

UNIVERSITY OF MINNESOTA



CENTER FOR TRANSPORTATION STUDIES

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# Center for Transportation Studies

2006 Annual Report




## Center for Transportation Studies

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# Center for Transportation Studies

## 2006 Annual Report

This publication is a report of transportation research, education, and outreach activities conducted by the Center for Transportation Studies and its affiliated programs for the period July 2005 through June 2006 (fiscal year 2006).

This report is organized using the Center's five areas of excellence as defined by the CTS Executive Committee, key goals it considers critical for innovation in transportation: *fostering ideas and knowledge development, championing formal education, promoting applied problem-solving, initiating public and stakeholder participation, and strengthening University expertise.*

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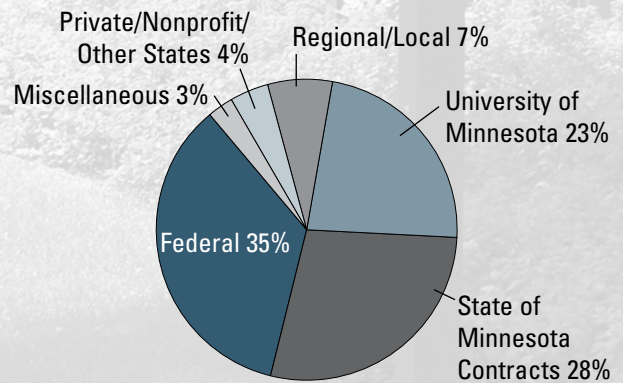
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## SAFETEA-LU supports CTS programs

The federal transportation reauthorization bill passed in August—known as SAFETEA-LU—increased funding by 60 percent for the Intelligent Transportation Systems (ITS) Institute at CTS and established a national Center for Excellence in Rural Safety at the University's Humphrey Institute of Public Affairs.

The ITS Institute will receive up to \$16 million to fund work over five years in several disciplines, including research at the University of Minnesota Duluth. The Center for Excellence in Rural Safety at the Humphrey Institute, one of four centers nationally, is funded at \$617,769 for the first year, with additional levels to be determined.



**CTS total annual revenues  
FY2006: \$18,601,178**



Creating opportunities for interdisciplinary collaboration within the University of Minnesota and beyond is key to our mission at the Center for Transportation Studies. Years of hard work, dedication, and innovative results by our faculty and staff have prepared us for larger research, education, and outreach efforts no one could have fully imagined when our center was established in 1987.

We have had a highly successful year at CTS, evidenced in part by \$18.6 million in total revenues. Our long-time programs in intelligent transportation systems, pavements and bridges, policy and planning, safety, and the environment continue to be strong and grow.

We also have continued a trend starting in 1997 with the Transportation and Regional Growth Study by facilitating the development of broad programs, often interdisciplinary and often connected to multiple sponsors. This past year, we created the Security in Transportation Technology Research and Applications Program (*for more on SECTTRA, see page 8*) and we participated in the development of the Transportation Engineering and Road Research Alliance (*for more on TERRA, see [www.terroroadalliance.org](http://www.terroroadalliance.org)*).

In addition, a series of new programs will address the integration of transportation into communities, an issue of growing importance for transportation.

Our Access to Destinations Study, an interdisciplinary set of projects examining accessibility in the Twin Cities, builds upon research from our Transportation and Regional Growth Study ([www.cts.umn.edu/trg](http://www.cts.umn.edu/trg)). This new study will measure accessibility by auto, transit, biking, and walking to a variety of destinations, including jobs, shopping, and entertainment. The McKnight Foundation has joined our study sponsors to fund outreach efforts for this study (*for more, see page 5*).

An exciting new direction in the area of integrated transportation design is sponsored by the American Institute of Architects. Faculty from architecture, landscape architecture, geography, planning, and civil engineering are conducting a large study on the impacts of well-designed transportation facilities on communities (*for more, see page 12*). In addition, the Federal Highway Administration chose CTS to evaluate non-motorized transportation investments in four pilot communities designated in the 2005 transportation act (SAFETEA-LU).

More effectively tying transportation to land use has long been the goal of community planners. These new initiatives will provide new information and tools to help this integration. Without a doubt, the result of this interdisciplinary collaboration is new knowledge that will enhance transportation—knowledge that improves our communities and, ultimately, our society.

A handwritten signature in black ink that reads "Robert C. Johns".

Robert C. Johns, Director  
Center for Transportation Studies



**CTS  
Area of  
Excellence**

Foster the development of new ideas and knowledge through faculty-led research programs and interdisciplinary teams that the Center administers and supports

## **Easing the commute**

Since 1994, the Minnesota Department of Transportation (Mn/DOT) and the Metropolitan Council have been working to ease congestion and manage rush hour traffic flow. Researchers at the University of Minnesota's Humphrey Institute of Public Affairs aided this effort by providing assistance with planning and evaluation of possible solutions.

One solution is Minnesota's first toll lane. Solo drivers can now use the high-occupancy vehicle (HOV) lane on I-394 during rush hour—for a fee. According to a recent study led by Lee Munnich, a CTS faculty scholar and director of the Humphrey Institute's State and Local Policy Program, the results are promising.

In May 2005, Mn/DOT converted the HOV lane on I-394 to the MnPASS high-occupancy toll ("HOT") lane. Solo drivers pay a fee collected via an electronic reader, or transponder, mounted on the windshield of their car. The fee is dynamic: when the lane fills, the fee increases; when the lane empties, the fee decreases. Carpoolers, bus users, and motorcyclists continue to use the lane at no charge.

## **Better traffic flow**

This system has increased usage of the once underutilized HOV lane. A recent study showed that an additional 350 vehicles now use the MnPASS lane on the way to downtown Minneapolis at the peak of the morning rush hour. During the evening peak, about 315 additional vehicles use the lane on the return trip to the western suburbs.

Although more vehicles now use the lane, carpoolers and bus riders have not experienced slow downs. Drivers are generally able to maintain an average speed of 50 mph. In fact, 85 percent of users surveyed said they were satisfied

# Ideas and Knowledge Development

with traffic flow in the MnPASS lane.

At the same time, congestion in the general-purpose lanes has also decreased. In 2004, drivers experienced 10 miles of congestion during the peak of the afternoon commute. In 2005—after the MnPASS Lane opened—congestion decreased to 5 miles. A similar decrease was also experienced by drivers during the morning commute.

## High satisfaction

MnPASS did have some growing pains in its first few months. After a public outcry, Mn/DOT decided not to charge tolls 24 hours per day on the MnPASS lanes west of Highway 100, a popular decision according to a recent survey. Mn/DOT also opened a shoulder lane to westbound traffic between Highways 100 and 169, further relieving conges-

tion in that segment. Since those adjustments, public approval has been strong.

Drivers of all income levels rate their use of I-394 in the post-MnPASS era as “enjoyable” and say MnPASS is a “good idea.” Low-income drivers approve of the project by nearly an overwhelming three-to-one margin. Many who can’t afford to use the lane every day like the option of “gridlock insurance” when they’re late for day care, work, or an important appointment.

To date, 10,365 MnPASS transponders have been leased, and the revenue generated is now covering the operating cost of the project.

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For more information about MnPass, see *I-394 MnPass: A New Choice for Commuters* at [www.mnpass.org/pdfs/mnpassreport-uofm0306.pdf](http://www.mnpass.org/pdfs/mnpassreport-uofm0306.pdf).

## Inside transportation research at CTS

**This page and the following 10 describe selected research efforts that reached milestones this year. Projects are grouped according to the Center’s four research emphases:**

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## Measuring accessibility

In Minnesota and across the country, land use and transportation planners are grappling with increased congestion. Yet mobility measures such as travel time or speed describe only how fast people travel. They tell us nothing about accessibility, that is, how easily people can get where they want or need to go.

For example, drivers in rural areas may zip to work with no congestion at all but still be 50 minutes from their job. Contrast that to the denser Twin Cities, where hundreds of thousands of jobs and services are within 15 minutes’ reach even on congested roadways.

Civil engineering professor David Levinson and post-doctoral researcher Ahmed M. El-Geneidy recently evaluated tools for moni-

toring accessibility within the land use and transportation system, and assessing the benefits of proposed changes. Their work, supported by the Minnesota Department of Transportation, Hennepin County, and the Metropolitan Council, is part of the Access to Destinations study, launched by CTS in 2005.

The researchers identified appropriate measures of accessibility and evaluated them in terms of accuracy, complexity, and ease of use. They also developed a series of maps and charts to illustrate the two most commonly used measures of accessibility.

In addition, they developed a third measure, “place rank.” This measure, modeled on the algorithm that underlies the Google

search engine, is complex but potentially more accurate than the other two.

Levinson and El-Geneidy also studied the effects of accessibility on home sales. They discovered that each job within 20 minutes’ travel time adds 25 cents to the price of a house (for example, 20,000 jobs within 20 minutes will add \$5,000).

On the other hand, each worker who lives within 20 minutes reduces the price of a house by 35 cents (20,000 workers decrease the price by \$7,000). In other words, homebuyers will pay a premium to live near jobs and away from competing workers.

*Read more about this research and more on the Access to Destinations Web site at [www.cts.umn.edu/access-study](http://www.cts.umn.edu/access-study).*

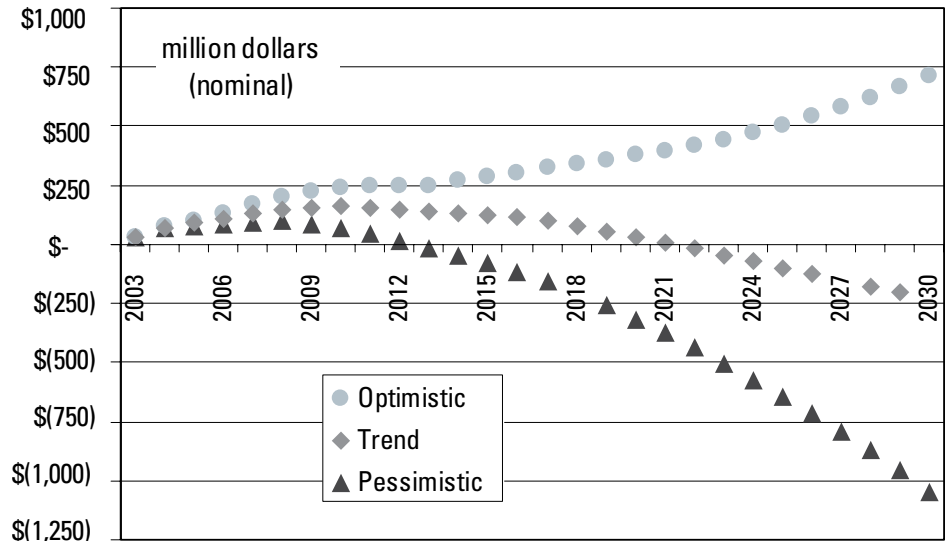
## Gazing into the future of road financing

For policymakers, ensuring the adequacy of future funding for the transportation system is one of the most challenging aspects of transportation planning. Barry Ryan and Thomas Stinson of the University of Minnesota’s Department of Applied Economics recently forecast potential revenues from three statewide road taxes to the year 2030 under different economic scenarios. Their goal was to identify policy trends, strengths, and weaknesses as a baseline for understanding future road funding challenges.

### Three scenarios

Ryan and Stinson’s research, funded by the Minnesota Department of Transportation (Mn/DOT), looks at three scenarios, dubbed Trend, Optimistic, and Pessimistic. Inflation is a key factor in their analysis, affecting the overall purchasing power of revenues derived from Minnesota’s major tax sources of road funding: the motor vehicles registration tax, the motor vehicles sales tax, and the fuel excise tax. In addition to the effects of inflation, vehicle fleet size, and fuel consumption, the researchers examine alternative fuel-tax outcomes, including reduced petroleum consumption and the adoption of alternative fuels.

Under the Trend scenario (which projects current trends into the future), the researchers predict that tax revenues will lose purchasing power due to inflationary pressures but that cumulative revenues and costs will nearly balance out over the forecast period. The Optimistic scenario predicts an increase in purchasing power, providing the opportunity for significant new spending without changing current laws. The Pessimistic scenario, on the other hand, posits a tax revenue shortfall by 2012, forcing changes in finance laws to avoid significant deterioration in road service.



