

TEXAS TRANSPORTATION

# Researcher

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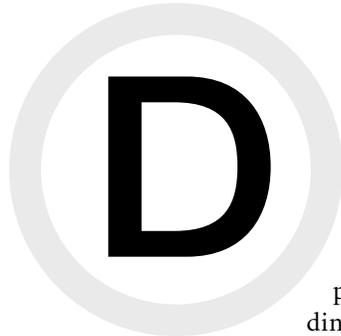


*Fifteen years of Southwest University Transportation Center* **SPECIAL SECTION**  
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## Managing **CONGESTED** **CORRIDORS**

# Highway congestion worsens

## Traffic solutions and impacts examined



Despite worsening traffic congestion nationwide, researchers at the Texas Transportation Institute (TTI) in College Station report some encouraging results from the latest Urban Mobility Study.

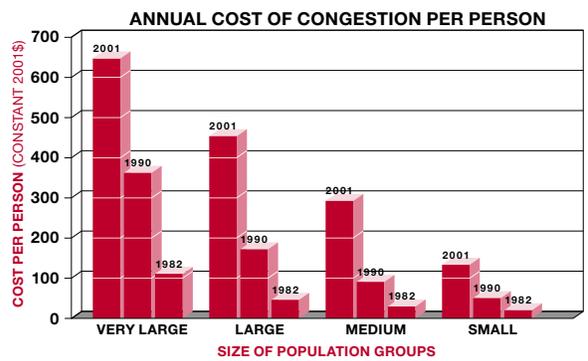
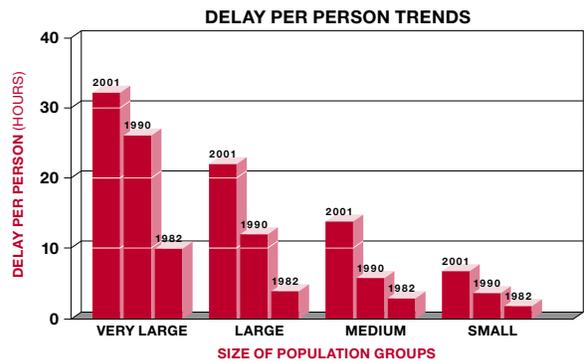
For the first time, TTI researchers measured the effectiveness of five remedies designed to keep traffic flowing. They included the use of public transportation services, bus and carpool lanes, traffic signal coordination, freeway incident management and ramp meters. According to the research, the analysis of those remedies is providing a clearer understanding of traffic congestion's magnitude and what might fix it.

"Congestion is worsening, no doubt about that, but it would be a much greater problem if not for these and other remedies," says Tim Lomax, who, along with David Schrank, compiled TTI's 2003 *Urban Mobility Report*.

The 2003 *Urban Mobility Report* was sponsored by the American Road and Transportation Builders Association's Transportation Development Foundation and the American Public Transportation Association. A consortium of 10 state transportation departments has participated in the methodology enhancements.

Traffic situations were examined in 75 urban areas measuring factors such as hours of travel delay per person and the Travel Time Index — a measure of additional time needed to make a trip during peak travel periods compared to free flow periods. The index has tripled since TTI began collecting data in 1982. A rush hour trip today takes 39 percent longer than a non-rush hour drive, meaning a 20-minute trip during the midday would take almost 28 minutes in the peak.

POP. GROUP	AVG. COST (\$)	AVG. DELAY (HOURS)	AVG. FUEL (GALLONS)
VERY LG. AREAS	650	33	52
LG. AREAS	450	23	37
MED. AREAS	290	15	24
SM. AREAS	130	7	10
75 AREA AVG.	520	26	42
75 AREA TOTAL	69.5 BILLION	3.5 BILLION	5.6 BILLION



“ Drivers in the Minnesota transportation system are asked to pay for transportation improvements through taxes and want to know what they are gaining from their investment. The Urban Mobility Study is one of the few studies that provides area-wide estimates and comparisons of urban mobility and congestion. ”

*Tim Henkel, director of the Office of Program Management, Minnesota DOT*

Illustrating the congestion-reducing effects on the national average 25-minute one-way commute time, the research revealed that a combination of all five remedies reduced the total amount of annual congestion delay per commuter from 58 hours to 50.5 hours.

Large cities aren't the only ones suffering worsening traffic congestion. Smaller cities dealing with growth are also having trouble keeping up with rising transportation demands.

“First of all, the *Urban Mobility Report* proves we can save a significant amount of time with solutions we now have available, and we can do it at a cost that's very low in comparison to what it costs to build a transportation system,” says Lomax. “But even with the widespread use of these cost-effective solutions, we need to add more capacity and manage the demand, as well as seek improvements in land development patterns.”

Operational techniques such as ramp meters, incident management and signal coordination help reduce the number of hours stuck in traffic. According to the TTI study, the contribution of these techniques lowered the average annual delay per person from 26 hours to 24 hours in 2001. If all three remedies were implemented on all major roadways in the 75 cities studied, the total travel delay would fall to 22 hours per person — a 15 percent improvement and equal to the traffic delays in 1996.

“This year's study reinforces our belief that the best solution is actually a combination of solutions with cities using their own 'bag of tricks' to fight this growing problem,” says Lomax.

“Daily commuters may notice their travel times are becoming more reliable even if the average isn't declining,” says David Schrank, who co-authored the *Urban Mobility Report*. “Had it not been for a handful of those congestion remedies, it would have been much worse.”

### THE COST OF CONGESTION

The cost of our growing traffic problems is staggering. Drivers wasted 5.7 billion gallons of fuel, or about 42 gallons per person, in the 75 areas studied. Annually, 3.5 billion hours of extra travel time can be blamed on traffic congestion. The total cost of congestion has risen to nearly \$70 billion, a rise of \$4.5 billion more than the previous year.

On a personal level, the average cost per person in the 75 cities studied was \$520, up about \$5 from the

previous study. The cost averages ranged from \$650 per person in areas with populations greater than 3 million to \$130 per person in smaller towns.

### IMPROVING DRIVING CONDITIONS

So how will the congestion study help improve driving conditions in Texas? The Texas Department of Transportation (TxDOT) funded an additional study to develop what is called the Texas Congestion Index (TCI). Working with staff from TxDOT and metropolitan planning organizations, TTI researchers developed the TCI to assist in evaluating the impact of alternative transportation improvements.

“The TCI will be a key planning tool in our urban planning process,” says David Casteel, TxDOT's San Antonio district engineer. “The congestion index is more inclusive of other modes of transportation and more robust for use in 'what-if' analysis while considering corridor planning.” As it is adapted to the TCI formula, the congestion study will become a key planning and public involvement tool, Casteel says.

### MONITORING THE TRANSPORTATION SYSTEM

The Minnesota Department of Transportation (Mn/DOT) uses the Urban Mobility Study as a way to measure, monitor and communicate the performance of their transportation system.

“Drivers in the Minnesota transportation system are asked to pay for transportation improvements through taxes and want to know what they are gaining from their investment,” says Tim Henkel, director of the Office of Program Management at Minnesota DOT. “The Urban Mobility Study is one of the few studies that provides area-wide estimates and comparisons of urban mobility and congestion.” **R**

#### MORE INFORMATION

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Complete details of the 2003 *Urban Mobility Report* can be found at the website: <http://mobility.tamu.edu>.

# Exploring toll road options in Texas

**T**oll roads are going to play an important role in the future of transportation in the state of Texas. Though toll roads are not new in the state, there is new interest in expanding their use to address traffic congestion and mobility concerns.

House Bill 3588, passed in 2003, provides new opportunities for toll facilities in the state. In response to the growing interest of using tolling to finance highway construction projects, the Texas Department of Transportation (TxDOT) is sponsoring numerous toll-related research projects. The Texas Transportation Institute (TTI) is conducting many of these studies exploring tolling options in the state.

## Credit-based value pricing

A recently completed TTI project, sponsored by TxDOT, examined the use of traveler credits as a means of helping to address transportation problems such as traffic congestion and excessive vehicle emissions. Termed credit-based value pricing (CBVP), this application involves travelers receiving an allocation of travel credits for a certain time period. Based on these predetermined factors, using a freeway or roadway would then cost the traveler different numbers of credits. These factors include:

- level of congestion,
- time of travel,
- mode of travel, and
- route chosen.

If the traveler used all of his or her allocated credits prior to the end of the period, he or she would have to purchase credits from travelers who had not used all of their credits. The cost of credits in this scenario is not fixed but rather set in a free market system similar to the stock market. “If you charge more for peak period driving in an automobile than transit use, then folks taking transit will have credits available to sell to people driving alone in the peak period,” says Mark Burris, assistant research scientist with TTI.

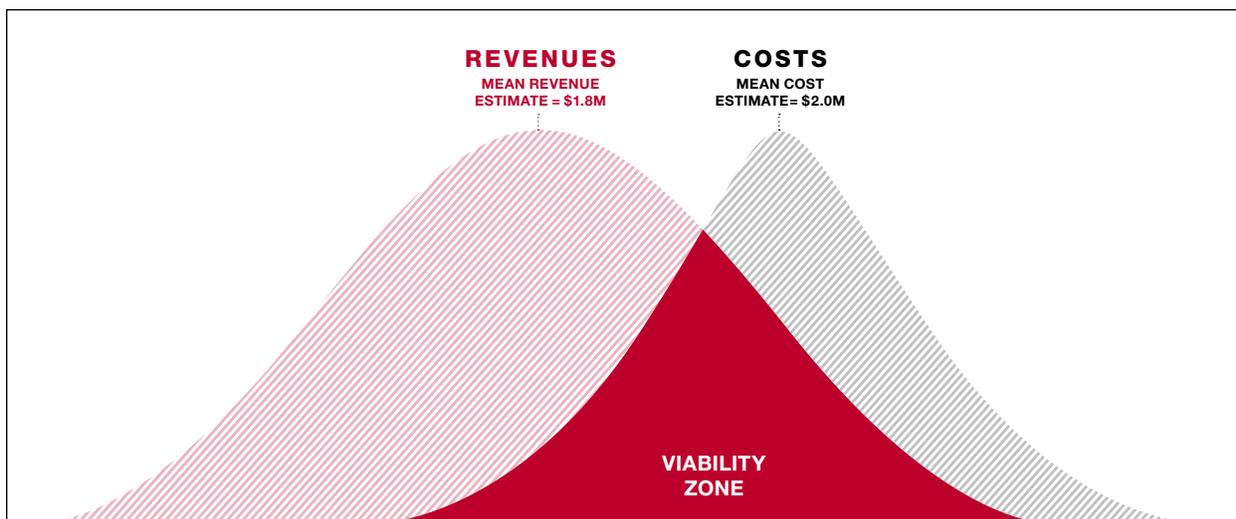
“Therefore, people have more of an incentive to use transit.”

