTI project will outline a recommended curriculum as well as some additional courses that programs can add to address specialized needs. These specialized areas include such topics as air cargo, human factors, business/corporate aviation and air transport labor management.

"There's no direct path for hundreds, maybe thousands, of high school students in Texas seeking a career in aviation," says Bill Gunn, director of systems and training

in TxDOT's Aviation Division. "Hopefully this research will show lawmakers there is a need, although not huge, and present a logical, well thought out educational program that does not involve huge amounts of money. Today, there is not an immediate demand for aviation professionals. However, a four-year program started today might just be viable for the pent up demand coming when the economy recovers."

State Representative Arlene Wohlgenuth, a pilot and a flight instructor, represents two counties near Fort Worth with close ties to the aerospace and aviation industry. She sought this research because she was concerned about students leaving Texas seeking educational opportunities in neighboring states.

"Of students participating in the University of Oklahoma's aviation program, 60–75 percent come from the Dallas-Fort Worth area," Wohlgenuth says. "The aerospace industry pumps billions of dollars into the Texas economy each year, and I believe a comprehensive four-year university-based curriculum should be considered. And, it might help attract and retain students that are historically underrepresented, such as women and other minorities," she says.

Expanding current programs or building one from the ground up could cost millions of dollars. Once complete, this research will provide substantial information to interested universities, such as staffing needs, curriculum, flight equipment and facilities, as well as how to take advantage of funding should it become available. ■

...the aviation industry has grown to the level where students preparing to enter the field must learn more than maintenance and the basics of flying.

Jeff Borowiec, TTI



The TTI project will outline a recommended curriculum for students in the field of aviation.

MORE INFORMATION

Jeff Borowiec
(979) 845-5200
jborowiec@tamu.edu



Research shows rural airports are key agricultural links

AIR

A handful of rural airports serving communities across Texas are feeling the strain of an expanding agricultural market. Many were not designed to handle large fuel and chemical trucks that can weigh up to 100,000 pounds.

“We’re talking about very small airports that are seldom used,” said Jeff Borowiec, associate research scientist at the Texas Transportation Institute (TTI). “But when they do get used, we find damage to aprons, access roads and loading areas.” In certain circumstances trucks are unable to get close enough to planes to load herbicides or fertilizers needed for the survival of crops without doing damage to public infrastructure. This is a critical issue not only for crop protection but also for planting. More than 90 percent of all rice in Texas is planted by air.

TTI recently completed research sponsored by the Texas Department of Transportation (TxDOT) examining the role and needs of rural airports, so they can better serve communities where they are located. Some rural air-

ports serve not only their community but communities in the surrounding counties as well.

Just about every county in Texas has an airport. Of the estimated 300 locations, 19 are classified as rural airports. Most are located in counties where agriculture drives economic activity, and many local governments don’t have the funds to update and maintain infrastructure.