Purchase power balance using core-CPI inflation, 2003-2030

### A long-range policymaking tool

Long-range planning, the report says, “is not just about predicting likely financial outcomes; it can help define policy goals and identify system strengths and weaknesses.” This work by Ryan and Stinson joins a body of other efforts to understand long-range policy trends for Minnesota, including Mn/DOT’s 20-year state transportation plan and the Twin Cities Metropolitan Council’s Regional Development Framework.

For decision makers, planners, and policy analysts, the new report offers a useful perspective on how transportation will be affected by long-term trends in tax policy.

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*Minnesota’s State Road Taxes in 2030: Will revenues keep pace with inflation?* is online at [www.lrrb.org/pdf/200526.pdf](http://www.lrrb.org/pdf/200526.pdf).

### Funding CTS research

Funding for transportation research at CTS reached an unprecedented level in FY06 at \$12.5 million, an increase of nearly 30 percent over FY05. This growth can be attributed to an increase in funding for the ITS Institute, along with the University’s success in leveraging a diverse set of local and national funding opportunities.



## In-vehicle driver assistance for teenagers

Parents of teenagers often worry when their child starts driving—and not without reason. Teens are among the most risk-prone groups of drivers, experiencing higher crash rates than drivers with a few more years of experience and the highest traffic fatality rate of any age group. Researchers with the Intelligent Transportation Systems (ITS) Institute are working to address this serious public safety issue by developing in-vehicle technology to monitor and correct inexperienced drivers' unsafe behaviors behind the wheel.

Professor Stephen Simon of the Law School is leading the project, which includes ITS Institute director Max Donath and HumanFIRST Program director Nic Ward as co-investigators and former mechanical engineering graduate student Shawn Brovold, who has designed much of the technology. The project is funded by the ITS Institute.

### Preventing fatal teen driver crashes

The research team's Teen Driver Support System (TDSS) is aiming to address the primary causes of most fatal teen-driver crashes: speeding, lack of seat belt use, alcohol impairment, and driver inexperience. TDSS has an ignition interlock that will prevent a driver from starting a car if he or she is not buckled up or is not sober. In addition, it provides real-time in-vehicle warnings about illegal or unsafe speeds, and records vehicle information for later review by parents or licensing agencies.

To date, the team has developed a prototype system for speed-limit feedback and reporting within Hennepin County. The system links the speed-limiting function to a digital map and a GPS sensor to determine the vehicle's location and the road's speed limit. If the driver's current speed exceeds the road's posted limit, an audible warning is used to

notify the driver, and details (e.g., time, location, speed) of the infraction are recorded for later review.

### Leveraging existing technologies

The system's ability to calculate the vehicle's location means an even more ambitious safety feature might be possible: driver warnings and intervention based on road geometry and weather conditions. By "looking ahead" to see if the vehicle is approaching a sharp curve or other potentially hazardous road feature, the system could issue a warning to inexperienced drivers before they get into trouble. In addition, the system could use Mn/DOT's weather recording devices to get real-time information on current driving conditions and adjust the car's maximum speed limit accordingly.

Most vehicles already have various technologies needed for the TDSS built into them. Vehicle navigation systems could serve as a platform for speed warning systems. Some newer cars even have an event data recorder—a sort of "black box"—that records data leading up to

and at the time of a crash (how fast the car was traveling, the seat belt status, etc.). Some cars also are equipped with an ignition interlock that prevents them from being started if the "drive" gear is engaged. Automakers, which already install seat belt sensors, could combine these features to make a seat belt ignition interlock. However, these types of safety features have yet to be implemented or offered as factory options.

The researchers plan to continue testing the system locally for functionality, test attitudes about the system, and test how feedback is delivered with teenagers in a driving simulator. They also plan to conduct multi-vehicle field operations tests and conduct market analysis, to gauge both the public's interest in the system as well as learn how to package and market the product.

More information about ITS research is online at [www.its.umn.edu/research](http://www.its.umn.edu/research).



Shawn Brovold

## ‘Machine vision’ detects suspicious activity in public places

Maintaining security in large public areas—such as transit stations and airports—is a critical part of ensuring the overall safety of the transportation system, and a constant challenge for security personnel. Even with extensive arrays of surveillance cameras, it remains difficult to monitor the movements of hundreds of individuals in thousands of square feet of free space. To make the job easier, computer science and engineering professor Nikolaos Papanikolopoulos is developing an automated system that gives security personnel a hand by watching out for patterns of suspicious activity.

Machine-vision techniques—using computers to intelligently process data from cameras—is one of Papanikolopoulos’s main research interests. For several years, he and his research team have worked to develop specialized image processing algorithms that enable computers to accurately identify and track individual vehicles and persons as they move around a busy scene. This work has become an important part of other transportation research projects, enabling automated data gathering in areas where complex traffic patterns limit the effectiveness of other detection systems.

### Tracking individuals

Recently, Papanikolopoulos worked with the Twin Cities public transportation agency, Metro Transit, to test a video surveillance system that automatically detects suspicious activity, such as loitering, at transit stops. Using a video camera mounted near a bus shelter, the system demonstrated the ability to track individual pedestrians as they moved around the area of the bus stop and determine if they appeared to be loitering for extended periods of time without boarding a bus.

That work, begun with seed funding from the ITS Institute, led to funding from the Department of Homeland Security to further develop the technology to monitor large indoor, multimodal, transportation-related spaces. With that goal in mind, the researchers are working to extend the vision-based tracking approach by coordinating multiple cameras and making some cameras moveable, thereby improving the system’s ability to track subjects of interest.

Papanikolopoulos says that indoor spaces present challenges to effective monitoring because of the large areas involved—up to 10,000 square feet or more—and large number of people moving from place to place. However,

the consistent artificial lighting found indoors eliminates the problems of variable sunlight and moving shadows, which frequently interfere with monitoring systems in outdoor locations.

### Detecting suspicious behavior

Among the technical issues explored in the ongoing research is improving the system’s ability to detect patterns of suspicious activity, such as when a person leaves a parcel in a public area and walks away. Another important aspect of the work is developing methods to coordinate multiple cameras to accurately determine the location of a moving person based on simultaneous observation from different points of view.

The incorporation of mobility and multiple cameras into the tracking and detection system links vision-based tracking to another major area of Papanikolopoulos’s research: distributed robotics, a branch of robotics in which teams of small robots work together to accomplish a task such as gathering data.

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*Recognition of Human Activity in Metro Transit Spaces* is online at [www.cts.umn.edu/pdf/CTS-04-02.pdf](http://www.cts.umn.edu/pdf/CTS-04-02.pdf).

## Transportation security research

A new program is being developed to earn recognition for the University of Minnesota as a world leader in the development and application of technologies for transportation security. SECTTRA—Security in Transportation Technology Research and Applications—is a joint program of the Department of Computer Science and Engineering (CSE) and CTS.

As program director, CSE professor Nikolaos Papanikolopoulos will work with CTS and sponsors to attract funding, involve faculty and department staff in research



Nikolaos Papanikolopoulos

activities, provide national and state leadership, and guide the delivery of research, education, and outreach efforts.

The SECTTRA program will collaborate with the ITS Institute and the Safety Security Rescue Research Center (SSR-RC) in CSE. Funded by the National Science Foundation, SSR-RC is a cooperative research center that

coordinates research with a spectrum of large general homeland security contractors, companies with a specific market share, and start-up companies with key enabling technologies.

SECTTRA’s mission complements SSR-RC’s goal of attracting private sector funding for a broad range of security-related research. It also complements the ITS Institute goal of attracting funds for other transportation technology research.

*More about SECTTRA* is online at [www.secttra.umn.edu](http://www.secttra.umn.edu).

## U of M research contributes to safety of pedestrian bridges

Some of the most important transportation-related discoveries made at the University help improve facilities and procedures already in place. Over the last few years, civil engineering professors Arturo Schultz and Catherine French, both CTS Faculty Scholars, and graduate student Eray Baran have done just that.

Their research on the stability and ductility (the ability to deform and still function properly) of some concrete pedestrian bridges has influenced changes in certain widely used bridge design specifications of the American Association of State Highway and Transportation Officials (AASHTO). In addition, the researchers have made design recommendations to improve the safety of these bridges when sustaining an impact.

### Some pedestrian bridges at risk

A prestressed concrete through-girder bridge is a practical and popular form of pedestrian bridge construction in which two prestressed concrete I-girders support the bridge deck. Widely used in Minnesota, the bridges are easy to construct, economical, and durable. However, many such prestressed concrete pedestrian bridges are also more vulnerable in certain situations. For example, an impact from a vehicle that is too tall could cause serious structural damage—and collapse if the girders are damaged—because these pedestrian bridges typically are of lighter construction and less capable of sustaining an impact than highway bridges.

In light of concerns raised when several of these bridges (only one in Minnesota) were hit by over-height vehicles during the past few years, Mn/DOT partnered with CTS in 2002 to fund a study of the problem. Researchers examined the bridges' stability and behavior when sustaining a side impact. In addition, researchers investigated new

AASHTO design code equations for calculating girder ductility.

### Improved design specifications

In light of a new requirement that state DOTs design all bridges in accordance with the AASHTO bridge design specifications by 2007, the researchers first scrutinized equations from these specifications as part of their project. Specifically, they examined the calculation of the moment (bending force) capacity and ductility of the prestressed concrete I-girders that support the bridge deck. The research revealed errors in those equations, which meant the flexural strength and ductility of the girders were being determined incorrectly, and sections of these bridges were more vulnerable to damage from an impact.

AASHTO has recently revised its design specifications to reflect the findings from the Schultz-French-Baran project and the findings of other similar research projects. The code change will more correctly correlate the design of the prestressed concrete I-girders with their expected behavior. Updated specifica-

tions for prestressed concrete through-girder bridges have been released to state DOTs, and the commentary for that design section cites the Schultz/French/Baran results as a reference for the modification. The results were also published in the *Precast/Prestressed Concrete Institute Journal*.

### Ensuring safety for motorists and pedestrians

Tests that dealt with the strength and stability of these bridges also carried out during the research project consisted of numerical analyses of the bridge system and tests of individual components. Much of that testing focused on the performance of hardware used to connect the many concrete and steel parts of the bridges. As a result, the researchers recommended design modifications to improve its ability to sustain an impact by an over-height vehicle. Most important, the recommendations will make concrete pedestrian bridges safer for both motorists and pedestrians.



## Assessing performance of stainless steel dowel tubes

Anyone who has driven on a concrete road knows the sound: a continual “bumpity bump” as the car passes over the joints between slabs. These joints absorb the movement of the slabs, which expand and contract as temperatures fluctuate. The slabs are connected by a solid, round, epoxy-coated metal dowel embedded in the concrete. The dowel keeps the slabs from heaving and cracking as vehicles pass over the joint.

But in cold climates, deicing salt penetrates the joint to its metal parts. Over time, the salt penetrates the coating and corrodes the dowel at its midpoint, causing it to break. When this happens, the road must be repaired.

### Planning for the long term

Traditionally, roads have been built to survive a certain number of load applications — for example, 10 million equivalent single axel loads of 18,000 pounds. The design of the road depended on the expected volume of traffic: more heavy traffic meant a thicker pavement and dowels.

In recent years, however, Mn/DOT has also begun to plan for longevity—up to 50 years. This means the dowels connecting concrete slabs will need to resist corrosion.

The simplest solution is to use solid

stainless steel dowels, which do not rust. But that is too expensive. A less costly solution is to use stainless steel pipe filled with mortar made of cement and sand. But such dowels would be difficult to manufacture in sufficient quantities. So Mn/DOT considered a third option: hollow stainless steel pipe.

### Testing the dowels

A team of researchers led by civil engineering professors Lev Khazanovich and Arturo Schultz, with funding from Mn/DOT, compared the performance of conventional steel and hollow stainless steel dowels. Using the Minnesota Accelerated Loading Facility (Minne-ALF), the researchers tested joints with both types of dowels. They simulated passage of 10 million very heavy single-axel loads (18,000 pounds) and 10,000 extremely heavy single-axel loads (30,000 pounds).