“With the increasing traffic volumes and inability to construct highways ‘fast enough’ to meet the need, new methods like value pricing need to be researched to alleviate the decreasing capacity and level of service of our roadways,” explains Andrea Cheng, design supervisor with TxDOT and project director.

“The results of the research show that the idea is promising,” says Cheng. “The research focused on whether value pricing is feasible, which it is, but additional research will need to identify possible implementation scenarios.” ■

Possible toll display for credit-based value pricing.





Revenue projections, shown in the figure above, can be difficult to project, because they are a function of a) total future demand in the corridor, b) proportion of that demand that will divert to the tolled facility and c) the level of the toll. Thus the distribution that describes the potential range of revenue in the above figure is even broader than the cost distribution. As shown in this hypothetical description, the mean present worth of the revenues would be \$1.8 million, which is less than the \$2.0 million in cost, so in the simple form, the tolling option would be rejected. (Details such as bond sale expenses and debt coverage are assumed to be part of the distributions in this highly simplified example.)

However, in the area where the two distributions overlap, the revenues equal or exceed the costs, meaning that a toll facility might well be viable. At some point there should be enough overlap in the two distributions to suggest that it is worthwhile to improve the predictions and potentially pursue a toll project. The question is: "How does this potential overlap in revenues and costs affect a specific project?" The proposed research should answer that question.

## Development of a toll viability screening tool

Toll feasibility studies represent the first step in determining the viability of a potential project. These studies are costly and time consuming.

"The success of a toll project depends on what portion of the project costs (construction, maintenance and administration) will be covered by these revenues," says Roy Jarbeaux, TxDOT project director.

### Tolling in midsized rural districts

The common perception of toll roads is that they are generally found in congested urban areas. A new TxDOT-sponsored implementation project is focusing on the possible application of toll road technology for an urban/rural highway in Tyler, Texas, a midsized metropolitan area. The project is examining the feasibility of operating a segment of Loop 49, currently under construction, as a toll road. The Tyler District's application of toll planning is the first in a midsized urban/rural environment in the state.

"The community took this idea and said it was a perfect corridor for consideration of a toll implementation because we designed it with controlled access, grade separation and no access points," says Mary Owen, district engineer for TxDOT's Tyler District.

The project is divided into two phases. Phase one addresses planning, conceptual design, public perception and financing issues associated with toll road implementation on Loop 49. The second phase consists of using the public perception data from phase one and the public information and outreach strategies addressed in previous research to develop and publicize educational programs.

"The results of this research will also benefit other midsized/urban areas interested in toll applications," says Ginger Goodin, associate research engineer with TTI. ■

"A screening tool that will help identify viable projects is an essential first step to begin the process of partnering with regional mobility authorities (RMAs) on projects that serve the needs of their communities."

TTI is currently involved in a TxDOT-sponsored project to develop a spreadsheet analysis tool to provide a preliminary determination of the viability of a toll road or toll-supported project. The tool uses inputs typically available to TxDOT or local planning agencies. Output measures represent various aspects of viability including economic measures, such as net present value or benefit: cost ratio (see above figure).

"Predicting the financial feasibility of a toll road is something that TxDOT and most other public agencies in Texas have not had to deal with before," says Bill Stockton, associate agency director and project supervisor. "Now, all of a sudden TxDOT, RMAs and other public entities are deluged with possibilities that five years ago didn't exist because of changes in legislation." ■



“ The report is a valuable resource for transportation professionals and policy makers considering road pricing strategies. It is especially timely given the growing interest in road pricing in many parts of the country. ”

*Paul Larrousse, director of the National Transit Institute at Rutgers, the State University of New Jersey, and chair of the project panel*

## Value pricing at the national and international levels

Texas Transportation Institute (TTI) researchers are assisting with a new Transit Cooperative Research Program (TCRP) report on road value pricing. The report is part of a multiyear project documenting traveler response to transportation system changes.

“This report examines automobile-oriented pricing,” notes Stephan Parker, staff officer at the Transportation Research Board (TRB). “It documents experience with area-wide, corridor and individual facility pricing schemes within the United States and internationally.”

Richard H. Pratt with Consultant, Inc., is the lead firm on the TCRP project, “*Updating the Traveler Response to Transportation System Changes Handbook*.” John Evans of John Evans Consulting L.L.C. was the lead author of the road pricing report. TTI’s Katie Turnbull, associate director, and Kiran Bhatt of K.T. Analytics, Inc., were co-authors.

“The report is a valuable resource for transportation professionals and policy makers considering road-pricing strategies,” notes Paul Larrousse, director of the National Transit Institute at Rutgers, the state university of New Jersey, and chair of the project panel. “It is especially timely given the growing interest in road pricing in many parts of the country.”

The report presents information on the value-pricing projects in the United States and pricing programs in Norway, the United Kingdom, Singapore and other countries. The report also examines underlying traveler response factors, along with impacts on different user groups, air quality and revenues.

The road value-pricing report represents one chapter of the *Traveler Response to Transportation System Changes Handbook*. The handbook includes a total of 19 chapters that focus on the general topic areas of multimodal/intermodal facilities, transit facilities and services, public transit operations, transportation pricing, land use and nonmotorized travel, and travel demand management.

In addition to the road value-pricing chapter, TTI researchers contributed to chapters on high-occupancy vehicle facilities, park-and-ride and park-and-pool, vanpools and bus pools, transit information and promotion, and pedestrian and bicycle facilities. ■

# Taking managed lanes national

TTI assisting FHWA in managed lanes initiative

Imagine you are the director of a state transportation agency faced with the task of improving mobility on a congested freeway. Your obstacles include high construction costs, limited right-of-way, and environmental and societal impacts. If an approach were offered to you that combined capacity expansion coupled with measures that sought to manage travel demand and improve transit and other forms of ridesharing — all within the framework of the existing freeway corridor — would you be interested?

The Federal Highway Administration (FHWA), with the help of the Texas Transportation Institute (TTI), is stepping up assistance to state agencies with managed lanes projects.

“Managed lanes offer the opportunity for agencies to apply proven operational strategies to improve safety and mobility and to mitigate possible adverse impacts that may be caused by congestion,” says John Obenberger, FHWA transportation specialist. “Managed lanes will allow agencies to proactively manage and control traffic with the combination of access control, vehicle eligibility and pricing strategies that are determined appropriate for the changing roadway and traffic conditions.”

## WHAT ARE MANAGED LANES?

The theory behind managed lanes is to set aside certain freeway lanes and to use a variety of operating strategies to move traffic efficiently in these lanes. As a result, travelers have an option to avoid congested freeways. Using managed lanes can allow a transportation agency to leverage existing capacity and to move both people and goods in a more efficient manner. Because the managed lanes concept is so new, and the experience base is so small, the Texas Department of Transportation (TxDOT) began a major research project in September 2000 to examine planning, designing and operating successful managed lanes.

“TxDOT is viewed as a national leader in the use of high-occupancy vehicle (HOV) facilities,



TTI researchers are conducting a research project aimed at studying proper traffic control and signing for managed lanes. Both photos courtesy of *HOV Interactive 2.0*, Parsons Brinckerhoff, Orange, CA, 2002.



managed lanes and other innovative strategies to address traffic congestion,” notes David Schumacher, senior transportation planner at the San Diego Association of Governments and chair of the Transportation Research Board committee on HOV systems.

TTI is also assisting FHWA develop a managed lanes primer and other information to help transportation agencies throughout the country interested in pursuing the concept.

“TTI is supporting FHWA’s managed lanes initiative by developing technical resources and outreach materials,” says Ginger Goodin, associate research engineer with TTI. A managed lanes primer, a cross-cutting issues report, case studies and other documents are being developed.

#### **STEP ONE: *Managed lanes case studies***

Three reports will help transportation professionals and other groups interested in pursuing managed lanes. A cross-cutting issues study identifies potential problems and opportunities that may be encountered in developing and operating managed lanes. The study also highlights the limited experience to date with different types of managed lanes.

A second report documents the evolution of the Houston HOV system over a 25-year period. The report highlights the development and operation of the HOV system, which includes HOV lanes, park-and-ride lots, express bus services, transit centers and other supporting elements. The institutional arrangements fostering the success of the system are also described.

A managed lanes primer provides guidance on elements to consider in developing and operating managed lanes. The primer presents factors to consider with the use of different managed lanes strategies and summarizes case study examples.

#### **STEP TWO: *Developing the strategic managed lanes initiative***

TTI researchers are assisting FHWA in developing a draft managed lanes initiative. TTI researchers helped plan and facilitate an FHWA-sponsored workshop on managed lanes and pricing in Key Biscayne, Florida, in November 2003.

At the workshop, experts from across the country provided insight into the issues and opportunities with managed lanes and identified possible research problem statements.