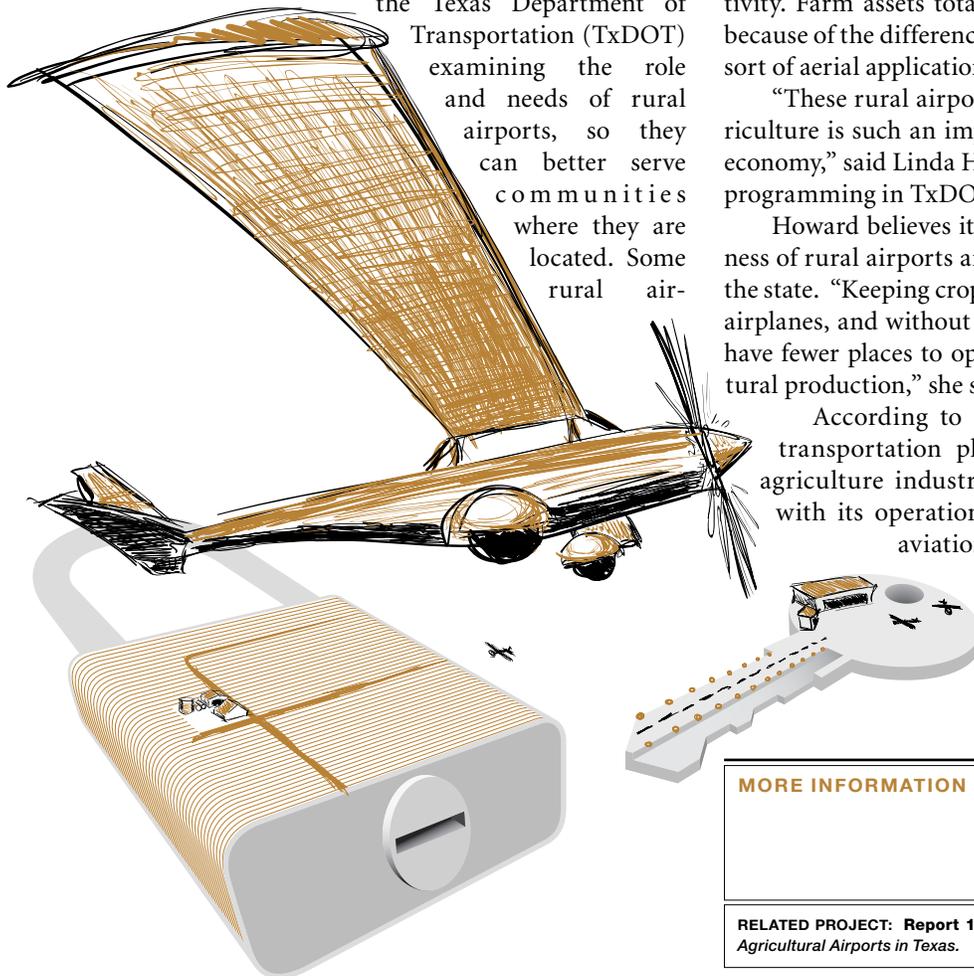
“This research has bolstered support statewide, recognizing the impact these rural airports have on the state economy,” Borowiec says. “Some counties might not have \$40,000 to improve access roads, build or improve pad sites where tanker trucks load planes for aerial application, build taxi-ways or provide aircraft tie-downs.” In some cases, once needed improvements are identified, the state can help pay for them through matching grant programs.

According to a study conducted in 1996 by the Texas Agricultural Extension Service, agriculture was responsible for more than \$44 billion dollars in economic activity. Farm assets totaled more than \$93 billion. And because of the differences in Texas climate, there is some sort of aerial application going on year round.

“These rural airports are so important because agriculture is such an important component of the Texas economy,” said Linda Howard, director of planning and programming in TxDOT’s Aviation Division.

Howard believes it’s important to create an awareness of rural airports and their specialized needs across the state. “Keeping crops viable requires the use of small airplanes, and without rural airports, the planes would have fewer places to operate, and that impacts agricultural production,” she says.

According to Borowiec, research shows how transportation planners can accommodate the agriculture industry in Texas without interfering with its operations or the operations at general aviation airports. And it points out the substantial economic loss if we neglect the needs of these rural airports. **R**



MORE INFORMATION

Jeff Borowiec
(979) 845-5200
jborowiec@tamu.edu



RELATED PROJECT: Report 1951-S, *Evaluation of the Role and Needs of Agricultural Airports in Texas.*

TTI Comings

LINDA CHERRINGTON has joined the Texas Transportation Institute (TTI) as program manager of the new Transit Mobility Program. Cherrington has an extensive background in transit planning and operations, policy analysis and public involvement.



Cherrington joins TTI after heading her own consulting firm for 17 years. She also worked for the Metropolitan Transit Authority of Harris County (METRO) for ten years, including serving as assistant general manager. Cherrington will be expanding TTI's transit research program. ■

TTI Goings

TTI bid a fond farewell to four of its employees in separate ceremonies this summer.

PENNY BEAUMONT was honored for her services on June 19 at the George Bush Conference Center. As associate director for policy and resources, Penny was responsible for the agency's state and federal legislative relations and strategy development, as well as internal and external communications, strategic planning and supervision of the Continuous Improvement process. Prior to joining TTI, Beaumont served as vice chancellor for communications and development of the A&M System, the first woman to hold vice chancellor rank in the system. Coordinating legislative communications for the 15-member A&M System was a primary responsibility in that job, as was on-going interaction with the legislative leadership in Austin and with the Texas Congressional delegation. After some extensive summer travel, which included an Alaskan Cruise, Penny returned to TTI on a part-time basis in mid-September. In her new capacity, she will assist Herb Richardson and other members of TTI's Management Team in the upcoming Legislative Appropriations Request and strategic planning processes as well as in the preparation of various presentations. Penny will also assist in the development of TTI policies and procedures. Penny and her husband Roger, professor emeritus of history, are also working a book *Invisible Empresses: The Vicereines of India*, based on research they did in the United Kingdom.