The hollow dowels were only slightly less effective than uncorroded conventional dowels. And because the hollow dowels won't corrode, they will be more effective and less expensive than conventional dowels over longer periods of time.

### Role of the Minne-ALF

The Minne-ALF is the result of more than 10 years of cooperation and coordination

between Mn/DOT and the University. This laboratory-based test facility allows researchers to apply rapid and repeated simulated heavy vehicle loads to new pavement designs and materials.

Without the Minne-ALF, researchers would have needed to build a test section of road or conduct a small-scale test with a single dowel. Gathering results from a test section requires years. Moreover, results from small-scale testing are less reliable. The Minne-ALF allowed researchers to accurately simulate 50 years of performance in less than two months. This rapid and rigorous testing means that new technology can be implemented almost immediately.

### Savings and safety

Concrete roads built with hollow stainless steel dowels will last longer—and require fewer repairs—which will save the state money.

Less road repair also reduces congestion because fewer lanes will be closed for construction. And since traffic accidents in highway work zones are a major problem, longer-lasting roads ultimately result in safer driving.

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A report describing this research is online at [www.lrrb.org/pdf/200601.pdf](http://www.lrrb.org/pdf/200601.pdf).

## Managing storm water pollution

Effective storm water management is a critical concern in the operation and maintenance of highway infrastructure.

John Nieber, Dario Canelon, and Caleb Arika of the Department of Bioproducts and Biosystems Engineering at the University of Minnesota collaborated with Robert Sykes of the Department of Landscape Architecture to produce a report that will help plan for the successful management of storm water runoff from highways to adjacent lands.

Their report, funded by the Minnesota Local Road Research Board (LRRB), describes best management practices for development or redevelopment activity clearly and in detail, with considerations about selection criteria based on applicability and performance such as overbank flood protection, channel protection, groundwater recharge, pollutant removal, and community acceptance. The report also discusses accurate cost estimation, potential negative impacts

of storm water management on adjacent highway infrastructure, and the results of a survey conducted among transportation design and maintenance professionals in the Twin Cities region.

Two reports describing this research are online at [www.lrrb.org/pdf/200549A.pdf](http://www.lrrb.org/pdf/200549A.pdf) and [www.lrrb.org/pdf/200549B.pdf](http://www.lrrb.org/pdf/200549B.pdf).

## Controlling reed canary grass in restored wetlands

Restoring wetlands that are lost or destroyed in the process of building transportation systems may be one of Mn/DOT's lesser-known responsibilities. One of the main obstacles to restoring native wetland vegetation is controlling invasive species, and reed canary grass, or *Phalaris arundinacea*, is one of the most difficult. A fast-growing perennial grass, it spreads throughout natural wetlands, posing a serious threat to diversity in vegetation.

University of Minnesota horticultural science professor Susan Galatowitsch and graduate student Carrie Reinhardt have studied the behavior of canary grass dominance in prairie pothole wetland restorations. From their data, they have developed recommendations for best management practices that will be publishable in Mn/DOT specifications.

### Protecting native vegetation

Establishment of canary grass is particularly bad for ecosystem restorations, such as those found along roadsides, especially wetland restorations in the northern states. This is because the canary grass's presence often prevents colonization by sedge meadow vegetation in restored prairie pothole wetlands. Therefore, efficiently controlling the invasive grass is crucial to the establishment of native vegetation in wetland restorations.

So Galatowitsch and Reinhardt, with funding from Mn/DOT, designed a large-scale field experiment on two research locations to examine the two most common techniques used to control canary grass: spring burning and glyphosate herbicide application.

Spring burning involves burning existing vegetation in the spring months when the vegetation is dormant. When the plants start to re-grow, herbicide applications are used to kill them.



Herbicide application, the team found, was very effective in reducing canary grass biomass (which is the plant's foliage and root mass) but its effectiveness depended on the timing of application. Late summer and early fall applications were significantly more effective than spring applications.

### Reducing the weed's opportunity to sprout

They also found that spring burning neither reduces canary grass biomass, nor does it enhance the effectiveness of later herbicide applications. It does, however, reduce the grass's seed bank, or the seed that is lying dormant in the soil and has potential to sprout again when conditions are right. This reduces the potential amount of propagule, or plant parts like roots or shoots that may be able to sprout. This reduction in propagule availability may limit canary grass's recolonization.

Although combinations of these control techniques effectively reduced canary grass in the experiment field, the grass recolonized quickly and prevented establishment of native species even after two rounds of control technique applications. Two years of the most effective use of herbicide and burning

were not enough to reduce the grass's dominance to the point where native species could become established.

### Managing a long-term process

The team concluded that since canary grass can establish from very low propagule densities and grows so rapidly, reduction of canary grass has to be a long-term process that is most effective when it includes a combination of later-season herbicide applications and burning. It remains complicated by potential reinvasion of cleared sites.

Nevertheless, Bob Jacobson, wetland restoration and management programs supervisor at the Mn/DOT Office of Environmental Services, says the researchers' findings have helped determine procedures he uses to control canary grass.

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*Best Management Practices for the Invasive Phalaris arundinacea L. (Reed Canary Grass) in Wetland Restorations* is online at [www.lrrb.org/pdf/200436.pdf](http://www.lrrb.org/pdf/200436.pdf).

## Urbanization of the countryside

Greater Minnesota is becoming urbanized. Today cities like Brainerd, St. Cloud, and Duluth are at the center of expanding regional “metro areas.” Urbanization is occurring even in parts of the state where the population is not growing, and it has profound implications for the state’s transportation system.

U of M geographers John Adams and Barbara VanDrasek, co-funded by the Minnesota Department of Transportation (Mn/DOT) and the Minnesota Local Road Research Board (LRRB) recently examined changes in population, housing, and industrial activity in 26 regional centers in Greater Minnesota. The researchers

also looked at occupational change and the changing characteristics of both commuters and the commute.

Their report *Urbanization of the Minnesota Countryside, 2000-2025: Evolving Geographies and Transportation Impacts* builds on research conducted as part of the five-year Transportation and Regional Growth Study, which concluded in 2003.

### Booming lake regions

Adams and VanDrasek found that popular northern destinations, such as the area around Grand Rapids, are attracting retirees as year-round residents. This has led to growth in the housing, service, financial, and

health care industries. Towns, villages, and hamlets within commuting range are becoming bedroom suburbs. Meanwhile, in unincorporated townships and around lakes, new houses are going up along major and minor highways and country roads that provide access to nearby malls.

As a result, roads once used mostly in summer are now traveled by commuters in all seasons. As more people build homes on lakes or in remote forested areas, better roads are needed for emergency vehicles such as ambulances. The result is a greater need for maintenance, such as winter plowing. In addition, population increases may also mean that regional centers like Grand

## CTS studying transportation design and communities

The American Institute of Architects (AIA) selected CTS to conduct a \$1 million research study to examine how communities benefit from well-designed transportation projects. The findings from this research project will provide a framework to help communities make wiser transportation decisions.

Specifically, *A Study on the Role of Well-Designed Transportation Projects Enhancing Communities*, slated for completion by July 2007, will measure how transportation projects of various types promote economic development, protect the environment, enhance public involvement, and add to the aesthetic and cultural identity of communities. The research is part of a \$2 million grant to AIA from the Federal Highway Administration (FHWA).

The research has three separate parts that will document measurable outcomes and best practices relative to design and planning. These outcomes, measures, and practices will be integrated in a fourth part, a synthesis on the composite synergies of the other three parts. This synthesis will be

cross-linked to cases and provide information that can be used as a guidebook.

An interdisciplinary research team at the University of Minnesota includes primary investigators from architecture, landscape architecture, geography, planning, and civil engineering. Robert Johns, director of CTS, is the study’s overall principal investigator responsible for interdisciplinary leadership. Landscape architecture professor Lance Neckar, instrumental in helping CTS prepare the proposal, is the study’s co-investigator, responsible for technical guidance of the research. Other researchers include geography professor John S. Adams, geography researcher Barbara J. VanDrasek, Center for Sustainable Building Research director John Carmody, Metropolitan Design Center professor and director Ann Forsyth, Humphrey Institute of Public Affairs assistant professor Carissa Schively, and civil engineering professor Gary Davis.

CTS frequently gathers researchers as a group to discuss approaches, share findings, and plan joint activities. CTS is using its experience in leading previous

interdisciplinary research teams—such as the Transportation and Regional Growth Study—to facilitate linkages across academic departments and colleges.

A key outreach goal of both CTS and the AIA is to educate transportation practitioners, community designers, and the public about the benefits and best practices of working together to enhance communities through well-designed transportation projects.



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Rapids will need some form of public transportation.

**Farm consolidation**

Transportation needs are different in southwestern Minnesota. In the five-county area around Marshall, for example, the population is shrinking as farms consolidate.

But larger farms mean more big trucks on the road taking farm products to market and delivering machinery and supplies to farmers. So while the overall volume of traffic may decrease, roads must now be able to withstand heavier trucks and longer hauls.

**Weekend gridlock**

Changes in traffic patterns are also occurring in towns located between the Twin Cities and popular weekend destinations.

For instance, Brainerd has experienced gridlock on Thursdays and Fridays as thousands of drivers pass through on their way to lake homes and cabins. Gridlock occurs again on Sunday as drivers go through town again on their way home.

**Challenges for planners**

Comprehensive land use and transportation planning is needed at state, regional, and local levels. But, according to Adams and VanDrasek, planners face four challenges:

- Local government is highly fragmented.
- Society has become more individualistic in outlook and self-centered in its behaviors.
- The boundary between public goods and private goods has blurred.
- People expect continued access to publicly provided services — including roads — but are increasingly reluctant to pay for them.



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Rail service and air transportation remain crucial for Minnesota, but highways form the major transportation arteries. Trunk highways and subsidiary roads are becoming the “city streets” of an increasingly urbanized countryside.

The hope is that economic development and population expansion can continue without destroying the very

features that make Greater Minnesota so attractive as a place to live, work, and play.

.....  
*Urbanization of Minnesota’s Countryside, 2000-2025: Evolving Geographies and Transportation Impacts* is online at [www.lrrb.org/pdf/200623.pdf](http://www.lrrb.org/pdf/200623.pdf).

**Knowledge building**

CTS implemented a new process for identifying critical transportation research needs with Mn/DOT and the Minnesota Local Road Research Board (LRRB). The knowledge-building process, which creates opportunities for the University to build knowledge in emerging issue areas, generally focuses on long-term, strategic research topics. “Knowledge-Building Research Priorities” were developed through a series of facilitated discussions with University researchers and key staff from Mn/DOT and local agencies, and several research proposals were funded as a result of this effort.



## Graduate Certificate update

Three Minnesota Department of Transportation (Mn/DOT) employees began coursework during FY06 in the Traffic Engineering and Operations concentration of the Graduate Certificate in Transportation Studies program.

The Graduate Certificate in Transportation Studies is designed to meet the needs of professionals who want to expand their skills and qualifications with an additional transportation credential. The concentration provides an option to certificate seekers for a more specialized training in traffic and intelligent transportation systems.

The certificate program is built around a core set of graduate-level courses in civil engineering, planning and public policy, and supply-chain management. Traffic Engineering and Operations concentration students are required to complete four core courses and at least one additional course from a list of three in civil engineering to round out a program requirement of 17 graduate-level credits.

.....  
Application materials and additional information about the Graduate Certificate Program also is online at [www.cts.umn.edu/certificate](http://www.cts.umn.edu/certificate).

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Champion formal credentialed education initiatives by supporting the development of more University education programs in transportation-related areas





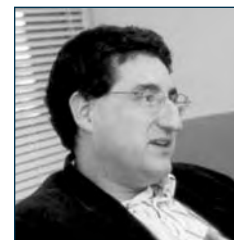
# Formal Education

## Transportation career expo

Panelists covered four main topics at the 11th Annual Transportation Career Expo on campus in March: networking, job searching, creating a resume, and interviewing. But nothing was emphasized more than the importance of establishing connections, be it with people, an organization, or the career itself.