#### **STEP THREE: *Closing the research gaps***

One of the critical components of managed lanes operational strategies is related to traffic control and signing. Driver information is a key research need, according to the experts gathered for the workshop, and FHWA has already taken the initiative to address it through a new research effort. TTI researchers Beverly Kuhn, Sue Chrysler and Ginger Goodin are leading the research project aimed at studying proper traffic control and signing, and building upon the work they have already done in Texas.

“The current guidance provided to planners and engineers regarding managed lanes facilities is limited to HOV and special use lanes, such as truck lanes,” says Sue Chrysler, associate research scientist with TTI. “There is little available research on traffic control devices specifically for managed lanes in a broad sense. Existing managed lanes have merely modified standard road signs to

fit a specific application. The FHWA-sponsored research aims to provide guidelines for effective traffic control for the widest variety of managed lanes applications.”

#### **THE LONG-TERM GOAL**

The goal of FHWA’s 10-year managed lanes initiative is to guide the focus and technical details for future managed lanes research, technology transfer and training initiatives and activities. ■

“Managed lanes offer the opportunity for agencies to apply proven operational strategies to improve safety and mobility and to mitigate possible adverse impacts that may be caused by congestion.”

*John Obenberger, FHWA transportation specialist*

#### **MORE INFORMATION**

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**H**ow long does it take you to get to work? If the answer is “too long,” as it is for many urban commuters, a project underway by the Texas Department of Transportation (TxDOT) in cooperation with the Metropolitan Transit Authority of Harris County, Texas, (METRO) may help shorten your drive time and give you more driving options — whether you have company in the car or not. The Texas Transportation Institute (TTI) is assisting with the project.

As the I-10/Katy Freeway undergoes a large, long-term expansion and commuter traffic continues to increase along US 290, researchers at TTI are exploring how to give commuters more options beyond the traditional high-occupancy vehicle (HOV) lane. For example, METRO’s QuickRide program has helped manage traffic volume on busy HOV lanes by charging \$2 for two-person carpools in some HOV lanes dubbed high-occupancy toll, or HOT, lanes.

Bill Stockton, associate director and research engineer at TTI, is heading a team exploring value pricing options with the QuickRide program in the hopes of increasing usage of the HOT lanes, improving customer satisfaction, reducing net operating costs and creating a smoother traffic flow.

Defined as a *concept that results in congestion relief and environmental benefits by providing enhanced travel choices using monetary incentives*, value pricing is at the center of studies underway along the I-10/Katy Freeway and US 290/Northwest Freeway. These studies are funded by the Federal Highway Administration (FHWA), TxDOT and METRO.

“Value pricing is part of the natural evolution of highways,” says Stockton. “We’re looking at expanding the QuickRide program to include allowing one person in the lane for a fee. The fee could vary by traffic volume, so when the lanes begin to fill, the price goes up. As the lanes clear, the prices decrease and more commuters may opt into the lane.”

With TTI’s assistance, TxDOT and METRO are exploring ways to improve and expand QuickRide, including:

■ **PRICING** — What is the optimal price for HOT lanes? What toll amount will commuters accept, how much is too

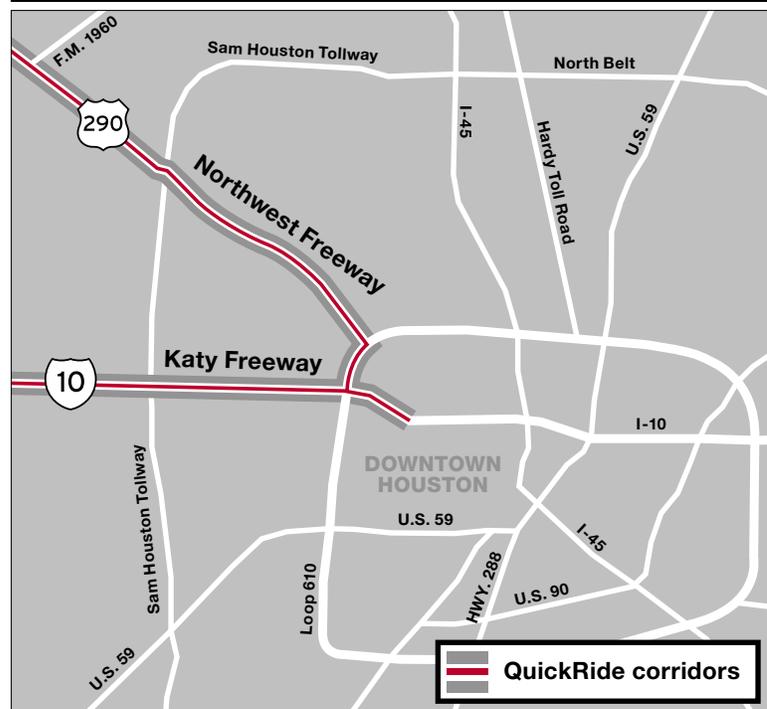
much, and how much is not enough to insure proper funding levels and maintenance?

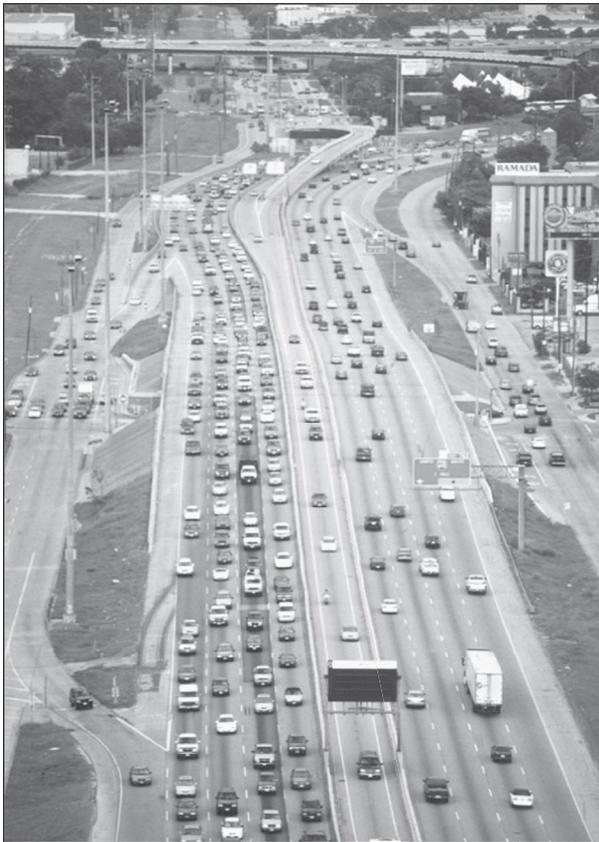
- **MARKETING AND SIGNAGE** — What is the best way to alert drivers to current tolls, lane locations and lane use restrictions (time of day, number of passengers, type of vehicle, etc.)? How can we increase usage of HOV lanes by communicating benefits to the public?
- **ENFORCEMENT** — How can we do a more efficient job collecting fares and insuring that the lanes are being used properly?

The current study, due to conclude in the fall of 2004, involves drafting and developing a marketing plan

# The value of VALUE PRICING

The HOT lanes on two of Houston’s busiest freeways are the focus of upcoming value pricing innovations.





(above): Motorists on the Katy HOV lane (shown in red) save travel time and enjoy a smoother commute.  
 (below): An access/exit ramp for HOV lanes (shown in red).



for review and implementation by the project's sponsors once the enforcement, signing, pricing and account administration recommendations are complete.

"This project will be the model for future deployment of value pricing on other HOV lanes in the Houston area when needed," says David Fink, transportation operations engineer for TxDOT's Houston District. **R**

## TxDOT & METRO

innovative partners

An early approach to reducing commute times and freeway congestion was to add freeway lanes for HOV use. These lanes allowed drivers in vehicles with two or more occupants to bypass more congested lanes. The contraflow demonstration project on I-45 North opened in 1979. The I-10/Katy Freeway HOV lane opened in 1984. The current, almost 100-mile system of HOV lanes, park-and-ride lots and express bus services is used by more than 121,000 passengers daily.

The success and use of HOV lanes increased as Houston commuters teamed up with other passengers and filled these managed lanes during morning and evening drive times. As congestion began to build even in the HOV lanes, planners began to consider other ways to maximize the efficiency of these lanes and continue to move carpools, vanpools and transit vehicles along the freeway.

### QuickRide TO THE OFFICE AND HOME AGAIN

As demand for HOV lane space increased, it became clear that METRO and TxDOT would need to explore more options. The Katy Freeway HOV lane was restricted to vehicles with three or more occupants from 6:45 a.m. to 8:00 a.m. and 5:00 p.m. to 6:00 p.m. While effective at reducing congestion in the HOV lane, researchers discovered that not enough commuters took advantage of the lanes with the increased passenger requirements.

By 1998 METRO and TxDOT had creatively teamed to develop the QuickRide program. The goal of QuickRide was to increase the number of people moving through the Katy HOV lane and in the Katy freeway corridor. Two-person carpools were again allowed in the HOV lane during the morning and evening peak drive times, for a fee of \$2. By displaying both a QuickRide hang tag in the vehicle and carrying a transponder, commuters could use an electronic account to pay for a ride in the HOV lane. In effect, these HOV lanes then become high-occupancy toll lanes, or HOT lanes.

Innovative traffic management by METRO and TxDOT created these HOT lanes to provide commuters more choice. For commuters who need to more quickly make it to their meeting, sporting event or daycare pick-up time, HOT lanes can be a little extra insurance that the drive should be smoother and faster than traveling in other lanes. ■

### MORE INFORMATION

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More information on QuickRide and value pricing is available at [www.QuickRide.org](http://www.QuickRide.org) and <http://houstonvaluepricing.tamu.edu>.

**I**t turns out that those video cameras that you have noticed

at intersections and interchanges all over the state are being put there to save you time and money.

