

**2007-08**



**ANNUAL REPORT**

Upper Great Plains Transportation Institute  
North Dakota State University

The **Upper Great Plains Transportation Institute** is an independent research and education center at NDSU. Administratively, it is directly responsible to the university provost. The Institute conducts research related to the immediate and long-term transportation needs of the region and disseminates information through conferences, workshops and seminars.

The research program is guided, in part, by an advisory council composed of representatives of various organizations, industries and agencies affecting or affected by transportation. The program areas focus on specific transportation issues, but, united within the UGPTI, they share expertise, staff and other resources to form an overall program with the flexibility to address emerging challenges and opportunities.

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# DIRECTOR'S MESSAGE



Gene Griffin

The roads draped across the prairie landscape like ribbons and the sturdy bridges reflected in our region's rivers and lakes are picture-postcard pretty. As long as we can get to where we're going, most of us don't give a thought to the maintenance and upgrade needs of our transportation infrastructure.

We forget that mobility of persons and freight underpins all of the critical elements of a civilized society – education, health care, governance, justice, education, commerce, and communications. Mobility is a necessary condition for socioeconomic success. We are fortunate that previous generations designed a system that was flexible and durable enough that we've been able to take it for granted. We have reached a critical time when that may no longer be true. A review of history indicates that each time our country has undergone an economic transformation, the demand for mobility has increased. That trend continues today.

The number of passenger miles traveled has more than tripled since 1960. Air passenger miles have increased by more than 18 times. Paratransit trips have increased from 68 million annually in 1990 to more than 114 million. Truck tons have increased by more than a factor of 10 since 1950. Rail tons have more than doubled. Small parcel shippers, a relatively new segment in freight mobility that includes UPS and Fed Ex, have grown from a \$22.5 million business in 1990 to more than \$55.5 million today. The volume of freight shipped by container has more than tripled since 1990.

Corresponding transportation growth has occurred in North Dakota. An increase in alternative and traditional energy development has placed a tremendous strain on the rural road network in some areas of the state. Today's agriculture production and processing requires an integrated transportation system with a global reach. Manufacturers in the region require complex supply chain management solutions to remain competitive.

That demand for mobility translates to congestion in our largest cities and greater wear and tear on the transportation infrastructure, especially in rural areas like those found on the

Upper Great Plains. In workshops across the state, we heard from local decision makers, business owners and citizens concerned about the state of North Dakota's infrastructure. They described increasing demands on roads, bridges and transit systems. The region's population is aging and many essential services are concentrated in a few population centers. At the same time costs to maintain transportation infrastructure are escalating rapidly and there are declining resources at both the state and federal levels. North Dakota is not alone in facing these concerns.

The Upper Great Plains Transportation Institute has grown into a broad program with multiple areas of expertise including agricultural transportation, freight planning, economic analysis, traffic analysis, transit, rural road safety and others. The dedicated and talented staff are well-versed in the challenges facing transportation in our region and globally. We are already engaged in research and outreach to help the region address the increasing demands on our transportation infrastructure. This report highlights our work to improve the competitiveness of the region's businesses, to assure that transportation investments are as effective as possible, and to improve the quality of life for those that live here.

One benefit of the UGPTI and its programs is the visibility that it brings to transportation issues. Our state, region and nation face critical decisions related to mobility. Our work helps bring those issues into focus for the public and for policy makers. Now, more than ever, society must recognize that mobility is vital to our future.

The work described in this report is made possible by a significant investment by the state of North Dakota and our other partners. These partnerships bring not only dollars, but ideas and innovations to the UGPTI and this region. At the same time, our partners' continued confidence in us is an acknowledgement of our abilities and accomplishments.

Thank you for your interest in our work and in the nation's transportation system.



# PROGRAM AREAS

**Academic programs** offered include an interdisciplinary Ph.D. program in transportation and logistics and a transportation option in the master's degree programs in civil engineering and agribusiness and applied economics. Graduates are prepared for careers in wholesale and retail business, construction, consulting, and government. A master's in military logistics (name changed to managerial logistics in October 2008) is also offered. UGPTI academic programs are largely funded by the Mountain-Plains Consortium and the Department of Defense. *Go to page 27 for more information.*

The **Advanced Traffic Analysis Center (ATAC)** enhances transportation systems in small to medium-size cities by using advanced traffic analysis and intelligent transportation systems to improve safety and mobility. The center's primary role is to support decision makers responsible for planning, operating and funding transportation systems at the local, regional and state level. Primary efforts focus on intelligent transportation systems, traffic operations and travel demand modeling. *Go to page 29 for more information.*

The **Agricultural and Industrial Freight Center** promotes the efficient use of resources and enhances the competitiveness of agricultural products in the region. Staff members evaluate transportation industry trends, policy, and rates – all factors that are critical to maintaining product quality and helping businesses and producers reach key markets. They also examine supply chain management and transportation-related economic development initiatives to enhance the competitiveness of agribusinesses in the region. *Go to page 30 for more information.*