Approximately 65 college students from Minnesota and Wisconsin attended the event, which gives students the opportunity to ask questions, receive seasoned advice, hear feedback on their resumes, and network with industry professionals. Employers promoted their organizations with booth displays, and several company representatives led informational sessions on transportation-related careers in areas

The Richard P. Braun CTS Chair in Transportation, which CTS initiated with a contribution from its royalty funds of \$500,000, was fully funded with the completion of a fundraising effort of \$500,000. Civil engineering associate professor David Levinson, a CTS Faculty Scholar, was appointed the inaugural chair, effective fall semester 2006.



David Levinson

such as intelligent transportation systems, engineering, policy and planning, and logistics management.

CTS hosted the event in cooperation with the Minnesota Local Road Research Board (LRRB), Minnesota LTAP, WTS Minnesota, the ITS Institute, and the Council of Supply Chain Management Professionals.



## Interdisciplinary Transportation Student Organization

This year's Interdisciplinary Transportation Student Organization (ITSO) Conference, held in March at the University's Coffman Memorial Union, featured a look back at the contributions of students to transportation research and a look forward to the development of light-rail transit (LRT) in the Twin Cities.

The second annual conference started with the presentation of the ITSO Kasia Winiarczyk scholarship, awarded to Nebiyou Tilahun, a civil engineering graduate student. Other scholarships were presented from ITS Minnesota, WTS Minnesota, and CTS.

Following the awards presentation, Hennepin County commissioner Peter McLaughlin spoke on the LRT development process. McLaughlin, the 2001 recipient of the CTS Distinguished Public Leadership Award and a graduate of the Humphrey Institute, provided insight into the future of public transportation in the Twin Cities

area and stressed that students must learn to connect engineering developments with community needs to benefit all involved.

ITSO (pronounced "it-so") was created with support from CTS by University of Minnesota students who are pursuing degrees in transportation-related fields. The group's main purpose is to connect with transportation professionals through monthly meetings and other events and learn about careers in transportation. ITSO membership has grown to 299 students, up from 65 in FY04.

ITSO has affiliated itself with several professional organizations including the Minnesota Chapter of Women's Transportation Seminar (WTS Minnesota),

the North Central Section of the Institute of Transportation Engineers (NCITE), and the Intelligent Transportation Society of Minnesota (ITS Minnesota).

Membership in ITSO is free. Students interested in becoming involved in this organization may visit the ITSO Web site at [www.tc.umn.edu/~itso/](http://www.tc.umn.edu/~itso/).



## CTS research seminars

During the 2005–2006 academic year, CTS continued to host research seminars to provide University researchers from a variety of disciplines an opportunity to share their findings. Research seminars were held in conjunction with meetings of the CTS Transportation Research Councils (Environment, Safety and Traffic Flow, Economy, and Infrastructure).

### Fall Semester presentations

- “Application of Precast Decks and Other Elements to Bridge Structures,” Carol Shield, Civil Engineering
- “Driver Assistive Systems for Rural Applications,” Craig Shankwitz, Intelligent Vehicles Laboratory
- “Access to Destinations,” Charleen Zimmer, ZAN Associates, and Kevin Krizek, Hubert Humphrey Institute of Public Affairs

- “GIS Protocols: Measuring the Pedestrian Environment,” Ann Forsyth, Metropolitan Design Center
- “In-Vehicle Technology to Correct Teen Driving Behavior: Addressing Patterns of Risk,” Shawn Brovold, Mechanical Engineering
- “Urbanization of Minnesota’s Countryside, 2000–2025,” John Adams, Geography

- “Minnesota Taconite as a Microwave-Absorbing Road Aggregate Material for Deicing and Pothole Patching Applications,” David M. Hopstock, Ph.D, Consultant, and Lawrence M. Zanko, Natural Resources Research Institute (NRRI), UMD

### Spring Semester presentations

- “Analysis of Prestressed Concrete Through-Girder Pedestrian Bridges under Lateral Impact,” Eray Baran, Civil Engineering
- “Our Metropolitan Area as a Place: Making an Accessible Region Through Transportation Research,” Robert Johns, Center for Transportation Studies, and David Levinson, Civil Engineering
- “Beyond ‘Business as Usual’: Ensuring the Network We Want Is the Network We Get,” David Levinson, Civil Engineering
- “Use of Miniature, Remotely Operated Aerial Vehicles in Traffic Management and Infrastructure Security Applications,” Demoz Gebre-Egziabher, Aerospace Engineering and Mechanics

## Advanced transportation technologies seminars

During the 2005–2006 academic year, the Intelligent Transportation Systems (ITS) Institute, housed within CTS, continued its multidisciplinary seminar series at the University. These advanced transportation technologies seminars included a diverse set of presentations by local and national researchers addressing different areas of ITS research, such as traffic management and modeling, human factors, sensing, and intelligent vehicles as they relate to road- and transit-based transportation. The seminars are offered for credit and required as a course in the Graduate Certificate Program in Transportation Studies at the University of Minnesota. Seminars are videotaped and available for loan.

### Fall Semester presentations

- “Minnesota Guidestar Program and Project Updates,” Ray Starr, Minnesota Department of Transportation
- “Model Reference Adaptive Control Framework for Real Time Traffic Management Under Emergency Evacuation,” Henry Liu, Civil Engineering
- “Multiple Model Techniques in Automotive Estimation and Control,” Derek Caveney, Toyota Technical Center
- “Technologies and Human Factors Related to the Intersection Decision Support Project,” Janet Creaser, HumanFIRST Laboratory

- “In-Vehicle Technology to Correct Teen Driving Behavior: Addressing Patterns of Risk,” Shawn Brovold, Mechanical Engineering
- “Understanding the Potential Market of Metro Transit’s Ridership and Services,” Kevin Krizek and Ahmed El-Geneidy, Hubert H. Humphrey Institute of Public Affairs
- “Development of Flexural Vibration Inspection Techniques to Rapidly Assess the Structural Health of Timber Bridge Systems,” Brian K. Brashaw, Natural Resources Research Institute, and Research Staff, Northland Advanced Transportation Systems Research Laboratories, UMD

## Summer transportation camp

In June, the ITS Institute and CTS hosted 45 students from the National Summer Transportation Institute, a 20-day camp held by the Fond du Lac Tribal and Community College and funded by the U.S. Department of Transportation. Most students came from middle schools and high schools on the Fond du Lac Reservation near Cloquet, Minnesota, and the surrounding area.

The group toured ITS Institute facilities to learn about traffic safety technology and Web-based programs that help students design roads. They got a taste of cutting-edge transportation research by visiting the HumanFIRST Program's driving simulator in the mechanical engineering department, and later made a stop at a Mn/DOT Freeway Incident Response Safety Team (FIRST) vehicle outside of the Civil Engineering Building.



## Beyond the Classroom: Student project on the cutting edge

When Michael Etheridge was an undergraduate in the University of Minnesota's mechanical engineering program, he presented his senior project to Mn/DOT maintenance

staff and the University in April 2005. A year later, his design for a safer, quicker system to change snowplow blades is just beginning to show its potential.

The Quick Edge Rapid Underbody Plow Cutting Edge Changing System was designed to reduce the risk of injury to workers changing snowplow cutting edges, reduce the amount of time it takes to do so, and achieve these objectives with minimal effects on the rest of the machine.

In January 2006, a prototype of the Quick Edge system was mounted on an in-service snowplow truck in Golden Valley and used four or five times throughout the rest of the winter. The University is also looking into patenting his design. The next step would be gauging companies' interest in licensing the design.

Etheridge has graduated and is now a project engineer at 3M. The Quick Edge system is an example of what can happen when students are able to apply their expertise outside of the classroom.