They do all this by simply detecting your vehicle and minimizing your wait for a green signal. Engineers have found that these cameras are also a great way to save tax dollars because they are often less expensive than other types of vehicle detectors. But, for some, the best news is that these cameras have no memory — they do not take pictures and are not used for enforcement of any kind.

Of the 6,500 multilane intersections maintained by the state, about 10 percent are outfitted with video detection systems. Inductive loop detectors are the standard, but as they begin to fail or are damaged during resurfacing, Texas Department of Transportation (TxDOT) engineers have chosen to replace them with cameras.

In fact, the video systems could turn out to save the state valuable tax dollars. Replacement of loop detectors can be expensive, time consuming and burdensome, especially in locations where shifting soils can cause damage to the underground loop wires. Traffic lanes must be blocked while construction crews cut into the pavement, remove the old loops and install new ones. Video cameras are easily installed above the intersection and mounted next to traffic signal lights. There are no loops to fail nor traffic lanes to be blocked with video systems.

“The video systems are growing in popularity,” says Carlos Ibarra, director of transportation operations in TxDOT’s Atlanta District. “We’re sold on them, and as we upgrade our intersections, we’re installing cameras,” he says.

As more state and local transportation engineers move away from the use of loop detectors and install video cameras, an urgent need has emerged for guidelines to plan for and maintain the systems.

So, Texas Transportation Institute (TTI) researchers, in a project sponsored by TxDOT, have developed a video detection handbook and manual to help engineers customize their local needs, plan installation and manage maintenance.

“These manuals will empower engineers,” says TTI’s James Bonneson. “They will help the engineer make choices, such as where to put the cameras, how to position them and how to maintain them,” he said. And unlike inductive loops, the camera’s detection zones can be quickly

# The camera eyes of Texas

Video detection devices gain acceptance while manuals become available



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The Texas Highway Products Corporation is TxDOT’s largest distributor of video detection devices. Company President Nader Ayoub says the manual and field guide have been needed for some time. “They give TxDOT uniformity with the deployment of this equipment,” he said. “Researchers have gone out and evaluated the different products, consolidated them into common practice, and highlighted the systems that work so that engineers don’t make the mistakes of others.”

But state-maintained intersections and interchanges are only a small portion of the tens of thousands maintained by cities that have been installing cameras. “When we upgrade intersections, we propose to cities the use of the video systems,” says TxDOT’s Ibarra. “City engineers are finding out the cameras are reliable and easy to install, and the manuals will help them learn more about video detection, as well as how to maintain the systems.” **R**

## MORE INFORMATION

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The director of this project was Carlos Ibarra, director of transportation operations in TxDOT’s Atlanta District, available at (903) 799-1480 or cibarra@dot.state.tx.us.

More information concerning the video detection manual and field guide, in addition to scheduling workshops, can be obtained by contacting James Bonneson.

# Southwest University Transportation Center celebrates 15 years of success

In 1987, the Surface Transportation and Uniform Relocation Assistance Act authorized the creation of the U.S. Department of Transportation's (USDOT) University Transportation Centers (UTC) program. Soon after, transportation centers across the nation began operation at universities in each of the 10 federal regions through a federal grant, with dollar-for-dollar matching funds from nonfederal sources required.

Today, more than 75 colleges and universities participate, with 27 UTCs throughout the United States to conduct combined programs of transportation research, education and technology transfer. Last year, the UTC colleges and universities graduated over 1,000 students with advanced transportation-related degrees, offered almost 2,000 undergraduate and graduate transportation courses, conducted over 400 research projects and trained over 25,000 practicing transportation professionals.

The Southwest Region University Transportation Center (SWUTC) was established at The Texas A&M University System in October 1988. SWUTC remains composed of a consortium of three universities: Texas A&M University (TAMU), The University of Texas at Austin (UT-Austin), and Texas Southern University (TSU), each of which has major transportation research and education enterprises.

The Texas Transportation Institute in The Texas A&M University System serves as the lead institution. SWUTC has been continuously headquartered in College Station on the main Texas A&M University campus.

SWUTC has developed a stable, consistent program that has matured in its role as a center of excellence for transportation research and education in Federal Region VI. The theme for SWUTC is *transportation solutions to enhance prosperity and the quality of life*. To put this theme into operation, the center's scientists, engineers and students focus their research expertise upon advancing four strategic thrusts for Region VI:

- support economic growth and trade;
- enhance mobility, accessibility and efficiency;
- promote safety and a safe environment; and
- develop the transportation workforce.

Over the last 15 years, these efforts have produced usable results in such areas as improved transportation activities along the Texas–Mexico border, innovative transit service programs, dynamic travel demand management, new solutions to realize safe communities and educational outreach programs to build a diverse transportation workforce for the 21<sup>st</sup> century.

“We look forward to participating in the future UTC program when it emerges at the completion of the current reauthorization process in Congress,” says SWUTC Director Dock Burke.

## Federal grants and matching funds allow work to continue

On Sept. 11, 2003, U.S. Transportation Secretary Norman Y. Mineta announced the award of five grants totaling \$4.5 million in support of advanced transportation-related research at UTCs across the nation. SWUTC received a \$906,000 grant administered by the Research and Special Programs Administration (RSPA) of the USDOT. “To encourage increased innovation . . . federal R&D funding for science and technology [exceeded] \$100 billion for the first time in history,” Secretary Mineta stated. “The seed money we invest with these grants will pay dividends for the American public by making transportation safer, more economical and reliable.”

With a USDOT annual grant of \$1 million (maximum) to operate its programs, SWUTC has consistently responded to the challenge of providing nonfederal matching funds. Throughout the period of operation under three federal grants, SWUTC's nonfederal matching has been funded with general revenues from the State of Texas, Oil Overcharge Funds from the State Energy Management Office, as well as contributions of in-kind services provided by each member institution of SWUTC. Typically, the efforts of SWUTC's members to secure nonfederal funds have generated a full dollar-for-dollar matching amount in so-called “hard dollars.”

## Education meets real-time needs

The educational component of SWUTC is particularly notable and has become a showpiece of the program, reflecting the high priority and real-time needs of the transportation industry in this area. SWUTC works to



Students tour TTI's proving grounds to view crash tests and see how safety features are built into the roadside.

develop the required pipeline of transportation professionalism, beginning with students at the elementary and secondary levels, proceeding through high school and into undergraduate education, and then culminating in graduate academic degree programs in various transportation specialties. Since it began in 1988, 267 students have graduated from the program, with 308 students having received SWUTC scholarships or stipends. Of those graduated, 87 percent are known to be working in the field of transportation.

### 2003 SWUTC GRADUATE STATS

- 5% – pursuing an advanced degree
- 19% – government employment
- 61% – industry employment
- 15% – teaching/research

### OUTREACH TO THE FUTURE WORKFORCE

A related expanded educational outreach effort has attracted elementary and secondary school children to participate in the Summer Transportation Institute Programs in Houston (TSU) and Dallas (Paul Quinn College). These summer agendas have proven to be highly successful at identifying and recruiting high school students as potential professionals in the transportation industry of the near future.

"I feel strongly that the Summer Transportation Institute program has had a strong impact on our minority students. In the last five years that we have been producing this program, we have developed students that have chosen engineering, transportation and business as part of their career path," says Khosro Godazi, SWUTC Associate Director at TSU.

### ADVANCED INSTITUTES

The Advanced Institute Program enabled the creation of an initiative titled Undergraduate Summer Internship in Transportation for outstanding undergraduate students from universities across the nation. This program promotes transportation systems as a career opportunity by engaging the selected interns in research with faculty and other students, primarily graduate students from a cross-section of disciplines. SWUTC undergraduate activities (such as the Summer Fellows Program) provide important linkages with undergraduate programs across the United States as sources of potential graduate students in the Advanced Institutes. In addition, the educational program at TSU has been enhanced through the award of SWUTC-funded fellowship/scholarship stipends for qualified graduate and undergraduate students.

**"For over 12 years, our Mentors Program has accelerated students' and state employees' professional development by providing them valuable opportunities to interact with top-level transportation professionals in transportation."**

Conrad Dudek, director of the Mentors Program, associate director of SWUTC and professor of civil engineering at Texas A&M University

**"The program has been successful in attracting excellent undergraduates to the transportation systems profession via graduate school in UT-Austin and other top academic programs."**

C. Michael Walton, Ernest H. Cockrell Centennial Chair in Engineering, UT-Austin

## SWUTC student success stories



**VALERIE BRIGGS KALHAMMER**  
Associate, Booz Allen Hamilton

Briggs attended The University of Texas at Austin where she received two master's degrees, one from the LBJ School of Public Affairs and the second from the College of Engineering. She was the SWUTC Outstanding Master's Student in 2000. "My SWUTC research was really the foundation for my career. Much of my current work and my professional reputation is based on my graduate research."



**WILLIAM EISELE**  
Associate Research Engineer, Texas Transportation Institute (TTI)

While pursuing his Ph.D. in civil engineering from Texas A&M University and as a researcher at TTI, Eisele has been involved with numerous research projects spanning many areas of transportation planning, design and operations. His specific areas of research include access management, high-occupancy vehicle (HOV) facilities and transportation system performance monitoring. Eisele received the SWUTC Outstanding Ph.D. Student of the Year Award at Texas A&M University and the SWUTC Ph.D. Student of the Year Award for the region in 2001. "SWUTC provided an opportunity for me to pursue my area of study for my Ph.D. dissertation. Through my research, I was able to explore advanced techniques of transportation system performance monitoring that had not been analyzed or explored. I am grateful to SWUTC for their support."