The **Department of Transportation Support Center (DOTSC)** provides intellectual capital to the NDDOT to solve complex problems. The center also addresses regional issues within North Dakota and the surrounding states. The center includes a student roadway design section supervised by on-site DOT design staff to employ, train and utilize undergraduate students in DOT design projects. The center's information technology center integrates NDSU computer science and management information systems students with real-world information technology issues and projects related to the DOT. *Go to page 32 for more information.*

The **Mountain-Plains Consortium (MPC)** conducts research, education and training on transportation infrastructure and the movement of passengers and freight. It is a competitively selected university program sponsored by the U.S. Department of Transportation, attracting the nation's best talent to study transportation and develop new transportation strategies and concepts. The consortium includes North Dakota State University, Colorado State University, South Dakota State University, the University of Utah, and the University of Wyoming. *Go to page 33 for more information.*

The **North Dakota Local Technical Assistance Program (NDLTAP)** fosters safe, efficient, environmentally sound, and cost-effective highway, road, and street systems by exchanging transportation technology with North Dakota's local units of government and the transportation community. NDLTAP accomplishes this effort through training, technical assistance, and information services as part of the Federal Highway Administration's nationwide LTAP network. *Go to page 35 for more information.*

The **Small Urban & Rural Transit Center (SURTC)** provides transit stakeholders, users, suppliers and agencies information and training on technology and improved management and operations to increase the mobility of small urban and rural residents through improved public transportation. Research focuses on transit coordination, ITS applications and mobility planning. *Go to page 37 for more information.*

The **Biennial Strategic Freight Analysis Center** addresses key issues in North Dakota transportation. Each biennium, the program focuses on an economic sector important to the state with the goal of improving the competitiveness of firms through transportation enhancement in North Dakota. The current effort focuses on freight planning. *Go to page 31 for more information.*

The **Transportation Learning Network (TLN)** is an interactive conferencing network linking the transportation departments in Montana, North Dakota, and Wyoming and the Mountain-Plains Consortium universities. TLN supports quality transportation through a network of people and technology that serves TLN members by enhancing communication, education, professional development, technology transfer and research. *Go to page 38 for more information.*

The **Transportation Safety Systems Center (TSSC)** develops and maintains software used by state and federal safety specialists nationwide at weigh stations and ports-of-entry for inspecting commercial vehicles. Additional software is used by safety specialists during on-site reviews of commercial carriers. In addition, the center is also extensively involved in safety-related research and analysis to improve targeting of enforcement efforts and enhance software programs. *Go to page 39 for more information.*

The **Rural Transportation Safety and Security Center (RTSSC)** promotes and enhances the region's transportation safety and security through research, education, and outreach in partnership with stakeholders. It is a collaborative effort between the Upper Great Plains Transportation Institute and the NDDOT, with funding from the Federal Highway Administration. *Go to page 36 for more information.*



*UGPTI education programs are designed to prepare tomorrow's transportation professionals. Students learn from staff involved in research and outreach programs so they are able to apply theory and case studies to real-world situations. Students apply classroom lessons through their intimate involvement in the Institute's research and outreach programs. The Institute's programs benefit from the students' enthusiasm, skills and creativity.*

# EDUCATION

**Ph.D. program continues to grow.** When NDSU launched its doctoral program in Transportation and Logistics in 2002, there were six students enrolled. During the 2007-2008 academic year, enrollment had grown to 23 students. The growth in the program indicates continued interest by students in transportation and logistics as an academic field and recognition that NDSU provides an excellent program. "National studies indicate that demand for graduates trained in transportation will continue to grow," notes Denver Tolliver, associate director of the UGPTI and director of its education programs.

**Military logistics.** The UGPTI coordinates the Masters of Military Logistics program offered by NDSU. This intensive 12-month program is offered to officers and military civilians. It provides them with the latest transportation and logistics research, technology and applications needed to improve the efficiency, effectiveness and responsiveness of logistical and transportation systems within the military. The first class graduated in 2007. There are five students enrolled in the program for the 2008-2009 academic year. In October, the name of the program was changed to Masters of Managerial Logistics to reflect the broader nature of the program.

**New graduate program under development.** The UGPTI is working with the NDSU College of Graduate and Interdisciplinary Studies to develop a Transportation and Urban Systems degree program. The degree program, if approved, will include two new degrees, a master of transportation and urban systems degree and a master of science in transportation and urban systems as well as a certificate in transportation and urban systems. The first degree is targeted at mid-career professionals and other candidates who do not wish to conduct advanced research. The second is aimed at individuals with strong research interests and capabilities. The certificate will be targeted at practicing professionals. The new degrees will be interdisciplinary in nature and will be part of the existing Transportation and Logistics program coordinated by the Upper Great Plains Transportation Institute. In addition to the UGPTI, the departments of Architecture and Landscape Architecture; Civil Engineering; Geosciences; Sociology and Anthropology; and Criminal Justice and Political Science will participate.