John Tarnowski, DeWayne Jones, Craig Shankwitz, and Michael Etheridge

## 2006 CTS student affiliates

### Student researchers

**William Afleje**, MS, Statistics (Janet Creaser)

**Ian Alexander**, MA, Public Policy and JD, Humphrey Institute and Law School (Lee Munnich)

**Bibhu Aryal**, MS, UMD Electrical and Computer Engineering (Taek Kwon)

**Brian Ashman**, MS, Biosystems and Agricultural Engineering (Bruce Wilson)

**Brooke Asleson**, MS, Water Resources Science (John Gulliver)

**Stefan Atev**, PhD, Computer Science and Engineering (Nikolaos Papanikolopoulos)

**Nathan Aul**, MS, Civil Engineering (Gary Davis)

**Eray Baran**, PhD, Civil Engineering (Catherine French and Arturo Schultz)

**Charles Bell**, MS, Civil Engineering (Catherine French and Carol Shield)

**Mathew Bevilacqua**, MS, Mechanical Engineering (Max Donath)

**Daniel Billings**, BS, UMD Electrical and Computer Engineering (Jiann-Shiou Yang)

**Nathaniel Bird**, PhD, Computer Science and Engineering (Nikolaos Papanikolopoulos)

**Robert Bodor**, PhD, Computer Science and Engineering (Nikolaos Papanikolopoulos)

**Joshua Brand**, BS, Aerospace Engineering and Mechanics (John Gulliver and Omid Mohseni)

**Shawn Brovold**, MS, Mechanical Engineering (Max Donath and Steve Simon)

**Ben Chihak**, PhD, Psychology (Kathleen Harder)

**Chris Clipper**, MS, Water Resources Science (John Nieber)

**Reuben Collins**, MS, Civil Engineering and MURP, Humphrey Institute (Francis Harvey)

**Michael Corbett**, MS, Civil Engineering (David Levinson)

**ReAnn Dargus**, MS, Mechanical Engineering (William Durfee)

**William Dehler**, MS, Civil Engineering (Joe Labuz)

**Charles DeVore**, BS, Civil Engineering (Catherine French)

**Heather Dolphin**, MURP, Humphrey Institute (Frank Douma)

**Kari Eichstaedt**, MS, Agronomy and Plant Genetics (Donald Wyse)

**Gurkan Erdogan**, PhD, Mechanical Engineering (Rajesh Rajamani)

**Andrew Erickson**, MS, Civil Engineering (John Gulliver)

**Joseph Erickson**, MS, UMD Applied and Computer Mathematics (Harlan Stech)

**Stephanie Erickson**, MURP, Humphrey Institute (Gary Barnes)

**Cyle Erie**, BS, Civil Engineering (Catherine French)

**Bulent Erkmen**, PhD, Civil Engineering (Catherine French and Carol Shield)

**Michael Etheridge**, BS, Mechanical Engineering (Craig Shankwitz)

**Noa Funk**, MS, Civil Engineering (Mihai Marasteanu)

**John Grittner**, BS, Child Psychology (Albert Yonas)

**Kim Grosenheider**, MS, Soil, Water, and Climate (Paul Bloom)

**Jim Hambleton**, MS, Civil Engineering (Andrew Drescher)

**Jennifer Haskamp**, MURP, Humphrey Institute (Carissa Schively)

**Xiaozheng He**, PhD, Civil Engineering (Henry Liu)

**Kyle Hoegh**, MS, Civil Engineering (Lev Khazanovich)

**John Hourdos**, PhD, Civil Engineering (Panos Michalopoulos)

**Betty Hu**, PhD, Civil Engineering (Carol Shield)

**Foad Hussein**, MS, Civil Engineering (John Gulliver)

**Michael Iacono**, MS, Civil Engineering (David Levinson)

**Basil Iannone**, MS, Ecology, Evolution and Behavior (Susan Galatowitsch)

**Marilyn Johnson**, MS, Soil, Water, and Climate (Paul Bloom)

**Sam Johnson**, MS, Water Resources Science (John Nieber and Gary Sands)

**Ajay Joshi**, MS, Computer Science and Engineering (Nikolaos Papanikolopoulos)

**Satsuki Kagaya**, BS, Child Psychology (Albert Yonas)

**Avigya Karki**, MURP, Humphrey Institute (Lee Munnich)

**Samuel Kidane**, PhD, Mechanical Engineering (Rajesh Rajamani)

**Prahlad Kilambi**, MS, Computer Science and Engineering (Nikolaos Papanikolopoulos)

**Woosung Kim**, MS, Civil Engineering (Joe Labuz)

**Adam Kokotovich**, MS, Science, Technology, and Environmental Policy (Lee Munnich)

**Maria Lee**, BS, Child Psychology (Albert Yonas)

**Xinjun Li**, PhD, Civil Engineering (Mihai Marasteanu)

**Adam Lindberg**, MS, Civil Engineering (Arturo Schultz)

**Wenteng Ma**, PhD, Civil Engineering (Henry Liu)

**Michael Marich**, MURP, Humphrey Institute (Lee Munnich)

**Jason Menard**, PhD, Anthropology (Francis Harvey)

**Grant Miller**, BS, Computer Science and Engineering (Nikolaos Papanikolopoulos)

**Kristine Moncada**, MS, Agronomy and Plant Genetics (Nancy Jo Ehlike)

**Norah Monte de Oca**, MS, Civil Engineering (David Levinson)

**Nick Moore**, BS, Biosystems Engineering (John Nieber)

**Thomas More**, MURP, Humphrey Institute (Lee Munnich)

**Paul Morris**, MS, Civil Engineering (Gary Davis)

**Richard Nicholson**, BA, Geography (John Adams)

**Lalit Nookala**, MS, UMD Computer Science (Taek Kwon)

**Eric Otto**, MS, Water Resources Science (John Nieber and Gary Sands)

**Pavithra Parthasarathi**, PhD, Civil Engineering (David Levinson)

**Tyler Patterson**, MURP, Humphrey Institute (Frank Douma)

**Angela Peterson**, MA, Applied Economics (Jerry Fruin)

## GPS Web modules for high school students

The ITS Institute launched two new Web modules to help high school students learn about transportation technologies. A new Topographic Mapping module introduces students to techniques of accurate mapping and the role of digital maps in new transportation technologies. A Human Factors module explores the important issue of how human capabilities and limitations affect the design of vehicles and transportation systems.

The modules were developed by the

Institute's K-12 coordinator, Mark Tollefson, an area high school science teacher. Previously, Tollefson developed modules on the Global Positioning System and freeway ramp metering. CDs containing the new modules and a poster explaining each topic and ITS were distributed to 160 high schools around Minnesota.

K-12 Web modules are available online at [www.its.umn.edu/education/modules.html](http://www.its.umn.edu/education/modules.html).

ITS Institute senior systems engineer Chen-Fu Liao is working on tools to give researchers, students, and eventually the public, access to advanced computer-generated traffic simulation systems.

- Aditya Polumetla**, MS, UMD  
Computer Science (Carolyn Crouch and Donald Crouch)
- Reid Pulley**, MS, Biosystems and Agricultural Engineering (Bruce Wilson)
- Feng Qian**, BS, UMD Biochemistry (Jiann-Shiou Yang)
- Jake Reneson**, BS, Civil Engineering (Catherine French)
- Ryan Rohne**, BS, Civil Engineering (Catherine French and Arturo Schultz)
- Troy Roth**, BS, Biosystems Engineering (John Nieber)
- Brian Runzel**, MS, Civil Engineering (Catherine French and Carol Shield)
- Matthew Selner**, BS, Mechanical Engineering (William Durfee)
- Atika Shamim**, MS, Civil Engineering (Lev Khazanovich)
- Matthew Smith**, MS, Civil Engineering (Catherine French and Carol Shield)
- Jason Sonnek**, MS, UMD Computer Science (Carolyn Crouch and Donald Crouch)
- Fajarrani Surya**, MS, Mechanical Engineering (Diwakar Gupta)
- Senthilkumar Swarminathan**, PhD, Mechanical Engineering (William Durfee)
- Joel Swenson**, MS, Civil Engineering (Joe Labuz)
- HunWen Tao**, MS, Civil Engineering (Gary Davis)
- James Tedrick**, PhD, Geography (Francis Harvey)
- Kristin Thompson**, MURP, Humphrey Institute (Kevin Krizek)
- Luke Thompson**, MS, Civil Engineering (Joe Labuz)
- Nebiyou Tilahun**, PhD, Civil Engineering (David Levinson)
- Derek Tompkins**, PhD, Civil Engineering (Lev Khazanovich)
- Walter Trach Jr.**, MS, Mechanical Engineering (Craig Shankwitz)
- Steven Tyler**, MURP, Humphrey Institute (Frank Douma)
- Jason Ulrich**, MS, Water Resources Science (Bruce Wilson)
- Harini Veeraraghavan**, PhD, Computer Science and Engineering (Nikolaos Papanikolopoulos)
- Raul Velasquez**, PhD, Civil Engineering (Mihai Marasteanu)
- Matt Verreaux**, BS, UMD Electrical and Computer Engineering (Brian Brashaw)
- Krishna Vijayaraghavan**, PhD, Mechanical Engineering (Rajesh Rajamani)
- Jason Wallak**, BS, UMD Electrical and Computer Engineering (Jiann-Shiou Yang)
- Fenghuan Wang**, MS, UMD Applied and Computer Mathematics (Harlan Stech)
- Qiang Wang**, PhD, Civil Engineering (Lev Khazanovich)
- Andrew Weithe**, BS, Soil, Water, and Climate (Paul Bloom)
- Matthew Wilson**, MS, Civil Engineering (John Gulliver and Omid Mohseni)
- Ryan Wilson**, MURP, Humphrey Institute and MS, Civil Engineering (Kevin Krizek)
- Xinkai Wu**, PhD, Civil Engineering (Henry Liu)
- Feng Xi**, PhD, Civil Engineering (David Levinson)
- Wuping Xin**, PhD, Civil Engineering (Panos Michalopoulos)
- Hui Xiong**, MS, Civil Engineering (Gary Davis)
- Peng Xu**, MURP, Humphrey Institute and MA, Landscape Architecture (Lee Munnich)
- Archna Yadav**, MS, UMD Computer Science (Jiann-Shiou Yang)
- Ilya Yut**, MS, Civil Engineering (Lev Khazanovich)
- Hongbing Zang**, MS, Civil Engineering (Panos Michalopoulos)
- Tom Zearling**, BS, Biosystems and Agricultural Engineering (Bruce Wilson)
- Shanjiang Zhu**, PhD, Civil Engineering (David Levinson)
- Justin Zimmerman**, MS, Civil Engineering (Arturo Schultz)
- Adam Zofka**, PhD, Civil Engineering (Mihai Marasteanu)
- Xi Zou**, PhD, Civil Engineering (David Levinson)

*Note: Principal investigators noted in parentheses*

## Graduate Certificate students

### Enrolled

- Steve Barrett**, Minnesota Department of Transportation (Graduate Certificate)
- Jose Fischer**, Minnesota Department of Transportation (MS, Agricultural/Applied Economics)
- Jiri Kratochvil**, Federal Express (Graduate Certificate)
- Eric Marquardt**, Minnesota Department of Transportation (MS, Geographic Information Sciences)
- Nicole Rosen**, Minnesota Department of Transportation (Graduate Certificate)

- Damon Sather** (MS, Geographic Information Sciences)
- Andrew Schlack** (MURP, Humphrey Institute)
- Jeremy Stahl**, Land O' Lakes (Graduate Certificate)

## Student awards

### Matthew J. Huber Award for Excellence in Transportation Research and Education

*Harini Veeraraghavan*  
*Adam Zofka*

### ITS Institute Travel Award Recipients

*Nathan Aul*  
*Xiaozheng He*  
*Wenteng Ma*  
*Norah Montes de Oca*  
*Tyler Patterson*  
*Xinkai Wu*  
*Feng Xie*  
*Wuping Xin*  
*Hongbing Zhang*  
*Xi Zou*

### ITS Institute Outstanding Student of the Year

*Shawn Brovold*

### CTS Travel Award Recipients

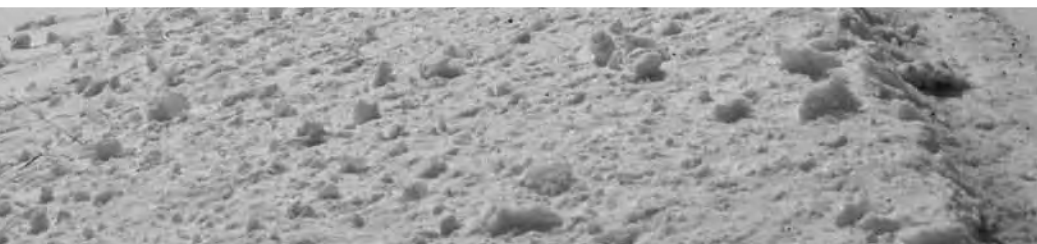
*Reuben Collins*  
*Michael Iacono*  
*Xinjun Li*  
*Justin Ocel*  
*Angela Patterson*  
*Kristin Thompson*  
*Raul Valesquez*  
*Iliya Yut*

CTS sponsored the attendance of 19 graduate-level students at the annual TRB Conference, held in Washington, D.C., in January, to make presentations at conference sessions and to develop contacts in the transportation industry.



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## Minnesota Local Technical Assistance Program

The Minnesota Local Technical Assistance Program (LTAP), housed at CTS, is all about sharing transportation knowledge, improving skills, and putting research and new technology into practice. Minnesota LTAP, established by Federal Highway Administration (FHWA) in 1992, is part of a network of 58 centers nationwide that support city, county, township, and tribal personnel. State DOTs, industry, and consultants to local agencies also rely on LTAP resources.

Minnesota LTAP receives funding from the Minnesota Local Road Research Board (LRRB) and the Minnesota Department of Transportation (Mn/DOT). Minnesota LTAP offers more than 60 statewide workshops and events on a variety of topics, including safety, maintenance, infrastructure, and workforce development.

LTAP offered the following workshops in FY2006:

- Asphalt Preservation and Maintenance
- Best Pavement Design Practices for Local Roads

### Transportation solutions

The Center transferred technology solutions to the transportation industry by planning and delivering Local Technical Assistance Program (LTAP) and Circuit Training and Assistance Program (CTAP) workshops. The workshops, in more than 50 statewide locations, reached more than 10,665 city, county, state, township, and other transportation personnel.

# Applied Problem-Solving

- Concrete Rehabilitation for City/County Roads
- Reducing Risk and Liability
- Traffic Engineering Fundamentals
- Gravel Road Maintenance and Design
- Motor Grader Operator Training
- Minnesota MUTCD

Minnesota LTAP partnered with other organizations to cosponsor the following events:

- Eleventh Annual Transportation Career Expo
- Tenth Annual Minnesota Pavement Conference
- Fifth Annual Road Salt Symposium
- Spring and Fall maintenance expos
- Work-Zone Traffic-Control Seminar
- Traffic Engineering Fundamentals workshop

## State maintenance expos

The fall 2005 maintenance expo, held October 5 and 6 in St. Cloud, attracted approximately 1,400 attendees from state, county, city, and township governments. The fall expo again emphasized winter operations, with sessions on such topics as proper brake-inspection techniques for snowplows, treated salt for cost-effective roadway deicing, speed and space management for safe snowplow operations, and parking lot and sidewalk snow and ice control.

The spring maintenance training expo drew 563 attendees April 11 and 12, 2006, also in St. Cloud. The spring expo included sessions about personal protective equipment, protection from overweight trucks, real examples of natural disaster management, roadsides for wildlife, safe trenching, new traffic signing requirements, traffic calming, gravel road maintenance, pavement rehabilitation, and work-zone safety.

- Minnesota Truck-Weight Compliance Training

During FY 2006, Minnesota LTAP partnered with Mn/DOT's State Aid for Local Transportation office to develop and distribute 1,000 copies of a DVD titled *Gravel Road Maintenance: Meeting the Challenge*. An instructor guide was developed to support the current Minnesota LTAP Gravel Road Maintenance class.

In addition, Minnesota LTAP partnered with Mn/DOT's State Aid office and the LRRB's Research Implementation Committee to deliver training to county highway staff on a new Crash Mapping Analysis Tool. The training and tool provides local highway officials with accurate information about

the crashes that occur on the state transportation system.