**VINCENT SANDERS**  
Senior Transportation System Planner, Metropolitan Transit Authority of Harris County, Texas

Sanders attended Texas Southern University (TSU) with a SWUTC stipend and also worked as a graduate research assistant in the Center for Transportation, Training and Research (CTTR) at TSU, where he made substantial contributions to transit research. "Working in the Center for Transportation, Training and Research gave me a chance to truly explore the multimodal world of transportation through academic and research experiences that led me to a better understanding of transportation planning concepts."

## Research expands opportunities

Since 1988, SWUTC projects have covered a broad range of transportation-related subjects, continually providing opportunities to develop new ideas, new researchers, introducing students into various technical fields of transportation and advancing the state of transportation science. Some of the program's outputs include:

- 400 funded projects,
- 115 individual principal investigators,
- the support of close to 75 research staff and teaching faculty members from the consortium, and
- 1,128 students that have contributed to SWUTC research work.

In addition, SWUTC funding often stimulates the growth of further research opportunities for consortium members, graduate students and transportation research agencies across the state. The following examples illustrate how recently successful SWUTC research projects have promoted either further research, implementation or technology transfer opportunities.

### CLEARING TRUCK TRAFFIC AT THE BORDER

At UT–Austin's Center for Transportation Research, Rob Harrison is heading multiple efforts to reduce truck traffic on trade corridors between the United States and Mexico. One of his projects studied the issues surrounding an open border and assessed the possible benefits and costs for the citizens of Texas.

"On balance, we found that the advantages outweighed the disadvantages," says Harrison. "What the open border is going to do is make the transportation supply chains between Mexico and the United States more efficient, and therefore more competitive."

Harrison also led another project that analyzed available data to discern main United States–Mexico truck trade corridors and to estimate truck volumes since the implementation of NAFTA. The researchers recommended implementing a NAFTA monitoring system that would track key information related to the movement of freight. The statistics gathered from this monitoring system will be beneficial for planning purposes and pavement management on the NAFTA highway network.

### ROAD RAGE RESEARCH EXPANDS

As a result of the findings in a SWUTC study titled "Intentional Violations of Safe Vehicle Operation and Their Impact on Highway Mobility and Safety" and conducted through the Texas Transportation Institute (TTI) at TAMU, the Texas Department of Transportation (TxDOT) funded an expanded multiyear study titled "Understanding Road Rage." For this study, TTI researchers conducted focus groups with commuters to explore aspects of driving that are particularly frustrating and stressful.

"We concentrated on aggressive driving because it's more common and more amenable to engineering-related solutions," says Carol Walters, the TTI research supervisor of the project. "If we better understand what transportation factors frustrate drivers, we should be able to improve road safety."

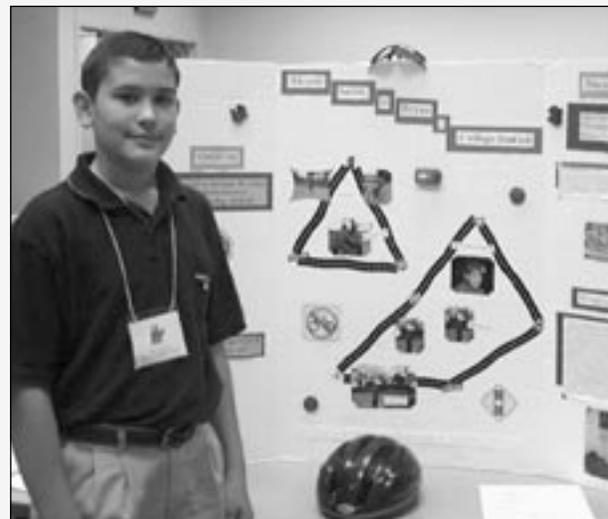
"The late merge concept looks promising, and we are very interested in seeing the results of the further evaluation," said TxDOT Project Director Terry Sams. "TxDOT will continue to examine the research recommendations of this study and work toward implementation where possible. The findings have provided us with some good insight into what causes driver frustration, and we'll use that information to continue improving our urban driving conditions."

### THE TRANSPORTATION ROAD SHOW

As a direct result of her 2001 SWUTC research project, "Develop a Transportation Science Competition and Career Fair for Junior High and High School Students," Debbie Jasek, assistant research specialist in TTI's Center for Professional Development, has developed a successful collaboration with the TAMU College of Science that will result in the promotion and increased exposure of junior and senior high students to the transportation sciences and career opportunities. There is now a transportation category in the Brazos Valley Regional Science and Engineering Fair (BVRSEF) held annually on the TAMU campus and a special award for transportation-related projects. Jasek also serves on the BVRSEF Committee.



(above): Cars queued to cross the border from Texas into Mexico.  
(below): Terry Anderson had the winning entry from Jane Long Middle School. His project focused on bicycle safety.



“A lot of students are not aware of all the different job opportunities available in the field of transportation,” says Susan Larson, math specialist with the Texas Rural Systemic Initiative. “By introducing students to these opportunities, TTI gives them better insight into what they can pursue for future careers.”

## Technology transfer supports knowledge sharing

In a decade and a half of operation, the SWUTC menu of technology transfer activities and techniques has included conferences, workshops, the publication of research reports, presentation of new knowledge, and seed funding support for related programs and engagements.

### EXAMINING RURAL TRANSPORTATION

A viable transportation system is a critical component to ensuring the economic health and vitality of rural

“A real key for us as researchers and as a nation is the sharing of information.”

*Russell Henk, TTI program manager*

#### 2003 TECH TRANSFER STATS

- 234 final technical reports have been produced.
- Since 1993, 1,524 hard copies of reports have been distributed worldwide to 34 different countries free of charge.
- 75 downloadable SWUTC reports are now available via the Internet, with an average of 75,000 files being downloaded each month.
- 669 papers have been presented.

Funded by SWUTC sources, the van at the Martin Cavazos Community Center in Sebastian serves residents of *colonias* neighborhoods in that part of the Rio Grande Valley.



areas in Texas. To address transportation issues facing Texas rural areas, SWUTC has sponsored the Texas Rural Transportation Conferences for the past three years in Canyon, Laredo and College Station. Topics covered have included issues relevant to rural transportation both in the Panhandle and South Texas — such as agricultural commodity movement by rail and truck, I-27 expansion, rural intelligent transportation systems, railroad transportation issues, workforce development, transportation for isolated *colonias* neighborhoods and home-to-work transportation service in rural Texas. Transportation and tourism, as well as rural goods movement, were focus areas for the conference in 2002.

### ADDRESSING URBAN TRANSPORTATION SOLUTIONS

The SWUTC consortium members at TSU in Houston have conducted numerous conferences and workshops designed to address urban transportation solutions and training in such areas as transit-oriented development, integration of light rail, energy savings and reduced congestion, regional mobility development issues and the question of a regional transportation agency.

“TSU and the Center for Transportation Training and Research receive tremendous benefit from being a member institution of SWUTC. The students participate in cutting edge research, as well as conference and seminars, which advance their knowledge beyond the classroom,” says Carol Lewis, SWUTC Executive Committee member and Director of CTTR at TSU.

### CONTRIBUTING TO HOMELAND SECURITY

Some of the unique aspects of the SWUTC technology transfer program are manifested in activities that arise as a direct result of support initially provided by the center. For instance, in response to renewed homeland security concerns brought about due to Sept. 11, 2001, SWUTC-funded researchers are pursuing complementary research and development of transportation security initiatives, which, if successful, will bring focused multidepartmental funding to Texas to support a variety of homeland security elements.

Currently, a new website on security issues is available at <http://transportationsecurity.tamu.edu>. The website is designed to provide information for TTI researchers on upcoming proposals so they may work to develop new research in the area of homeland security. The website also features links to various homeland security offices for the purpose of providing the most current information available.

“A real key for us as researchers and as a nation is the sharing of information,” says Russell Henk, program manager of TTI’s research and implementation office in San Antonio. “The information available on homeland security is so dynamic that it needs to be frequently updated or it’s useless.” **R**

# PIA system improves traffic flow and reduces wait time

**T**he light changes to red and your car, along with a line of others, comes to a halt. The signal for the other direction turns green and one car passes through the intersection. In essence, one car passed through when four or five might have, had the signal been better regulated. Sound frustrating?

In a time of shrinking budgets and growing traffic volumes, traffic engineers must learn to do more with less. Regulating previously uncoordinated signals at isolated intersections is one such challenge.

Texas Transportation Institute (TTI) researchers, as part of a Texas Department of Transportation (TxDOT) research project, have created a platoon identification and accommodation (PIA) system to more efficiently regulate traffic at isolated intersections. This system minimizes wait time on the part of the larger number of vehicles and, thereby, increases the overall efficiency of traffic flow through these intersections.

“The uncoordinated nature of these intersections makes for longer wait times and higher stress for motorists,” explains Nadeem Chaudhary, TTI’s lead researcher on the project. “And the longer cars idle at an intersection and the more often they start and stop, the more pollution is added to the air.”

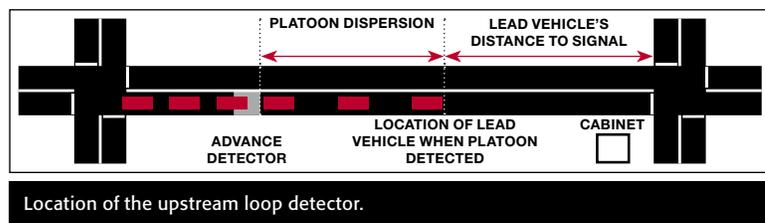
To better regulate the flow at these intersections, advance detection of approaching vehicles is needed. Researchers identified groups of approaching vehicles, called “ platoons,” to quantify traffic flow. They then developed a platoon detection algorithm to identify cars traveling in a platoon. The algorithm, part of the new PIA system, defines a platoon as a predetermined number of cars passing over that detector in a finite amount of time. Once the system recognizes that a platoon has passed, it then regulates the traffic signal downstream to optimize traffic flow in real time.