**TLN and MPC offer more graduate courses.** The TLN and the MPC offered four graduate courses during the past year. "Our accessibility through the internet and our relationships with universities and departments of transportation are expanding our audience," notes TLN director Julie Rodriguez. "Many career tracks within transportation are requiring more advanced knowledge. The reduced travel time and costs associated with taking graduate classes, short courses or seminars through the TLN are huge advantages." The courses were:

- *Airport Planning and Design* was taught by Hesham Mahgoub at South Dakota State University. The course was geared to engineering students who would like to understand how airports are designed and planned. The course covered aircraft vehicle performance and airport interaction, airport planning, and analysis methods in airport engineering.
- *Public Transportation* was taught by Jill Hough at North Dakota State University. The course included concepts and models used in the transit industry for both rural and urban settings. The course also covered policy issues, government's role in transit, transit planning, demand forecasting, performance evaluation and system costing.
- *Transportation Modeling* was taught by Aleksandar Stevanovic at the University of Utah. The course addressed important transportation modeling techniques from theoretical and practical perspectives. The course taught modeling through the application of various commercial transportation modeling packages. The packages are used to support the most important aspects of traffic and transportation analyses.
- *Pavement Materials* was taught by Khaled Ksaibati at the University of Wyoming. The course focused on the most important aspects of asphalt pavements, giving students a working knowledge in selecting materials for pavement construction, testing aggregates and bituminous materials, designing and testing asphalt mixtures, evaluating the performance of flexible pavements, and rehabilitation strategies for deteriorated pavements.

**Seminar series continues.** The UGPTI continues to sponsor a series of transportation-related seminars during the academic year. The seminars provide helpful updates on transportation research and issues at the local, regional and national level. The series is focused on UGPTI staff, but is open to the public. The 23

topics offered during the 2007-2008 academic year ranged from updates on UGPTI research to presentations on topics such as transportation planning, electric vehicles, and alternative fuels. The seminar series was resumed in the fall of 2008.

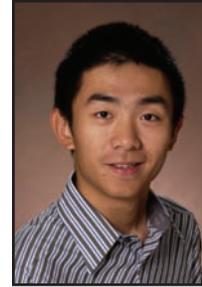
# Student Activities

Chen nominated. NDSU Ph.D. student Xianzhe Chen has been nominated by Jun Zhang, Department of Industrial and Manufacturing Engineering, for the IBM Fellowship Program which is a worldwide competitive program. Xianzhe has been working with Zhang on his thesis topic of Supply Chain Management. Zhang noted "Xianzhe has been doing a phenomenal job researching and applying supply chain data."

Scholarships awarded. The UGPTI awarded four scholarships at its annual Awards Banquet. The \$1,500 scholarships are awarded each year through the Mountain-Plains Consortium with funding from the US DOT University Transportation Centers program. Since 2002, 26 scholarships have been awarded. Daniel Leek Geu received the Paul E.R. Abrahamson Scholarship. Geu is majoring in agricultural economics. Geu came to the United States from southern Sudan in east Africa 14 years ago and hopes to specialize in areas such as agricultural transportation, logistics, or marketing. David Bruins, Michael Grundman and Joshua Loegering received Transportation Engineering Scholarships. The scholarships recognize academic achievement and promote the education of transportation students at NDSU. Bruins is a senior in civil engineering and a native of Watford, ND. Bruins has been employed by the Fargo District of the North Dakota Department of Transportation and at the DOT Support Center at NDSU. Grundman is a senior in civil engineering from Osakis, MN. He works at the Advanced Traffic Analysis Center. Loegering is a senior in civil engineering and originally from Milaca, MN.

Student honored. Natalie (Beck) Easterday was named SURTC's Outstanding Student of the Year by the U.S. Department of Transportation University Transportation Center program. Easterday received the award in January during the Transportation Research Board's Annual Meeting in Washington, D.C. The award recognized Easterday's excellent communications skills and her academic contributions. Easterday is a master's student studying emergency management at NDSU. She also holds a bachelor's degree in business administration. The honor included a trip to the TRB meeting and a \$1,000 award. Each year, the U.S. DOT recognizes an outstanding student from each participating University Transportation Center. Easterday was a graduate research assistant with SURTC. She has done research examining the planning differences between rural and urban communities with regard to the use of public transportation in emergency operations.