Minnesota LTAP also partnered with LRRB and Mn/DOT's Maintenance Research office to develop the *Minnesota Snow and Ice Control Field Handbook for Snowplow Operators*. Based on that material, a three-hour training module was developed and delivered to more than 650 attendees across the state.

Register for workshops and events, read the latest news and research about a wide variety of transportation-related topics, or contact qualified professionals for training or service needs. Learn more about Minnesota LTAP programs online at [www.mnltap.umn.edu](http://www.mnltap.umn.edu).

Minnesota LTAP partners with Mn/DOT, the Minnesota Local Road Research Board (LRRB), the Minnesota Public Works Association, and the Minnesota Street Superintendents Association to hold these annual spring and fall maintenance expos. The events allow transportation professionals, especially those in the maintenance area, to

exchange ideas and information; learn about new technologies, practices, and materials; and improve communications within the workplace. Half-day outdoor equipment demonstrations and indoor equipment displays of exhibitors' technology also are included.



## Local Operational Research Assistance (OPERA) Program

Five maintenance research projects—ranging from windshield wiper deicer to DuraTherm pavement markings—are featured in the second OPERA annual report, produced by Minnesota LTAP

for the Minnesota Local Road Research Board (LRRB).

The LRRB’s Local Operational Research Assistance Program, or the Local OPERA Program, helps to develop innovations in the construction and maintenance operations of local government transportation organizations. The annual report is a compilation of projects completed during FY06 by local government transportation organizations receiving OPERA support.



The program encourages maintenance employees from all cities and counties to get involved in operational or “hands-on” research. In particular, OPERA—which funds up to \$10,000 for projects—helps to develop great ideas locally and share those ideas statewide.

More information about the Local OPERA Program, including an application for OPERA funding and the 2006 annual report, is online at [www.mnltap.umn.edu/opera](http://www.mnltap.umn.edu/opera).

## Roads Scholar Program

Student enrollment in Minnesota LTAP’s Roads Scholar program tripled during FY06, bringing the total of enrollees to 1,200.

The Roads Scholar Program, which began in 2003, awards a Minnesota LTAP certificate to maintenance personnel who are committed to learning new skills and expanding their knowledge in the latest road and bridge innovations. To complete the program, students must

complete eight credits within five years by attending LTAP workshops, maintenance expos, and Circuit Training and Assistance Program (CTAP) workshops. LTAP sponsors 25 sessions annually that meet the program’s certification requirements.

More information about the LTAP Roads Scholar Program is online at [www.mnltap.umn.edu](http://www.mnltap.umn.edu).

## Circuit Training and Assistance Program

CTAP, or the Circuit Training and Assistance Program, is a mobile outreach effort providing training, technical assistance, and technology transfer to city, county, state, and related personnel. Workshops may be scheduled for a range of topics upon request.

CTAP has increased the number of workshop participants over the last few years. In FY06, CTAP instructor Kathy Schaefer, a former maintenance supervisor with Mn/DOT, conducted training sessions for 5,129 employees from cities, townships, counties, and the state.

CTAP is sponsored by Minnesota LTAP, Mn/DOT’s Maintenance Research and Operations Office, and the Minnesota Local Road Research Board (LRRB).

More information about CTAP may be found online at: [www.mnltap.umn.edu/ctap](http://www.mnltap.umn.edu/ctap).





## AirTAP

AirTAP—the Airport Technical Assistance Program—is a statewide assistance program for aviation personnel offering practical instruction by knowledgeable, experienced trainers and provides a range of helpful information, materials, and resources.

One of AirTAP’s primary goals is to

give aviation personnel a network of colleagues they can go to with questions about the operation, administration, and maintenance of their airport.

AirTAP held its second annual fall forum October 11 and 12, 2005, in Brainerd. Participants heard from experts on a wide range of topics, includ-

ing airport technology, insurance issues, pavement maintenance techniques, and environmental concerns. In addition, a number of distinguished guests were on hand to offer insights on state and national aviation policies and trends, including Rep. James L. Oberstar, senior Democrat on the Committee on Transportation and Infrastructure, state Sen. Ann Rest, who chairs the Minnesota Senate Aviation Subcommittee, and state Rep. Michael Beard, who serves on the House Transportation Committee.

AirTAP is sponsored by the Mn/DOT Office of Aeronautics, in partnership with CTS and the Minnesota Council of Airports, or MCOA.

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Electronic versions of all AirTAP publications may be downloaded from the AirTAP Web site along with other useful information, materials, and resources, such as a list of key contacts within Minnesota and the Midwest region in specific aviation-related topic areas, at [www.airtap.umn.edu](http://www.airtap.umn.edu).



## Utility project receives FHWA award

A CTS support team, led by Associate Director Cheri Marti, assisted in Mn/DOT’s “Utility Manual Accommodation Policy Rewrite and Training Delivery” project. The project received the inaugural Federal Highway Administration (FHWA) 2006 Excellence in Utility Relocation and Accommodation Innovation Award. The award recognized a collaborative effort to develop an improved utility coordination process to minimize project delays, construction costs, and contractor claims; foster consistent application

of the process for Mn/DOT, state-aid, and consultant projects; and strengthen cooperation with utility owners. The utility project consisted of a 15-step process, accommodation policy, a comprehensive manual, related training, and a project implementation plan. The project was initiated at the request of Mn/DOT’s Office of Technical Support and carried out in cooperation with the Utility Agreements/Permits Unit.

From August 2005 to May of 2006, CTS conducted seven utility training sessions reaching 275 attendees from Mn/DOT, utility companies, and consultants.



**CTS  
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Serve as a catalyst for focusing the public debate on transportation-related issues while maintaining the role of an objective neutral facilitator

## **2006 Annual Transportation Research Conference**

In May 2006, CTS held the 17th Annual Transportation Research Conference in St. Paul. The event presented the latest research in the areas of transportation safety, technology, finance, infrastructure, and planning. Highlights include:

- A plenary presentation titled “Privacy and Movement: New Challenges for Technology Enhanced Transportation” by Colin Bennett, professor and chair of the political science department at the University of Victoria in British Columbia. Bennett, while comparing the United States to other nations, discussed the implications of technology that improves transportation safety and efficiency and also captures private data.

CTS was awarded funding to deliver two projects through the National Cooperative Highway Research Program (NCHRP): a review of project delivery workforce management practices in state DOTs and a workshop for human resources and project delivery staff based on findings from the review; and a leadership forum for state DOT CEOs in September 2006.

# Public and Stakeholder Participation

- A panel discussion on transportation-related privacy issues with Marthand Nookala from Hennepin County public works, Dan Murray of the American Transportation Research Institute, and former University of Minnesota president Ken Keller of the Humphrey Institute of Public Affairs
- A luncheon presentation in which Thomas DeCoster, executive director

of the AASHTO Leadership Institute, shared his advice about leading multiple generations (*for more about DeCoster's presentation, see page 27.*)

- An introduction to the new Access to Destinations study, as well as the presentation of findings on privacy and reducing driving risks, transit reliability, and pedestrian and bicycle safety by University researchers. Nearly two dozen conference concurrent

sessions also included such topics as the political history of the Interstate system, the impact of the Hiawatha LRT, traffic and travel demand management, successful program delivery and multi-agency collaboration, and homeland security.

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 More about the 2006 Transportation Research Conference is online at [www.cts.umn.edu/news/report/2006/07](http://www.cts.umn.edu/news/report/2006/07).



Colin Bennett



Dan Murray



Ken Keller

Approximately 19,187 people receive CTS newsletters, which includes a 12 percent increase in electronic subscribers from the previous year.

## CTS annual meeting and awards luncheon

In April 2006, CTS staff and committee members presented annual awards to recognize significant contributions to the field of transportation.



Kathryn Swanson



Richard Murphy Jr.



Jeff Hamiel



Anne Beers

**Richard P. Braun**  
**Distinguished Service Award:** Kathryn Swanson, director of the Office of Traffic Safety, Department of Public Safety, and member of the ITS Institute Board

**William K. Smith**  
**Distinguished Service Award:** Richard Murphy Jr., CEO of Murphy Warehouse Company, CTS Executive Committee chair, and University of Minnesota adjunct professor

**Ray L. Lappegaard**  
**Distinguished Service Award:** Jeff Hamiel, executive director of the Metropolitan Airports Commission and member of the CTS Executive Committee

**Distinguished Public Leadership Award:** Anne Beers, assistant commissioner of the Department of Public Safety and CTS Executive Committee member

## CTS Research Partnership Award: Metro Evacuation Traffic Management Plan

The CTS Research Partnership Award recognizes research projects within the CTS program that have resulted in significant impacts on transportation, and rewards teams of individuals who have drawn on the strengths of their diverse partnerships to achieve those results.

More information about the award is online at [www.cts.umn.edu/awards/researchpartnership](http://www.cts.umn.edu/awards/researchpartnership).

In this project, University researchers worked with 70 public and private agencies in the metro area to create a system to coordinate local emergency evacuation plans across multiple communities. The system would minimize potential congestion on major roadways, speed up the evacuation process, and maximize safety for citizens.

According to University computer science and engineering professor Shashi

Shekhar, principal investigator for the project, walking may be faster than driving in emergency evacuations of a mile or less.

The team developed a Web-based user interface that provides evacuation routes within a few clicks, and which Mn/DOT has already used to develop an evacuation traffic management plan for the Twin Cities area.

Shekhar says the goal of his research team was to create a tool that would run more efficiently than the standard programming approach and allow users—such as transportation professionals and first responders—to quickly find the best escape routes, even for large scenarios.

During the development of the routing software, the researchers discovered that a walking-based evacuation in a one-mile area is roughly three times faster than

driving on congested roads. In addition, the research found different evacuation needs for day and night due to work-related population shifts.

To test the new system, Shekhar's team ran a comparison with the existing evacuation plan for the nuclear plant near Monticello. Evacuation time is about 30 percent faster with the new tool, and computation time falls from 268 to 162 minutes.

Based on the findings, Shekhar recommended that policymakers consider adding extra capacity, especially more lanes and walkways in key bottleneck areas of the transportation network.

*Contraflow Transportation Network Reconfiguration for Evacuation Route Planning* is online at [www.lrrb.org/pdf/200623.pdf](http://www.lrrb.org/pdf/200623.pdf).



Shashi Shekhar (University of Minnesota Department of Computer Science and Engineering), Daryl Taavola, Erik Seiberlich (URS Corporation), Sonia Morphew, Cathy Clark (Mn/DOT), Betsy George, Qingsong Lu (University of Minnesota Department of Computer Science and Engineering), Laurie McGinnis (CTS associate director), Robert Vasek (Mn/DOT)

## CTS luncheon presentations

The Center's luncheon presentations provide a setting for transportation professionals, faculty, and students to interact as they listen to presentations on national issues. The spring luncheon is held in conjunction with the annual CTS transportation research conference.

### Fall luncheon

In November, UCLA professor Donald Shoup explained that "free" parking isn't really free. Though motorists park for free when reaching 99% of their destinations,



Donald Shoup

the cost of that parking space is so diffused throughout the economy that consumers still pay for it indirectly—a cost that rivals national spending on Medicare and defense. Citing the example of Old Pasadena, California, Shoup proposed charging market rates for curb parking and returning meter revenue to neighborhoods that generate it.

### Winter luncheon

In February, Leonard Evans, president of Science Serving Society and 33-year veteran of General Motors, discussed federal government policy toward road safety.



Leonard Evans

Rather than cracking down on driver behavior with seatbelt laws and more widespread surveillance technologies on roads, Evans said policymakers have approached traffic safety through vehicle design and crash survivability. As a result, the United States has dropped from first to 16th place in the world for safety since the 1970s.

### Spring luncheon

In May, Thomas DeCoster, executive director of the American Association of State Highway and Transportation Officials (AASHTO)



Thomas DeCoster

Leadership Institute, shared his advice about leading multiple generations. For the first time in U.S. history, four generations—veterans, baby boomers, Generation X, and Generation Y ("Tweeners" straddle the groups)—with distinctly different sets of values are in the transportation workplace.