Researchers tested the system in the laboratory using CORSIM (Corridor Simulation software) to verify its efficacy prior to real-world implementation. Field testing was conducted at two sites: College Station and George West, Texas.

“The overriding concern in regulating these intersections is maximizing safety for all motorists,” says Chaudhary. “We chose these particular sites for the

unique testing environments they offered.” Using loop and video detection methods, researchers established how the downstream signals should be regulated based on real-world traffic patterns.

One interesting result of this research is that inductive loop detectors proved more reliable than video detectors at intersections with high semi-truck traf-



fic. “The biggest problem observed with video-based systems was that they sometimes counted semi-trucks twice if there was a big difference in color between the cab and trailer,” explains Chaudhary.

The research proved that the algorithm works, and researchers believe it should be further implemented, tested and refined. For this project, researchers added a computer with the algorithm to the existing controller hardware of the signals under study. However to be truly cost-effective, the new algorithm should be *built into* the controllers regulating traffic signals.

“Unfortunately, the algorithms developed in this project are not currently available from manufacturers,” explains Brian Van De Walle, TxDOT’s project director for this study. “Our next major challenge will be to get vendors to incorporate this capability into their standard signal controller package, and TxDOT is committed to seeing this research further implemented.”

Following their research project, Chaudhary and his team determined that further implementation with the current controllers could be done more cost-effectively. Replacing the hardware classifier currently used with a software classifier developed by TTI will save approximately \$3,000 in equipment costs per site. And standardization of the cabinets in which the system hardware resides could save approximately \$1,000 per site. **R**

## MORE INFORMATION

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# With **safety,** **mobility** and **access** for all

Access management means careful planning

**G**etting there safe. Getting there fast. These are among the top concerns of traveling Texans. But how do we balance the concerns of drivers who want speed and safety, and businesses and customers who want access to stores and services? Many of the answers to these and related questions can be found in a careful approach to transportation engineering and planning called access management.

“Access management is an engineering and planning method of balancing the needs of safety and mobility on a highway system with the need to provide access to adjacent land uses,” says Rory Meza, director of roadway design for the Texas Department of Transportation (TxDOT).

Simply put, access management involves planning and coordinating the location, design and operation of driveways together with internal roadway design fea-

tures such as medians, median openings, interchanges and street connections. An access management plan can encourage more collaboration between local governments and state agencies. Doing so can help ensure better transportation decisions and subsequently a better quality of life, more economic development and increased public safety.

## SAFETY

*Half of all crashes in urban areas happen at or near intersections — including driveways.*

Access management provides improved safety and mobility while allowing reasonable access to adjacent land and businesses. Reducing crashes, and therefore saving lives, is central to this planning process. One of the most effective ways to reduce crashes is to reduce the number of conflict points on roadways. Managing driveway locations, intersections, turning vehicles and median openings along a given portion of a roadway can reduce the number of opportunities for vehicles to crash.

“The safe design and operation of the state roadway system is the core guiding principle behind TxDOT’s access management program and related administrative rules,” says Bill Eisele, an associate research engineer at the Texas Transportation Institute (TTI). “The recent TxDOT district training courses [discussed below] provided staff with the engineering guidance, planning tools and administrative procedures for consistent consideration of access requests and application of access management techniques to facilitate motorist safety.”

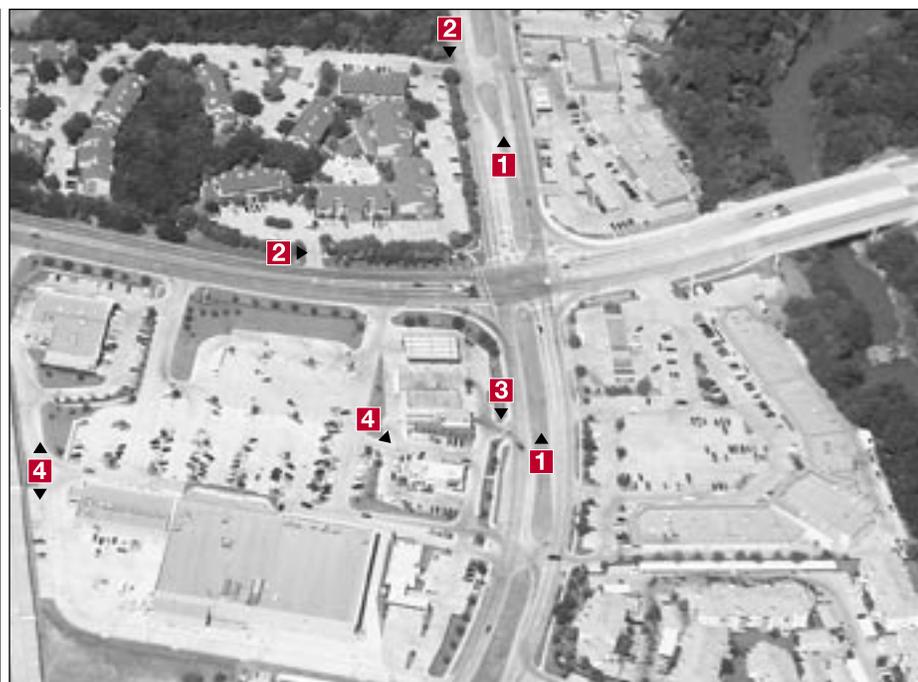
## MOBILITY

*Access management can reduce traffic congestion.*

Improving mobility is another key component of access management. While limiting the number of inter-

Aerial photograph showing different features of access management.

- 1. Raised medians** limit and control left-turn movements.
- 2. One access point** on each adjacent street (for an apartment complex).
- 3. Shared and cross-access** allows multiple businesses to share one driveway/access point.
- 4. On-site circulation** allows motorists to drive among businesses without getting back on the main streets.



sections is important for safety, adequate spacing *between* intersections and driveways helps improve traffic flow. Adding a turn lane on the side of a road allows through traffic to pass without slowing for turning vehicles. Properly timed traffic signals keep traffic moving. Commute times are reduced and congestion is eased when mobility aspects of access management are applied.

Recently approved by the Texas Transportation Commission, the administrative rules supporting access management in Texas are based on research sponsored by TxDOT and conducted by TTI.

“Maintaining long-term safety and mobility is the state’s objective in this effort,” says Mark Marek, TxDOT’s deputy director of design. “Access management is a way to get us there.”

### ACCESS

#### *New guidelines in Texas*

Based on research at TTI, access management offers guidance for many different intersection and roadway scenarios but should not be considered a “one-size-fits-all” approach to solving problems. Each situation is unique, and researchers say what works in one community may not work in another. Access management in Texas allows planners and engineers to customize their approach to improving safety and mobility.

“The new access management program in Texas will provide TxDOT and local governments the opportunities to develop or expand relationships as they work toward achieving goals of improving safety and mobility on Texas highways,” says Bill Frawley, research scientist. “These goals can be accomplished by TxDOT and local governments coordinating review of development plans and access requests along state roads.”

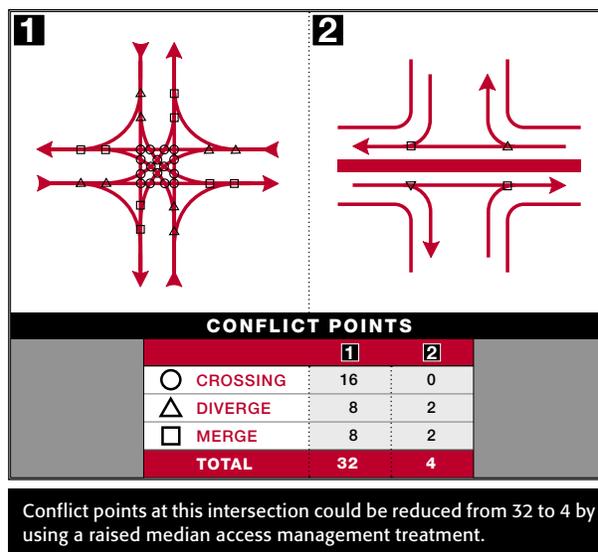
To introduce the new policy, Meza, Marek, Frawley and Eisele led 17 workshops throughout TxDOT districts in the fall of 2003. In classroom discussions they emphasized the opportunity access management affords the districts to work closely with cities to design and improve roadways for better safety and mobility while encouraging reasonable access for future economic development.

“We are relieved and encouraged to see that the ‘years’ of commitment to the development of Texas’ access management program are finally bearing fruit,” says Mary Owen, district engineer for TxDOT’s Tyler District. “TTI and TxDOT have worked faithfully to promote and maintain the principles paramount to the program. I am confident the implementation of the first generation of access management, Texas style, will save lives and preserve the effectiveness of Texas’ transportation system for the next generation.”

### SAVING LIVES

In Texas more than 3,500 people die in crashes each year. On an average day nearly 10 people lose their lives on Texas roads.

According to Frawley and Eisele, access management can reduce crashes 20 to 70 percent by reducing



the number of conflict points. Through traffic moves more efficiently. Vehicles slowing to turn are separated from through vehicles. Braking and hard acceleration are reduced.

Drivers get there faster. They get there safer, too. **R**

### MORE INFORMATION

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(L-R): Bill Eisele, TTI; Mark Marek, TxDOT; Bill Frawley, TTI



To access TxDOT’s online access management manual, visit:  
<http://manuals.dot.state.tx.us/dynaweb/coldesig/acm>.

For more information about TxDOT’s access management manual, contact TxDOT’s Deputy Design Division Director **Mark Marek** at (512) 416-2653 or [mmarek@dot.state.tx.us](mailto:mmarek@dot.state.tx.us).

**RELATED MATERIALS:** **Report 4141-1**, *Developing Access Management Guidelines for Texas*; **Report 4221-1**, *Estimating the Impacts of Access Management Techniques: Methodology and Preliminary Findings*; **Report 1847-S**, *Summary of Access Management Programs and Practices in the United States*; and **Report 3904-S**, *A Methodology for Determining the Economic Impacts of Raised Medians: Final Project Results*.