Student gains transit expertise as intern. Transportation and Logistics Ph.D. student Marc Scott gained a wealth of hands-on experience as an intern at the Transit Authority of River City in Louisville, KY, during the summer of 2008. The internship was an outgrowth of outreach activities conducted by SURTC with the Transit Authority of River City. In Louisville, Scott worked on finance issues for the agency, developing spreadsheet models, investment analysis of various fleet purchase options, and developing reports and white papers for staff and administration. He also assisted with public meetings focused on proposed fee increases and service charges. The meetings ranged from a session with Louisville's mayor and a presentation to the Louisville Metropolitan Council to one-on-one visits with transit riders. "With Marc's internship in Louisville, we were also able to help bridge the gap between research and issues challenging the industry. Marc now has a perspective that he would never have gained only at the university and that perspective enriches our work," says SURTC director Jill Hough.



Chen



Bruins



Geu



Loegering



Grundman



Scott



Easterday

## Department of Transportation Support Center Activities

Real-world design. The Engineering Center at DOTSC has been utilizing civil and construction engineering interns to develop multiple highway improvement projects over the past year. These projects include concrete pavement repair, asphalt pavement overlay, small urban reconstruction, multi-use trail, interstate reconstruction, and safety (turning lanes) projects. Nine projects were completed in the last year. All nine projects are being built during the 2008 construction season across the state of North Dakota.

In addition to the completed projects, preliminary engineering work has begun on five new projects and the final design is active on four projects. One of these improvements is a widening, full depth reclamation, and hot bituminous pavement project. This project will blend the existing surfacing and base together, in-place, on the roadway. Portland cement and water will be added to the blended material to form a stabilized base for the roadway. Hot bituminous pavement will then be laid over the top of the new base layer. This is a fairly new technique for North Dakota, and will be the third project built in the state using this method. Additional projects follow.

- **Putting experience to work.** Eighteen different civil and construction engineering students have worked at the DOTSC in the past year. Of those, ten have graduated from their respective program and are active in the engineering field. Seven have gone to work for the NDDOT, one is pursuing a graduate degree from NDSU, one is employed at the Missouri DOT, and one went to work for BNSF Railroad.
- **Activity Sheet project.** In May 2007, the DOTSC information technology students started work on a Web-based project creation and ranking system for NDDOT. Each biennium, activity sheets for projects are to be created outlining purpose and costs. The hierarchical user role structure would approve and rank activity sheets. When the final ranking is complete, the finalized activity sheets will be printed and brought forth to the ND state legislature for budgeting. As of June 2008, a final revision was in progress before project completion.
- **Pavement performance project.** In June 2008, this project was starting its first stage. Its purpose is to offer an interface for graphing pavement data. These graphs would illustrate the reliability of different pavement preservation techniques depending on different factors.
- **ITS device management system project.** In May 2008, the DOTSC information technology students were introduced to a project for NDDOT to create a Web-based system to catalog ITS devices and track trouble tickets for the devices. The FHWA requires such an application so that they can get reports easily from the NDDOT about different ITS devices. This project must be completed by October 2009 as specified by the FHWA.
- **Software updates.** The DOTSC information technology department also worked to convert and/or update existing programs to run with updated software programs. These programs can help store data in a way that is easily accessible and maintainable.





*UGPTI staff members have close working relationships with professionals in government agencies and industry. Many UGPTI staff members have work experience as consultants and transportation professionals. Those relationships and that experience are channeled into training programs and applied research. In addition, staff members are resources for colleagues to consult on emerging issues and technology. Results from the Institute's research programs are key components of outreach efforts.*

# OUTREACH



Jon Mielke, UGPTI

**UGPTI hosts statewide discussion on mobility and transportation.** The Upper Great Plains Transportation Institute hosted a statewide discussion on the mobility needs of North Dakota and the state of its transportation infrastructure.

In March and April, the Institute hosted regional workshops in Williston, Dickinson, Minot, Bismarck, Devils Lake, Jamestown, Grand Forks, and Fargo. A statewide conference to summarize input and tap input from state leaders was held in Mandan May 1. Nearly 600 people attended the sessions. A summary of the discussions was presented to the North Dakota Legislature's Interim Transportation Committee in Fargo June 19.

"People expect a lot out of North Dakota's transportation system," says Jon Mielke, a UGPTI researcher and one of the organizers of the sessions. "Demands on that system, both for personal mobility and for economic activity, are growing. At the same time, costs to maintain and improve the system are escalating and revenues are not keeping pace."

At the statewide meeting May 1, UGPTI researcher Alan Dybing presented results of a study that showed the annual roadway and bridge funding needs for North Dakota at nearly \$540 million. At the same time, the Federal Highway Trust Fund is expected to be depleted next year with the projected loss of \$70 million in federal highway funding as a consequence.

Complicating the problem has been inflation in the cost of building materials and fuel. Representatives from the city, township, county, and state levels outlined how budgets are being squeezed. Mielke notes that the producer price index increased by 32 percent from 2001 to 2005. Revenue for the

state highway system increased by only 18 percent during that time. From 2001 to 2008, the North Dakota Department of Transportation experienced construction cost increases of approximately 60 percent.