## Oberstar Forum on Transportation Policy and Technology

A diverse group of regional, national, and international officials, policymakers, and professionals joined U.S. Rep. James L. Oberstar in April to explore the value of



Berthold Tillmann

integrating non-motorized transportation into communities. This was the fifth meeting of the transportation policy and technology forum named in honor of Oberstar and hosted by CTS.

Oberstar headlined the two-day event, which also featured Berthold Tillmann, the mayor of Münster, Germany. Humphrey Institute of Public Affairs assistant professor Kevin Krizek and Metropolitan Design Center professor and director Ann Forsyth presented find-

ings from their recent Twin Cities biking and walking studies.

Representatives from the four non-motorized transportation pilot program communities, funded through the transportation legislation passed by Congress in July 2005, were on hand to discuss the key elements of their respective programs. Those were: Lea Schuster (Transit for Livable Communities in St. Paul), Darwin Hindman (Columbia, Missouri), Shannon Haydin (Sheboygan County, Wisconsin), and Steve Kinsey (Marin County, California). Billy Fields (Rails-to-Trails Conservancy) also joined the discussion.

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More information about this and previous Oberstar forums is online at [www.cts.umn.edu/oberstarforum](http://www.cts.umn.edu/oberstarforum).



## Freight and Logistics Symposium

The 9th Annual Freight and Logistics Symposium brought together representatives from the shipper and carrier communities as well as policy-makers and academic researchers to examine issues driving the freight network in Minnesota and the nation. Topics included transportation system capacity, industrial competitive-



John Ficker

ness of Minnesota manufacturers, and supply-chain strategies to deal with constrained capacity.

The symposium's main sessions included a keynote address by National Industrial Transportation League president John Ficker on freight mobility and transportation system capacity, a panel discussion about the effects of logistics costs on corporate decision making, and a panel focusing on emerging supply-chain and infrastructure approaches to

capacity challenges.

CTS sponsored the event in cooperation with the Minnesota Department of Transportation (Mn/DOT), Minnesota Freight Advisory Committee, Council of Supply Chain Management Professionals Twin Cities Roundtable, and Twin Cities Metropolitan Council.

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A summary report detailing the entire event is available online at [www.cts.umn.edu/publications/proceedings](http://www.cts.umn.edu/publications/proceedings).

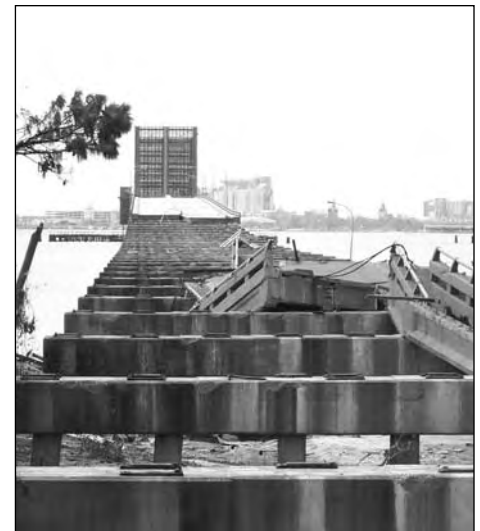
## Minnesota Pavement Conference

In February 2006, participants of the Tenth Annual Minnesota Pavement Conference received the latest news in pavement research and technology from variety of practitioners and researchers. More than 200 attended the conference. Presentation topics ranged from Hurricane Katrina transportation infrastructure damage to an update on the Minnesota Department of Transportation (Mn/DOT) MnROAD facility, a tutorial on when to pave gravel roads, and the introduction of a new DVD created by Minnesota LTAP, *Gravel Road Maintenance: Meeting the Challenge*.

CTS hosted the event, which was sponsored by Mn/DOT, Minnesota LTAP, and a number of other organizations, and facilitated by the University's College of Continuing Education.

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More about the conference can be found in the spring 2006 issue of Minnesota LTAP's *Technology Exchange* newsletter, or online at [www.mnltap.umn.edu/publications](http://www.mnltap.umn.edu/publications).

Pictured right: U.S. 90 bridge, Biloxi Bay, Mississippi, after Hurricane Katrina



## Transportation finance roundtables

CTS and the State and Local Policy Program at the Humphrey Institute of Public Affairs held two roundtables during the year to discuss transportation finance. The roundtable series is intended to stimulate open discussion among transportation leaders about a wide variety of transportation viewpoints.

### Traffic, Tolling, and the Trans-Texas Corridor

October 2005

State agencies are partnering with each other and private industry to try innovative approaches to meet the state's transportation demands.

Featured: Katie Turnball (associate director of the Texas Transportation Institute), Ginger Goodin (TTI's Austin office manager), and Carlos Lopez (Texas Department of Transportation director of operations)

### I-394 MnPASS—A New Choice for Commuters: How is it Working?

March 2006

The majority of I-394 users support MnPASS, the express lanes are working, and previous concerns about the project are fading, according to a Humphrey Institute study for the Minnesota Department of Transportation (Mn/DOT).

Featured: Lee Munnich (Humphrey Institute senior fellow and State and Local Policy Program director), and Nick Thompson (I-394 MnPASS project manager with Mn/DOT)

Visitors to the CTS Web site ([www.cts.umn.edu](http://www.cts.umn.edu)) increased by 24 percent to 147,550.

## Context Sensitive Design and Solutions workshop

CTS hosted the Midwest Region Context Sensitive Design and Solutions (CSD&S) Workshop in August 2005 for sponsors Mn/DOT and the Federal Highway Administration (FHWA). Minnesota is one of five pilot states originally selected by the FHWA to advance CSD&S initiatives. As part of this work, the Minnesota Local Technical Assistance Program (housed within CTS) has offered several sessions of CSD&S training in recent years.

Speakers included Mn/DOT deputy commissioner Doug Differt, FHWA Minnesota division administrator Tom Sorel, Scott Bradley, Mn/DOT landscape architecture chief, former AASHTO president Tom Warne, Michigan DOT director Gloria Jeff, Idaho DOT director Dave Ekern, and Dwight Horne, director of the FHWA Office of Program Administration.

The conference also featured four presentations by University of Minnesota

researchers Joyce Weinsheimer (Center for Teaching and Learning Services with the Office of Human Resources), Bill Gartner (Applied Economics), Lance Neckar (Landscape Architecture), and Kathleen Harder (Center for Sustainable Building Research).

.....  
More about the CSD&S Workshop, including presentations, is online at [www.cts.umn.edu/education/csd/csdsworkshop](http://www.cts.umn.edu/education/csd/csdsworkshop).

## Toward Zero Deaths Program

In November 2005, the Toward Zero Deaths: Integrating Minnesota’s Traffic Safety Agenda Conference, held in St. Cloud, drew about 450 attendees and served as a forum for sharing information on how to reduce the number of fatalities and injuries on Minnesota roads.

A poignant and personal presentation opened the conference. Connie and Nathan Backstrom, with their younger sons Charles and Ryan in attendance, described how they coped when their sons Matthew, Jacob, and Justin were killed in fall 2004 when their car was hit by a drunk driver near Farmington, Minnesota.

Several University of Minnesota researchers were among the present-

ers. Psychiatry professor Ken Winters discussed adolescent brain development and the associated crash risk. Mechanical engineering professor Max Donath, director of the ITS Institute, described innovative education programs and in-vehicle technologies to ensure teens drive more safely. Researcher Mick Rakauskas of the University’s HumanFIRST Program discussed a recent study showing that sober drivers talking on a cell phone or operating in-vehicle controls performed worse than drivers who were intoxicated.

Other conference sessions addressed more challenges to traffic safety—impaired driving, underage drinking, speeding, poor judgment, the aging population—and new approaches to counteract them.

Toward Zero Deaths is a multi-agency partnership that includes representatives from the Minnesota Department of Transportation, Minnesota Department of Public Safety, Minnesota State Patrol, Federal Highway Administration, and CTS. The conference was hosted by CTS and sponsored by Mn/DOT, the Department of Public Safety, and the Minnesota TZD program. It included the Minnesota Department of Public Safety Safe and Sober and Child Passenger Safety conferences.

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More information about the program can be found at [www.tzd.state.mn.us](http://www.tzd.state.mn.us).

## SAFETEA-LU workshop

In October 2005, an array of speakers introduced the provisions and policy implications for Minnesota of the new federal transportation reauthorization bill (Safe Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users) at the SAFETEA-LU Minnesota Workshop, held in St. Paul. Several state legislators and their staffers were among the large turnout of more than

320 people, along with representatives of all levels of government, industry, the University of Minnesota, and local media.

The Minnesota Department of Transportation (Mn/DOT), the Federal Highway Administration (FHWA), and the Minnesota Department of Public Safety (DPS) sponsored the workshop, with CTS serving as host.

Presentations from the event are posted on Mn/DOT’s SAFETEA-LU page at [ww.dot.state.mn.us/safetea-lu](http://ww.dot.state.mn.us/safetea-lu).

Participants at CTS events more than doubled during the past five years, from 827 (FY00) to 2,355 (FY06).

## Transit coordination conference

In February 2006, CTS hosted the Transit Coordination Best Practices Forum on the University's St. Paul campus, with sessions covering such topics as partnerships, cost allocation, maintenance and dispatching coordination, insurance, brokerages, and use of the private sector to deliver service.

Bryna Helfer, with the Federal Transit Administration's United We Ride Project, gave the keynote presentation. More than 100 participants included social service providers, transit professionals, private industry and nonprofit repre-

sentatives, and state, local, and regional government policymakers.

Forum sessions were based on topic areas identified in a survey of transportation stakeholders conducted by the Minnesota Department of Transportation (Mn/DOT) in cooperation with the Metropolitan Council. Mn/DOT's Office of Transit sponsored the event.

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*The Community Transportation Web site at*  
[www.cts.umn.edu/ct](http://www.cts.umn.edu/ct).



## Roundabouts conference

In April 2006, CTS hosted the Minnesota Roundabouts Conference in Brooklyn Center. The conference, which drew more than 300 people from across the country, explored the value of roundabouts—a type of circular intersection used in place of stop signs or traffic signals. Studies show that the number of crashes and serious injuries plunge when roundabouts are installed, and congestion, fuel consumption, and emissions fall significantly, too.

Mn/DOT deputy commissioner Doug Differt, the opening speaker, called roundabouts another tool in the state's Toward Zero Deaths (TZD) toolbox ([www.tzd.state.mn.us](http://www.tzd.state.mn.us)). In addition, Susan Ferguson of the Insurance Institute for Highway Safety (IIHS) presented research supporting the case for roundabouts. Several Minnesotans also were on hand to share their experiences with roundabouts, including Maplewood city engineer Chuck Ahl, Maplewood

police chief David Thomalla, Richfield city council member Bill Killian, Cory Slagle of Washington County, and Bernie Arseneau of Mn/DOT's Office of Traffic, Security, and Operations.

The conference was sponsored by Mn/DOT, Mn/DOT's State Aid for Local Transportation, the Minnesota County Engineers Association, the City Engineers Association of Minnesota, and the Federal Highway Administration—Minnesota Division.

## Midwest Transportation Knowledge Network

The Midwest Transportation Knowledge Network (MTKN) held a joint conference with the Transportation Library Connectivity pooled-fund study, led by Wisconsin DOT. Eleven states, including Minnesota, are working together to establish transportation library networks in other regions of the country as well as strengthen the Midwest network.

The MTKN has been supporting the recommendations of TRB Special Report 284, *Transportation Knowledge Networks: A Management Strategy for the 21st Century*,

which was published in January 2006. The report outlines strategies for creating a long-term administrative structure for meeting the information service needs of the transportation sector. The report identifies the core services that need to be provided, how those services should be provided, and funding options to support those services.

CTS is one of the founding members of MTKN, an 11-state network of transportation libraries in the Midwest. MTKN's main purpose is to improve access to transportation research and information by

transportation professionals in the region. The National Transportation Library funded the development of the MTKN in December 2001 as a pilot project. MTKN became incorporated with formal bylaws and other agreements in 2005.

If you would like more information about the Midwest Transportation Knowledge Network or the Transportation Libraries Catalog, please visit [www.mtkn.org](http://www.mtkn.org), or contact Arlene Mathison, CTS Information Manager and Librarian at 612-624-3646, [amathison@cts.umn.edu](mailto:amathison@cts.umn.edu).