**D**rivers heading to distant destinations may not give much thought to the highway right-of-way (ROW), often covered in a blanket of grass or colorful wildflowers. Yet these inconspicuous strips of land just along the edges of our roads comprise some of the most valuable pieces of real estate in the world.

In some states, public utilities, which mostly consist of water, electric, telecommunication and natural gas companies, are not allowed to place their lines within the ROW. The State of Texas, however, gives public utilities the right to bury their lines within the ROW (based on the Texas Utility Code and the Texas Utilities Accommodation Policy as outlined in the Texas Administrative Code).

As deregulation of the utility industry has swept the state, pressure to make underground space available for new utility lines is building. The Texas Department of Transportation (TxDOT) is looking for ways to ease the race for underground utility space while honoring its commitment to open access for all public utilities. Researchers at the Texas Transportation Institute (TTI) explored the underground options as part of a TxDOT-sponsored research study.

“The challenge is the limited space for utilities,” says Beverly Kuhn, division head at TTI. “We began this research by asking, ‘What is the most effective way to manage ROW space so that we can allow all of the utilities in that want in? And how can we make it easy for utilities to access and maintain their lines?’”

TTI explored utility corridors as one way to accommodate utilities in the limited ROW space. These rigid, underground structures are often made of concrete or steel. Utility lines run the length of the underground corridor. Lines are spaced far enough apart to prevent interference between electrical and communications lines and contamination between sewage and water lines. The corridor’s ample size allows easy access for

maintenance and room for additional lines to be added in the future.

Though not considered inexpensive, research shows that utility corridors can be a viable option for placing or relocating utilities in ROWs both in new construction and reconstruction applications.

“The research conducted at TTI provides us with a good tool for use in some areas that are congested with multiple utilities and that are limited in ROW space,” says Tommy Jones, TxDOT’s Abilene District ROW administrator.

Documented in *Utility Corridor Structures and Other Utility Accommodation Alternatives in TxDOT Right-of-Way*, the research also demonstrates that joint trenching (parallel lines along the same trench) and multiduct conduits (tubes designed to hold multiple lines) are feasible alternatives for TxDOT as it works toward more effective ROW management. These alternatives have pros and cons — as do utility corridors — that transportation engineers and planners must consider when choosing a utility accommodation option.

“This research provides valuable insight into the complexities of the utility industry, including their individual needs and concerns,” says Gary Ray, TxDOT’s Houston District design project coordinator. “In spite of what might be construed as an initial resistance, I predict that necessity will drive future consideration on a case-by-case basis and

lead to the inevitable use of utility corridor structures in urban areas throughout Texas. TTI’s research report [4149-1] is an excellent resource guide for design managers operating in these congested environments.” **R**

## CRAMPED QUARTERS

Researchers explore how to make the most of limited space in rights-of-way



Utility corridors are being researched as one way to accommodate utilities in limited ROW space.

### MORE INFORMATION

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This research is documented in **Report 4149-1, Utility Corridor Structures and Other Utility Accommodation Alternatives in TxDOT Right-of-Way.**

# TEXAS TRANSPORTATION INSTITUTE ADVISORY COUNCIL

The Texas Transportation Institute (TTI) wishes to recognize the members of the TTI Advisory Council by featuring their profiles in the *Texas Transportation Researcher*. The TTI Advisory Council meets once a year to hear updates on research projects and program initiatives, discuss critical transportation issues facing Texas and provide guidance on potential future research efforts.



**ALAN C. CLARK** is the manager of the Transportation and Air Quality Programs for the Houston–Galveston Area Council (H-GAC). He is the director for H-GAC’s Metropolitan Planning Organization (MPO), which is responsible for development of the region’s multimodal transportation plans. The MPO’s Transportation Policy Council approves the programming of all federal highway and transit funds in Harris County and the adjacent seven counties. Mr. Clark’s responsibilities also include coordinating the Houston–Galveston area’s response to mandates contained in the Clean Air Act Amendments of 1990.

In November 1995, Mr. Clark was awarded the Road Hand Award by the Texas Department of Transportation because of his significant contributions to development of the Statewide Transportation Improvement Program and for his expertise in the retooling of the transportation planning process. In 1999, Mr. Clark was appointed to the board of advisors for the Eno Foundation, an internationally recognized organization promoting transportation research and education.

Mr. Clark has been a transportation planner with H-GAC since 1983 and has managed its transportation and air quality programs since 1986. Mr. Clark has served as an adjunct professor with Texas Southern University. Prior to coming to H-GAC, he worked as a transportation planner with the Metropolitan Transit Authority of Harris County and as a traffic engineering consultant.

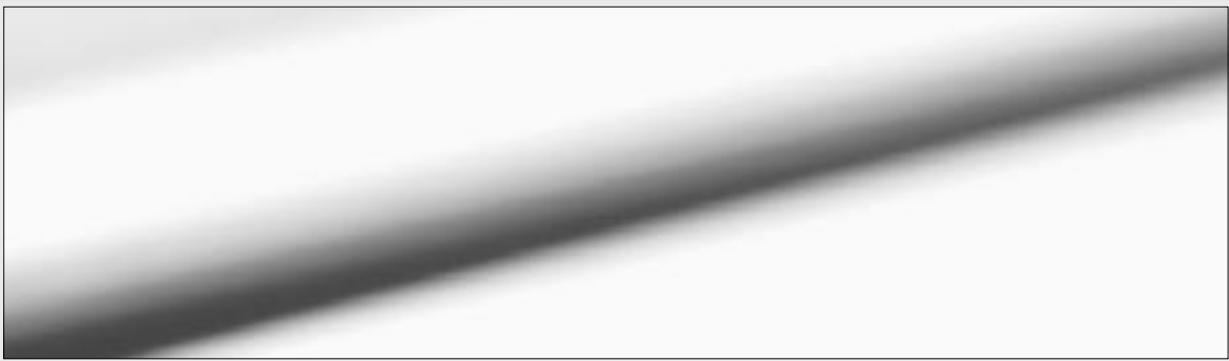
Mr. Clark holds master’s degrees in civil engineering and city and regional planning from Ohio State University. He completed his undergraduate degree in business administration from the University of Tennessee in his hometown of Knoxville. ■



**LINDA S. WATSON** is the general manager of the Corpus Christi Regional Transportation Authority (CCRTA). Working alongside a 12-member board of directors, she manages and directs the CCRTA toward its objectives, which include representing the organization in concert with the board of directors with federal representatives, community leaders and the public.

Ms. Watson’s educational background includes a B.S. degree and an M.A. in urban and regional affairs from The University of Texas at Arlington. She began her career in public transportation with the Fort Worth Transportation Authority, where she served in a variety of capacities. In 1991, Ms. Watson was promoted to assistant general manager of the Fort Worth Transportation Authority until accepting the position of general manager of the CCRTA in 1996.

In 1995, the Greater Dallas/Fort Worth Chapter of the Women’s Transportation Seminar named Linda S. Watson “Woman of the Year.” The American Public Transportation Association (APTA) Executive Committee appointed Ms. Watson vice chair of human resources in 2002 – 2003. She was most recently selected to serve on the Transportation Research Board as chair of the Transit Cooperative Research Program’s Oversight and Project Selection Committee. ■



**MICHAEL W. BEHRENS** is the executive director of the Texas Department of Transportation (TxDOT). Under Texas Transportation Commission direction, he manages, directs and implements TxDOT policies, programs and operating strategies. He also represents TxDOT before the Texas Legislature and other entities.

In 1971, Behrens earned his bachelor's degree in civil engineering from Texas A&M University, and he began his career with TxDOT as an engineering assistant in the Yoakum District. Other positions he held in the Yoakum District include La Grange area engineer, district planning engineer and assistant district engineer.

In 1992, after serving as acting district engineer for the Yoakum District, Behrens was appointed district engineer for the 11-county district. He became the department's assistant executive director for engineering operations in Austin in April 1998.

Behrens is a member of the Transportation Research Board Executive Committee and the board of directors of the American Association of State Highway and Transportation Officials (AASHTO). He is vice president of the Western Association of State Highway and Transportation Officials (WASHTO). He also serves on the Civil Engineering Council for Texas A&M University. ■



**ARNOLD W. OLIVER** graduated from The University of Texas with a B.S. degree in civil engineering in 1960. He began his 33-year career with the Texas Department of Transportation as a summer employee while still attending college. Upon graduation, he joined the department full time in the Wichita Falls District.

While a senior engineer in Wichita Falls during the mid-1960s, he pioneered applications of computer automation, producing the first set of state highway plans created entirely by automation. Ten years later, as resident engineer in Young County, he introduced the first integrated engineering/maintenance operation in the history of the agency. His innovation subsequently became the model for all districts statewide. Concurrently, he helped TxDOT's Austin-based central administration develop and implement the comprehensive filing and file retention system used to this day.

In 1986, Mr. Oliver was promoted to district engineer for the Paris District. There, his attention to the dangerously deteriorating condition of the area's bridges resulted in much-needed funding for bridge replacement. His next promotion, a year and a half later, was to district engineer for Dallas, where he expedited the long-stalled \$500 million Dallas Central Expressway project and oversaw the design and planning of the city's first high-occupancy vehicle lanes.

In 1989, Mr. Oliver was named executive director of the department, heading an organization of 15,000 employees, \$1 trillion in assets and a budget of more than \$3 billion.

Upon his retirement from TxDOT in 1995, Mr. Oliver joined HNTB Corporation. In 2002, he was named Friend of TTI as well as Distinguished Engineering Graduate of The University of Texas at Austin. ■



(L-R): TTI Deputy Director Dennis Christiansen, commission member Robert Nichols, TxDOT Executive Director Steve Simmons, commission member Ric Williamson.