"The result of that reduced buying power is deferred maintenance," Mielke says. But deferring maintenance on the state's road network is expensive because pavement deterioration is an accelerating process. Ride quality on new pavement declines by about 40 percent over the first 20 years of its life. After that, pavement deteriorates much more rapidly. That means a road rehabilitation project that occurs when pavement is 20 years old will cost 400 percent to 500 percent more if the project is delayed 7-8 years.

Francis Ziegler, director of the North Dakota Department of Transportation, said the state's highway system is in a preservation mode and that 39 percent of the asphalt roadways are considered mediocre. He noted that demands on the road system are increasing. Manufacturing, energy production, and crop production have all increased substantially in the state with a corresponding need for freight mobility.

Mark Johnson, executive director of the North Dakota Association of Counties, says with about half of all county roads in the state in fair condition and about one-third considered poor, delay is not an option. "We need to invest in our road network and now is the time to do it. We no longer have the comfort of expecting or waiting for federal funds," he says.

Expenses that are escalating faster than revenues are also a problem for the state's transit agencies. "We need to look at the human factors involved with these issues," Pat Hansen said. Hansen is program director at South Central Adult Services, which provides transit services for the Valley City area.

"Roads and bridges are important, but we're transporting people, sometimes up to 300 miles round trip, for very important medical services," Hansen says. "Mobility is not just about cost, it's about quality of life. I appreciated that I was able to make that point."

Hansen says the meetings performed the important task of providing the same information to transit operators, transportation officials, and state and local decision makers across the state. "I have a much better idea of what transportation issues are facing the state and I can see the legislative issues and challenges that we're facing."

UGPTI director Gene Griffin told the group that several strategies could be employed to address the situation.

“We will need to continue to work smarter and make better use of our scarce resources,” he said. That ability is currently limited by technology, institutional barriers and collective and individual pride. We can make great strides if we can overcome those barriers or at least push them back.”

Griffin also noted that decision makers will need to set clear priorities that take into account transportation needs. “This rationalization requires political will,” he said. “But the result will be a transportation system that meets the state’s fundamental needs and a set of minimal demands.”

With innovation and a rationalized approach to demands within the state will come a need for additional funds, Griffin said. “There is a growing recognition among federal, state, and local agencies, as well as within the private sector, that maintaining and enhancing our transportation system needs to be a priority.”

The Mountain-Plains Consortium, NDLTAP, and SURTC provided support for the effort.

**Integrating security into small MPO planning.** When disaster strikes, being prepared can make all the difference. That’s why UGPTI researcher Mark Lofgren is working with the Fargo-Moorhead Metropolitan Area Planning Organization to develop transportation security plans. Because so much of what occurs in a community depends on transportation, planning for disruptions is essential for managing security issues and for promoting safe recovery. The goal of the study is to help the Fargo-Moorhead area meet the U.S. Department of Transportation mandate to incorporate security into its planning documents and processes. In addition, the plan will serve as a model for smaller MPOs looking for ways to integrate and sustain security initiatives in their own transportation planning activities. In many instances security activities may be related to other planning factors such as safety, accessibility, and efficiency. Federal instructions recognize the relationships and encourage MPOs to address security in ways that are efficient and effective. The work will provide insight for interagency coordination in transportation aspects of disaster and security events.

**Developing a vision for mobility.** Eight national organizations joined in an effort to create a new national “vision” for transportation to maintain America’s place in the world economy and way of life. UGPTI director Gene Griffin and associate research fellow Kathryn Harrington-Hughes helped organize the effort and develop recommendations. On May 21-23, more than 150 representatives of both public and private sector transportation and industry organizations were invited to convene at a national conference to help develop this vision. To lay the groundwork for the deliberations, nine working groups produced recommendations on subject areas. Topic areas included: freight; highways, travel, and tourism; freight and passenger rail; transit and intercity bus; metropolitan mobility; sustainable transportation; advanced technology and innovation; highway safety; and funding. Participating organizations included the American Association of State Highway and Transportation Officials, AAA, American Council of Engineering Companies, American Public Transportation Association, American Road and

Transportation Builders Association, American Trucking Associations, Associated General Contractors and the Association of American Railroads.

**Flagger training.** NDLTAP developed a flagger-training module that will be viewed by all flaggers in North Dakota. The module includes a handbook and a presentation. Prior to the first day on the job, all flaggers must view the presentation and take a short quiz to ensure they know and follow the guidelines.



Flagger training.

**Training for transportation technicians.** The North Dakota Department of Transportation, with the support of NDLTAP provided training for the new transportation technician series within the department. Twenty-eight NDDOT maintenance transportation technicians participated in a 32-hour course entitled “Introduction to Highway Construction.” The course provided the new transportation technicians with an introduction to basic skills such as math, plan reading, materials, construction inspection, and traffic control. The various course topics were instructed by DOT and UGPTI staff members. This instruction has been initiated by the department to give transportation technicians an opportunity to better understand the skills required to inspect DOT construction projects.