## International visitors tour U of M research labs

Officials from 17 countries across the globe—from Norway to Uganda, Japan to New Zealand—came to Minnesota in April for a meeting of the Performance of Roads Administration Committee of the World Road Association (known as PIARC).

PIARC is a world leader in the exchange of knowledge on roads and road transportation policy and practices within an integrated, sustainable transportation context.

In addition to attending the meeting and touring other sites, the group visited ITS Institute facilities at the University of Minnesota. Craig Shankwitz, director

of the IV Lab, gave an overview of the lab's activities, including a demonstration of driver-assistive technologies on the TechnoBus.

Mike Manser, research associate with the HumanFIRST Program, provided an overview of the University's driver behavior research and provided a demo of the driving simulator.

ITS Institute board member Randy Halvorson, Mn/DOT Program Management

division director, hosted the meeting as the United States' representative on the committee.



Craig Shankwitz leads a tour of the TechnoBus

## NATSRL annual research event

In November 2005, the Northland Advanced Transportation Systems Research Laboratories (NATSRL) held its fourth annual research day at Mn/DOT District 1 Headquarters in Duluth. Transportation practitioners, researchers, students, and community members attended the half-day event. NATSRL, located at the University of Minnesota Duluth, is a program of UMD and the Intelligent Transportation Systems (ITS) Institute at CTS.

Electrical and computer engineering professor Taek Kwon provided an update on his work in rural ITS applications. In addition to a renewable energy light pole that is on Mn/DOT property, he discussed his work in developing a gravel

road traffic counter and his initial design efforts for an intersection traffic movement counter.

Computer science professor Rich Maclin presented an update on the department's project in developing an automatic process to detect Road and Weather Information System (RWIS) sensor malfunctions. Chemistry professor John Evans presented results from his work to explore a low-cost, optical fiber-based spectrophotometry and surface acoustic wave device for remote sensing of road conditions. Brian Brashaw, program director for the Natural Resources Research Institute (NRRI), provided an update on his development of inspection techniques

to assess the conditions of rural bridge systems.

Other UMD presenters included Jiann-Shiou Yang, who provided an update on his study of short-term arterial travel time models; David Wyrick, who discussed his work in fleet management life-cycle cost analysis; and Stanley Burns, who presented his work in using magneto-resistive sensors for vehicle classification.

More about NASTRL is online at [www.its.umn.edu/labs/natsrl.html](http://www.its.umn.edu/labs/natsrl.html).

### Managing effective public participation

As a follow-up to the 2005 Midwest Regional Workshop on Context Sensitive Design/Solutions, Mn/DOT contracted with CTS to develop and deliver a new training course, "Managing Effective Public Participation: Stop the Pain and Increase the Gain."



## CTS Faculty and Research Scholars Program

Under the CTS Faculty and Research Scholars Program, begun in 2003, scholars have joint appointments at CTS as well as in their own departments. The program provides an ongoing forum for faculty and researchers to meet with CTS staff to provide feedback, discuss interdisciplinary research opportunities, develop new education initiatives, and discuss ways to improve expertise in response to external demands. The program also addresses how to provide support and guidance to new faculty.

The researchers listed below were selected as scholars because of the transportation focus in their research and education activities, their ongoing involvement with CTS, and their successful relationships with transportation research sponsors. Their two-year appointments may be renewed or rotated to other candidates.

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Learn more about CTS Faculty and Research Scholars at [www.cts.umn.edu/scholars](http://www.cts.umn.edu/scholars).

CTS works with 30 CTS Faculty Scholars and 17 CTS Research Scholars from a variety of University of Minnesota departments to address transportation issues.

**CTS  
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Excellence**

Strengthen the research and education expertise in transportation-related fields among the faculty and staff within the University

# University Expertise

## 2006 Faculty and Research Scholars

### Bridge Engineering



**Catherine French**  
Professor  
Civil Engineering



**Jerry Fruin**  
Associate Professor  
Applied Economics



**Bruce Wilson**  
Professor  
Bioproducts and  
Biosystems Engineering



**Arturo E. Schultz**  
Associate Professor  
Civil Engineering



**Diwakar Gupta**  
Professor  
Mechanical Engineering



**John Bloomfield**  
Research Associate  
College of Design



**Carol Shield**  
Associate Professor  
Civil Engineering



**Robert Johns**  
Director  
Center for Transportation  
Studies



**Kathleen Harder**  
Research Associate  
College of Design

### Data Systems



**Taek Kwon**  
Professor  
Electrical and Computer  
Engineering (Duluth)



**Alfred Marcus**  
Professor  
Strategic Management  
and Organization, Carlson  
School of Management



**Michael Manser**  
Research Associate  
HumanFIRST Program,  
ITS Institute



**Osama Masoud**  
Research Associate  
Computer Science and  
Engineering



**Gerard McCullough**  
Associate Professor  
Applied Economics



**Nic Ward**  
Director  
HumanFIRST Program,  
ITS Institute



**Nikos Papanikolopoulos**  
Professor  
Computer Science and  
Engineering



**Barry Ryan**  
Research Fellow  
Applied Economics



**Andrew Drescher**  
Professor  
Civil Engineering



**Shashi Shekhar**  
Professor  
Computer Science and  
Engineering



**David Biesboer**  
Professor  
Plant Biology



**Lev Khazanovich**  
Associate Professor  
Civil Engineering

### Economics and Management



**Karen Donohue**  
Associate Professor  
Carlson School of  
Management



**Paul Bloom**  
Professor  
Soil, Water, and Climate



**Joseph Labuz**  
Professor  
Civil Engineering



**Mihai Marasteanu**  
Associate Professor  
Civil Engineering

**Traffic Engineering and Management**



**Gary Davis**  
Professor  
Civil Engineering



**Ahmed El-Geneidy**  
Post-Doctoral Research  
Fellow  
Civil Engineering



**John Hourdos**  
Research Fellow  
Civil Engineering



**David Levinson**  
Associate Professor  
Civil Engineering



**Henry Liu**  
Assistant Professor  
Civil Engineering



**Panos Michalopoulos**  
Professor  
Civil Engineering

**Transportation Planning and Policy**



**John Adams**  
Professor and Chair  
Geography



**Gary Barnes**  
Transportation Economist  
State and Local Policy  
Program, Humphrey  
Institute of Public Affairs



**Frank Douma**  
Assistant Director  
State and Local Policy  
Program, Humphrey  
Institute of Public Affairs



**Ann Forsyth**  
Professor and Director  
Metropolitan Design  
Center, College of Design



**Kevin Krizek**  
Associate Professor  
Humphrey Institute of  
Public Affairs



**Barbara Lukermann**  
Senior Fellow Emeritus  
Humphrey Institute of  
Public Affairs



**Lee Munnich**  
Senior Fellow and Director  
State and Local Policy  
Program, Humphrey  
Institute of Public Affairs



**Lance Neckar**  
Professor  
Landscape Architecture,  
College of Design



**Carissa Schively**  
Assistant Professor  
Humphrey Institute of  
Public Affairs



**Thomas M. Scott**  
Director  
Center for Urban and  
Regional Affairs



**Barbara VanDrasek**  
Research Associate  
Geography



**Mary Vogel**  
Director  
Center for Changing  
Landscapes, College of  
Design

**Vehicle Systems and Fuels**



**Max Donath**  
Professor and Director  
Intelligent Transportation  
Systems (ITS) Institute



**David Kittelson**  
Professor  
Mechanical Engineering



**Rajesh Rajamani**  
Associate Professor  
Mechanical Engineering



**Craig Shankwitz**  
Program Director  
Intelligent Vehicles  
Program, ITS Institute

CTS-affiliated researchers received \$3.4 million in funding for transportation-related research, due to entrepreneurial efforts beyond the CTS funding process.

## Affiliated researchers and departments

### Aerospace Engineering and Mechanics

Demoz Gebre-Egziabher  
William Garrard  
Yiyuan Zhao

### Agronomy and Plant Genetics

Roger Becker  
Nancy Ehlke  
Donald Wyse

### Applied Economics

Jerry Fruin\*  
William Gartner  
Gerard McCullough\*  
Barry Ryan\*  
Tom Stinson  
Douglas Tiffany

### Bioproducts and Biosystems Engineering

Jonathan Chaplin  
John Nieber  
Gary Sands  
Bruce Wilson\*

### Carlson School of Management

Fred Beier  
Karen Donohue\*  
Alfred Marcus\*  
Mahmood Zaidi

### Child Development

Herbert Pick  
Albert Yonas

### Civil Engineering

Randal Barnes  
Paul Bergson  
Gary Davis\*  
Andrew Drescher\*  
Ahmed El-Geneidy\*  
Cathy French\*  
Ted Galambos  
John Gulliver  
Bojan Guzina  
Kimberly Hill  
Miki Hondzo

John Hourdos\*  
Lev Khazanovich\*  
Joseph Labuz\*  
David Levinson\*  
Henry Liu\*  
Mihai Marasteanu\*  
Panos Michalopoulos\*  
Arturo Schultz\*  
Carol Shield\*  
Gene Skok  
Karl Smith  
Henryk Stolarski  
Vaughan Voller

### College of Design

John Bloomfield\*  
John Carmody  
Kathleen Harder\*  
Lance Neckar\*  
Robert Sykes  
Mary Vogel\*

### Computer Science and Engineering

Mats Heimadahl  
Ravi Janardan  
Osama Masoud\*  
Nikos Papanikolopoulos\*  
Shashi Shekhar\*  
Jim Slagle  
Richard Voyles

### Electrical and Computer Engineering

Vladimir Cherkassky

### Geography

John Adams\*  
Francis Harvey  
Rod Squires  
Barbara VanDrasek\*

### Horticultural Science

Susan Galatowitsch

### Humphrey Institute of Public Affairs

Gary Barnes\*  
Richard Bolan  
Frank Douma\*

Kevin Krizek\*  
Barbara Lukermann\*  
Lee Munnich\*  
Carissa Schively\*

### Kinesiology

Mary Jo Kane  
Thomas Smith  
Michael Wade

### Law School

Stephen Simon

### Mechanical Engineering

Lee Alexander  
Saifallah Benjaafar  
Pi-Ming Chen  
Janet Creaser  
Max Donath\*  
William Durfee  
Alec Gorjestani  
Diwakar Gupta\*  
David Kittelson\*  
Michael Manser\*  
Arvind Menon  
Rajesh Rajamani\*  
Mick Rakauskas  
Craig Shankwitz\*  
Patrick Starr  
Nic Ward\*

### Metropolitan Design Center

Ann Forsyth\*

### Plant Biology

David Biesboer\*  
Iris Charvat

### Public Health

Judith Garrard

### St. Anthony Falls Laboratory

Jeff Marr  
Omid Mohseni

### Soil, Water, and Climate

Paul Bloom\*  
Peter Graham  
Satish Gupta  
Thomas Halbach  
Mark Seeley  
Dong Wang

### Urban and Regional Affairs

William Craig  
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.....  
CTS research reports are available for download online at [www.cts.umn.edu/publications/reports](http://www.cts.umn.edu/publications/reports).

## **Accomplishments**

Civil engineering associate professor David Levinson and Humphrey Institute of Public Affairs assistant professor Kevin Krizek edited *Access to Destinations*, a 414-page collection of 17 research papers from the CTS "Access to Destinations" conference held at the University of Minnesota in November 2004.

A visibility measurement system developed by Taek Kwon received approval for a

second patent from the U.S. Patent Office. Kwon, whose work has been sponsored by the ITS Institute for the past few years, is a professor in UMD's Department of Electrical and Computer Engineering and a NATSRL researcher. Kwon's system may help traffic managers make safety-related decisions, such as whether to reduce speed limits or warn motorists in heavy fog.

Civil Engineering associate professor David

Levinson co-authored *The Transportation Experience: Policy, Planning, and Deployment* with William Garrison from the University of California Berkeley. The 460-page book explores the genesis of transportation systems and the effect of policies on those systems.

# Appendix A

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