### Short Course highlights TxDOT accomplishments

More than 2,000 Texas Department of Transportation (TxDOT) employees and other transportation professionals from across the state and nation attended the October 2003 77<sup>th</sup> Short Course in College Station, Texas.

A slideshow presentation during the opening session highlighted several successful TxDOT projects including improved rest areas, the installation of a wire rope safety fence barrier on the median of the LBJ freeway and the relocation of the I-30 interchange in Fort Worth to preserve historical buildings.

TxDOT Executive Director Mike Behrens spoke about the record highway construction spending, the launch of the Amber Alert system, the success of the Click It or Ticket safety belt campaign, and the nation's first statewide clean air public outreach campaign, Drive Clean Across Texas.

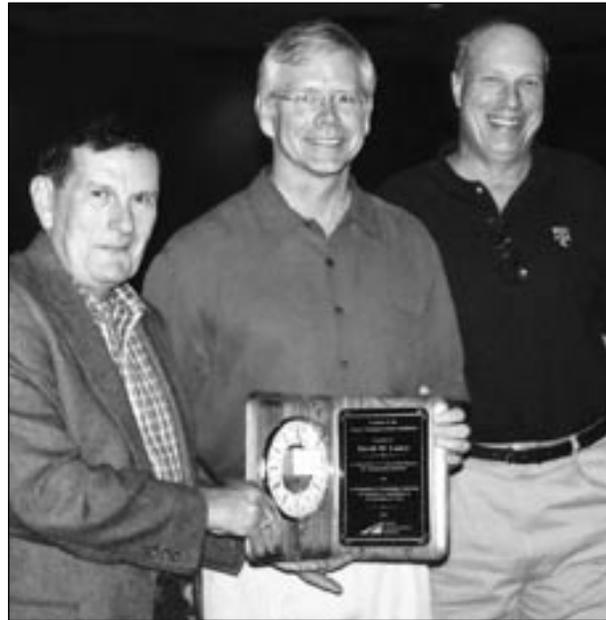
Texas Transportation Institute (TTI) Director Herb Richardson commented during his remarks that "it's always a pleasure to see everyone back at the Texas A&M campus as the Short Course provides a way to exchange information and visit with TxDOT colleagues and professionals from other transportation agencies throughout the country."

Sponsored cooperatively by TxDOT and TTI, the annual Short Course highlights recent transportation projects, policies and technologies. ■

### Roop, Mounce receive promotions

Steve Roop was recently promoted to assistant director of the Texas Transportation Institute (TTI). Roop has worked at TTI for 12 years and was previously the director of the Multimodal Freight Program. Both the Multimodal Freight Program and the Center for Transportation Safety (CTS) will report to Roop in his new capacity.

John Mounce was promoted to director of CTS. Mounce



(L-R): Herb Richardson, David Laney, Dennis Christiansen.

### David Laney selected as 2003 Friend of TTI

Chairman of the Amtrak Board of Directors, former chair of the Texas Transportation Commission and TTI Advisory Council member, David Laney received the 2003 Friend of TTI Award.

Since his appointment to the Transportation Commission in 1995, Laney has been involved in many TTI activities. He was a featured speaker at the dedication of the Gibb Gilchrist Research Building and the keynote speaker at the TTI 50<sup>th</sup> anniversary celebration dinner. Laney has been actively involved in the TTI Advisory Council and has talked with Texas A&M University students. He has provided extensive guidance and support in helping TTI advance its goals in the reauthorization of TEA-21.

Laney was recognized as the 2003 Friend of TTI at the President's Buffet preceding the Texas A&M/Kansas football game. Texas A&M President Robert Gates announced the award being given to Laney during his remarks at the buffet. Current and past TxDOT employees joined TTI for the event.

[ CONTINUED ON PAGE 23 ]

has worked at TTI for 33 years and was previously a senior research engineer with the Crash Analysis and Modeling Group at CTS.

The Multimodal Freight Program is a combination of the Center for Ports and Waterways, rail research, pipeline research and intermodal trucking. CTS was created by the legislature and brings together engineering and public health safety researchers to provide a unique perspective to the issue of reducing fatalities and injuries resulting from traffic crashes. ■

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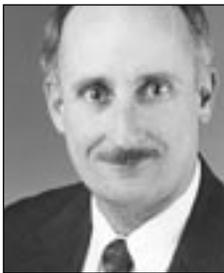
Earlier this year Mr. Laney joined the Dallas law firm of Jackson Walker, L.L.P., as partner. Prior to that he was a partner in the firm of Jenkins and Gilchrist, also in Dallas. A graduate of Stanford University, Mr. Laney received his law degree from the Southern Methodist University Law School. He is a member of the Dallas, Texas and American Bar Associations.

Over the years, a large number of people have provided significant support to TTI. In 1999, the institute began giving formal recognition to one individual annually who has provided an exceptional level of support to TTI for many years.

Laney joins four other Friend of TTI Award winners: former Executive Director of TxDOT Arnold Oliver (2002), Chancellor Emeritus of The Texas A&M University System Barry Thompson (2001), former Mayor of Houston Bob Lanier (2000) and former General Manager of the Metropolitan Transit Authority of Harris County Bob MacLennan (1999). The names of each of these individuals are on permanent display in one of the main TTI conference rooms. ■

### Paul Krugler joins TTI

Paul Krugler retired from the Texas Department of Transportation (TxDOT) in August 2003, after a distinguished career. Krugler served as director of the Office of Research and Technology Implementation during the last five years. He joined TTI in December as manager of Research Implementation.



Krugler worked for TxDOT for 30 years and began his career as an engineering assistant in the Materials and Tests Division. Krugler led the implementation program at TxDOT and

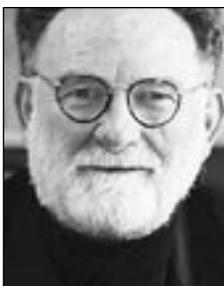
also was active in the American Association of State Highway and Transportation Officials (AASHTO) Technology Implementation Group initiative.

Krugler will help TTI researchers in assisting sponsors implement the results of research projects. While implementation of research has always been important at TTI, in recent years more of the institute's research sponsors are giving increased emphasis to implementation. Formally recognizing this need in the TTI organization provides opportunities to more closely meet the sponsors' needs.

Krugler will also be actively participating in the development and conduct of contract research. For example, his skills and knowledge in pavements and materials will closely complement TTI's extensive existing capabilities in this area. ■

### Christiansen and Burke receive Regents Fellow Award

The Texas A&M University System Board of Regents recently bestowed its Regents Fellow Service Award on TTI Deputy Director Dennis Christiansen and Senior Research Scientist and Director of the Southwest Region University Transportation Center Dock Burke. In 1998, the board established the Regents Fellow Service Award Program to honor service, extension and research professionals who have provided exemplary professional service to society that has created large and lasting benefits to Texas and beyond. This is the first time that TTI has had two such appointments in one year.



Christiansen has been employed by TTI for 32 years and currently serves as deputy director. During his early career at TTI, Christiansen led a wide range of research programs that have had a major impact on transportation in Texas and beyond. Approx-

mately 50 publications document his contributions, which range from park-and-ride facilities, transportation fuel consumption, carpools and methods for estimating congestion. Christiansen is an acknowledged international expert in the area of high-occupancy vehicle (HOV) systems, which he initially developed and saw implemented in Houston. Many of the concepts pioneered in Houston, which emerged from Christiansen's research, have been duplicated throughout the country.

Burke has been with TTI for 33 years and has served as study supervisor or cosupervisor for more than 50 transportation research projects during his career at TTI. He has authored or co-authored more than 85 technical reports, papers and articles and delivered approximately 40 technical discussions and presentations on transportation topics. His research includes a variety of policy and technical topics involving financial policy of transportation agencies, international transportation between Texas and Mexico, truck sizes and weights issues, freight commodity movements (including commodity flows and intermodal movements), and economic impact and development aspects of transportation expenditures.

The awards were presented at a luncheon ceremony Dec. 4. ■

## THE BACK ROAD



Frustrating traffic delays due to congested freeways and surface streets are no longer confined to larger cities. Small and medium-sized cities now experience almost the same level of congestion as major urban areas. That's the bad news. The good news, according to TTI's annual *Urban Mobility Report*, is that some strategies already in use are helping to reduce the problem. This year's study il-

lustrates the positive effects that public transportation service, bus and carpool lanes, and three types of roadway operating efficiencies — traffic signal coordination, freeway incident management (clearing crashes and disabled vehicles) and the use of freeway entrance ramp meters (signals that regulate traffic flow onto the freeway) — can have on improving urban mobility. This issue of the *Researcher* contains more interesting details about the study and what improvements are most useful in helping ease traffic congestion. An article on managing freeway lanes describes another way to help manage traffic more effectively, as does the issue of pricing various options.

Another area of great interest is how we choose to finance new construction and other essential transportation improvements. In recent years, the Texas Legislature has approved a number of innovative financing options and approaches, including the creation of regional mobility authorities. TTI researchers have been looking at urban/rural toll road options that will help cities determine if a toll road is feasible for their location. As creative solutions are proposed to speed construction of new roadway capacity, TTI researchers will continue to monitor and report on their progress in expanding our state's transportation system.

This issue also includes a special section acknowledging the Southwest Region University Transportation Center's (SWUTC) 15th year of operation. TTI is the lead institution in the consortium partnership of The Texas A&M University System, Texas Southern University and The University of Texas at Austin. One of the most successful University Transportation Centers (UTC), SWUTC was recently awarded \$906,000 by United States Department of Transportation's Research and Special Projects Administration. The UTC program will be up for renewal in the upcoming transportation reauthorization bill.

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. My best wishes to you for a happy and successful 2004.

Thanks for your continued interest in TTI research.

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## Researcher

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