**Vision Safe Drive Conference held.** The first Vision Safe Drive Conference was held in November 2007 in Bismarck. Representatives from eight states and the District of Columbia were present with more than 100 attending and almost



U.S. Customs and Border Patrol



National Summit on Ag and Food Truck Transport

30 speakers. The conference provided a venue for leaders and experts in traffic safety to exchange ideas on emerging issues, success, and challenges. The discussions were used to prioritize research and outreach needs for the region as well as create a unified vision for traffic safety. Conference sponsors included the Rural Transportation Safety and Security Center, the Mountain-Plains Consortium, NDDOT and the North Dakota Division Office of the FHWA. Another conference is scheduled for May 2009 in Rapid City.

**Issue briefs published.** The Rural Transportation Safety and Security Center has published a series of “Issue Briefs” on rural traffic safety issues. The on-going series highlights key issues and research and are designed to provide background for public policy debate and prioritizing by local agencies. The briefs have highlighted deer-vehicle collisions, driver drinking, speeding, risky driving behavior by young males, and graduated driver’s license programs.

**National Summit on Ag and Food Truck Transport.** More than 200 attendees and 40 speakers participated in the first-ever National Summit on Agricultural and Food Truck Transport for the Future held in Washington, D.C. in December 2007. The event was organized by the Agricultural and Food Transporters Conference of the American Trucking Associations and the UGPTI with support from the U.S. Department of Agriculture, the U.S. Department of Transportation and the Mountain-Plains Consortium. The summit examined the impact of farm and energy policy changes on domestic agricultural production and processing and the ability of commercial agricultural trucking to meet demands from the environment on trucking and agriculture. A second summit is scheduled for December 2008.

**Software for motor carrier safety.** Staff at UGPTI’s TSSC continue to develop and maintain high-quality software for use by federal and state commercial vehicle safety specialists nationwide. The work is funded by the Federal Motor Carrier Safety Administration. The software applications are used by specialists in many functions, including helping to conduct inspections, checking on driver’s license status, reviewing information from past inspections, reviewing carriers’ safety and violation history, and developing case files for enforcement

activities. This FMCSA work is the primary activity of the Transportation Safety Systems Center.

**Border help.** TSSC is working with the Federal Motor Carrier Safety Administration and U.S. Customs and Border Protection to improve truck and bus safety and security at U.S. borders. The center is helping to bridge FMCSA and CBP computer systems and databases to facilitate the clearance of commercial carriers, vehicles and drivers. The goal is to identify and contain unsafe vehicles while speeding the flow of safe vehicles and goods crossing the border.

**Setting research agenda for human service transport.** The Community Transportation Association of America’s National Resource Center for Human Service Transportation relied on SURTC expertise in January 2008 when it convened its national Human Service Transportation Research Summit in Washington, D.C. The summit drew together representatives from industry, government, and academia to participate in a series of activities aimed at identifying and prioritizing research opportunities in the field. The activities were facilitated by SURTC staff members including Jill Hough, Jim Miller, Jeremy Mattson, and David Ripplinger. SURTC used the results from the activities to author a national research agenda. The center anticipates that organizations such as the Federal Transit Administration, the Transit Cooperative Research Program, University Research Centers and others will use the agenda to guide their research investments.

**NDinfo.org is an online transportation service directory.** Through a contract with the NDDOT, the UGPTI developed a statewide online transportation service directory. The NDinfo.org website enables individuals to access information about available transit services across the state. Currently, researchers with the UGPTI’s Small Urban & Rural Transit Center are updating database information on transit providers, adding route maps to the site and developing a trip planner.

**SURTC-Dakota Transit Association partnership.** The Dakota Transit Association has contracted with SURTC to provide an executive director. SURTC outreach and training coordinator Gary Hegland currently fills that role.

During the past year, the association has enhanced training opportunities, identified strategies to increase funding for member operations, promoted rural transportation nationally, and increased education and advocacy efforts.

**Risk management for transit.** Risk management for transit operators is often focused on minimizing vehicle accidents, but SURTC's training coordinator Gary Hegland has developed a comprehensive training course that addresses four major issues – people, property, reputation, and money – as geared specifically to transit. He has presented the course in Texas and Minnesota and has spoken on risk management for transit at a number of other locations across the country. He has been spicing up his training sessions with “Turning Point” technology. The technology is an audience response system integrated into his PowerPoint presentation that allows the audience to submit answers to questions using a hand-held keypad.