(L-R) Gordon Shunk, Ethel Bunton, George Dresser.



(L-R) Greg Mason, Kate Mason, Penny Beaumont, Roger Beaumont.

On August 11, a retirement party was held in the Gilchrist Building for George Dresser, Ethel Bunton and Gordon Shunk.

GEORGE DRESSER was a program manager for the System Planning, Policy and Environment Research Group. He joined TTI in 1968 as a research assistant. According to Richardson, Dresser "was instrumental in establishing TTI as a leader in air quality and transportation planning research." After retirement, Dresser plans on traveling and improving his skills as a philatelist.

ETHEL BUNTON was employed as lead office assistant under Dresser for 19 years. Previously she worked for the Department of Student Affairs at Texas A&M. During his remarks, Dresser thanked Bunton for her years of loyalty and hard work. Bunton plans on staying busy after retirement with traveling and taking care of her grandkids and other family members.

GORDON SHUNK was a senior research scientist for the TTI office in Arlington and manager of the Urban Analysis Program. He was director of transportation planning for the North Central Texas Council of Governments, the metropolitan planning organization for the Dallas/Fort Worth area, for ten years. His retirement plans include catching up on projects around the house, gardening, playing with his grandson and volunteer work. ■

THE BACK ROAD



Even though we have more highway miles than any other state in the U.S., Texas's transportation system is increasingly multi-modal. Freight—and sometimes even people—are likely to move across Texas through a combination of air, highway, road, rail and water transportation. Be-

cause of TTI's broad range of research expertise in roadside safety, transportation operations, ITS, transit, transportation economics and policy, rail and ports and waterways, the Institute can bring together experts from various modes as needed to address complex transportation issues. One way that synergy occurs is through our multimodal centers and divisions, several of which are highlighted in this issue of the *Researcher*. One especially intriguing project at the Multimodal Freight Transportation Program is looking at the feasibility of freight pipelines as one way to divert freight traffic from highways to alternative systems, thus conserving limited roadway capacity and extending highway life. Rail research is another area of emphasis covered in this issue. Highway safety, traffic congestion and air quality needs create an environment where railroads may play a larger role in the multimodal transportation system. TTI researchers are studying how railroads can recapture market share through public-private partnerships.

Moving people via transit rather than automobiles is another area of interest for TTI, both for urban and rural areas. Researchers are looking at ways to facilitate coordination among transit providers in three case study areas along I-35, and are helping rural public transit systems by developing an environmental compliance manual. Both projects are aimed at making it easier for transit systems to manage their systems more effectively.

As always, we welcome your comments about the *Researcher* and hope you'll contact us if you'd like additional information on any of the subjects in this issue.

Thanks for your continued interest in TTI research.

RESEARCHER

Texas Transportation Institute/Information & Technology Exchange Center
The Texas A&M University System
3135 TAMU
College Station, TX 77843-3135

RESEARCHER

TEXAS TRANSPORTATION INSTITUTE (TTI) / INFORMATION & TECHNOLOGY EXCHANGE CENTER (ITEC) • THE TEXAS A&M UNIVERSITY SYSTEM

PUBLISHER / DIRECTOR, TTI	Dr. Herbert H. Richardson
EXECUTIVE EDITOR / DIRECTOR, ITEC	Susan M. Lancaster
EDITOR	Kelly West
MANAGING EDITOR	Chris Sasser
WRITERS	Penny Beaumont Jack Hodges Dr. Katie Turnbull Chris Sasser Brandon Webb Kelly West
DESIGNER / PRODUCTION ARTIST	Marcus Overton
PHOTOGRAPHER	James Lyle
ART DIRECTOR	John Henry
COPY EDITOR / PROOFREADER	Rhonda Brinkmann

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