**Transit coordination.** As federal and state mandates push transit agencies and human service agencies to coordinate their services, UGPTI specialists have become the go-to experts for rural agencies. Gary Hegland, SURTC's training coordinator, and Carol Wright, SURTC's associate director for training and outreach have developed training on how to develop coordination plans. Hegland spoke at the Montana Transit Association Spring Conference in April. About 30 operators were in attendance to learn about implementing a coordination plan in their own communities. Hegland used the River Cities coordination plan that he wrote for Pierre, South Dakota as a primary example. Wright spoke at the Colorado Association of Transit Agencies Conference and Expo in September 2008. She discussed finding coordination partners and breaking down barriers.

**Transit safety and security.** Gary Hegland was certified by the Community Transportation Association of America as a transit safety reviewer who can conduct transit safety and security assessments. Reviewers visit transit systems and determine if they meet industry benchmarks for safety and security. In those areas where they fall short of the benchmarks, they offer suggestions on how to improve. Carol Wright offers

training on developing safety and security plans. In November 2007, Hegland performed an assessment for Anchorage Public Transit and was able to offer strategies for improving driver and vehicle safety. In September 2008, Carol Wright conducted a half day workshop for the Colorado Association of Transit Agencies on safety, security and emergency management. Wright also serves on the FTA's Bus Safety and Security Work Group.

**Planning to succeed in the transit business.** An intensive business plan training course provides small urban or rural transit agencies with a jump start on developing a business plan. The course gives participating transit managers hands-on experience with information that is specific to their own agency. “This is intensive training on a very complex topic,” says Carol Wright, SURTC's associate director for training and outreach. “Participants provide information to SURTC ahead of time, so that we can plug it into the business plan outline they'll be using during the training.” Affiliated faculty member Jim Miller is the lead instructor for the training. Participants learn to implement performance measures and assemble a business plan using financial data and demographic information that is specific to their own agency. “They leave with a business plan for their agency that is ready to put into action,” Wright says.

**Introduction to transit management.** Learning by doing may work, but it may not be the most effective and efficient way to manage a small transit agency. That's why SURTC developed an “Introduction to Transit Management” course. “The course is designed for new transit managers to allow them to learn the ropes and hit the ground running,” notes Carol Wright, SURTC's associate director for training. “It's also for transit people in the industry who are ready to expand their knowledge base.” So far, the course has been taught in North Dakota and Alaska. There has been interest in the course from Colorado, Iowa, South Dakota, Texas, Wyoming, Utah and other states. The course is augmented with state-specific examples provided by department of transportation officials at each location. This course is designed to provide a broad-based knowledge of basic concepts related to transit operations, funding, record keeping, compliance issues, etc.



Risk management training



Gary Hegland



TLN work zone safety course



TLN work zone safety course

SURTC's goal is to develop a certificate program as part of the completion of course requirements. As part of the course, each student will receive a 600-page training and resource manual.

**Revising ND's state transit management plan.**

Researchers helped the NDDOT refine its statewide transit management plan to better reflect state-specific regulations and requirements for transit operations. The focus was on requirements for federal funding. The new version of the plan reflects NDDOT and other state regulations as well as updates to federal regulations. Every state is required by the Federal Transit Administration to have a statewide plan. The plan should be a valuable tool for state officials as well as for transit managers to assure they are complying with requirements of their major funding providers.

**Improved transportation coordination endorsed.**

Mobility for residents of North Dakota took a significant move forward in April with a pledge from Lieutenant Governor Jack Dalrymple to work to improve coordination among transit providers in the state. "The endorsement of this concept puts it on the front burner, politically, and will help make it a priority across the state," notes UGPTI's Carol Wright. The endorsement came during a Transit Coordination Summit April 9 in Bismarck. Also at the event, Dave Leftwich of the North Dakota Department of Transportation outlined the state's regionalization plan which will promote the NDDOT's coordination efforts. The event was sponsored by SURTC and AARP North Dakota. Within transportation, the terms coordination, cooperation, and collaboration all refer to groups of people, programs, and/or funding sources working together to improve services to clients through a more unified approach. Nearly 100 transit managers, county commissioners, state legislators, human service providers, department of transportation professionals, and others attended the conference.

**TLN doubles technical courses.** The TLN reached more than 1,250 people in nine weeks through six work zone safety courses. The number is more than doubled from last year. "For comparison," said TLN director, Julie Rodriguez, "last year we only had four events with attendance in the triple digits, this year we had 12."

**TLN starts Web conferences.** The TLN added another aspect to its training modules by making Web conferences available. The new technology will allow people to receive training at their own desks. This advancement will extend TLN's reach.

**TLN sees increase in sites and partners.** WYDOT added TLN sites in Riverton and Gillette. The addition of these two sites puts the total of regular TLN sites to 35. TLN also developed new relationships with the American Traffic Safety Services Association and the Occupational Safety and Health Administration and expanded its relationships with the Federal Highway Administration and the National Highway Institute.

**JTRF special transit issue.** Last year, public transportation in the United States had the highest ridership in the past 50 years. This year, ridership has increased even more. That makes a special issue of the Journal of the Transportation Research Forum especially timely. UGPTI's Jill Hough served as guest editor. Articles cover topics as diverse as the effects of gasoline prices on bus ridership to measures for transit network performance. Other topics include bus emissions and bus transit route design. Two of the articles were authored by UGPTI staff. "The Effects of Gasoline Prices on Bus Ridership for Different Types of Transit Systems" was written by Jeremy Mattson and "Hedonic Value of Transit Accessibility: An Empirical Analysis in a Small Urban Area" was written by former associate research fellow Xinyu Cao and Jill Hough. The special issue was sponsored by the American Public Transportation Association and was made available at APTA's annual Expo and meeting early in October 2008.

**Transit business planning.** When one of the region's most successful transit agencies decided to develop an updated business plan, it asked the UGPTI for help. River Cities Public Transit (RCPT) provides public transportation to Pierre, SD, and surrounding areas and has experienced phenomenal growth and success over the past six years. As of 2007, RCPT offered more than 250,000 one-way trips per month in an eight-county region serving a population of about 32,000 people. Despite its success, the RCPT's board and its manager, Ron Baumgart, asked SURTC to review its operations and to formulate a detailed business plan. The process helped RCPT to identify additional public transit markets, forecast future capital and fund needs, and communicate a clear vision to its stakeholders.

**LTAP Clearinghouse.** The UGPTI works with the American Road and Transportation Builders Association in Washington, DC, to manage the National Local Technical Assistance Program/Tribal Technical Assistance Program Clearinghouse. The program serves as an exchange for highway transportation-related technology and information for local units of government and state LTAP centers. The UGPTI provides technical assistance in upgrading the LTAP website and is exploring new technology applications and other methods of technology transfer that could be applied by centers across the country. The TLN and the ND LTAP are integral parts of this effort.



Intro to Transit Management training



Carol Wright



Ayman Smadi

# SMADI

**Smadi earns Fulbright appointment.** A prestigious Fulbright Scholar grant allowed advanced research fellow Ayman Smadi to spend 10 months teaching and helping develop research programs at the University of Jordan in Amman.

In January, Smadi began teaching a graduate course in urban transportation planning. He has also been helping develop the university's transportation research program. He says the effort will help Jordan address critical transportation needs through education and research. "Jordan has made great strides toward modernizing its economy and implementing sweeping reforms. Transportation is a key ingredient for supporting continued growth and development," Ayman says.

Smadi is a native of Jordan and is now a U.S. citizen. "I spent the first half of my life in Jordan and the second half in the United States, so in a sense I feel like I am bi-cultural," Smadi says. "This is not only an excellent professional opportunity, it is also an opportunity to help NDSU link to quality students from Jordan who want to eventually study in the United States."

Smadi earned a master's degree in civil engineering from the University of Oklahoma and a doctorate in civil engineering from Iowa State University. He has been at the UGPTI since 1993 and has been director of the UGPTI's Advanced Traffic Analysis Center since 1998. Smadi will continue to serve in that capacity during the Fulbright award term. Smadi says the success of the project will lead to a long lasting program of collaborative transportation education and research between NDSU and Jordanian universities in the areas of transportation and logistics. "We have had several positive experiences with graduate students recruited from the University of Jordan and this project could solidify a formal link to recruit highly qualified students to NDSU's Transportation and Logistics graduate program."

He also will explore research opportunities for the UGPTI in areas related to transportation planning and logistics and supply chain management. Smadi noted that rapid growth in the Middle East region has attracted private and public transportation expertise from around the globe. "This project will allow UGPTI to gain international experience and exposure in the region. As a researcher and educator, the experience will provide me with additional insights and allow me to develop international case studies that can enhance the UGPTI program."

Smadi is one of about 800 U.S. faculty and professionals who will travel abroad through the Fulbright Scholar Program. Recipients of Fulbright awards are selected on the basis of academic or professional achievement, as well as demonstrated leadership potential in their fields. The Fulbright program's purpose is to build mutual understanding between the people of the United States and the rest of the world. The program is sponsored by the U.S. Department of State, Bureau of Educational and Cultural Affairs.



*UGPTI research programs have roots that are more than 40 years deep. Originally focused on North Dakota commodity transportation, the Institute's research portfolio is now national in scope. The focus of that portfolio is on the mobility of people and freight in rural areas and communities and small cities.*

# RESEARCH

## Intelligent Transportation Systems

**Regional ITS architecture updates.** A regional ITS architecture provides a framework for supporting ITS deployment by defining services, developing system requirements, identifying information flows, coordinating agency roles, and integrating functions across jurisdictional lines. Having a current regional ITS architecture is a requirement for receiving federal funds for ITS projects. ATAC has been a resource for the NDDOT and ND MPOs for developing and maintaining their regional ITS architectures. The update process is needed to reflect new ITS priorities and strategies, account for expansion in ITS scope, and allow for evolution and incorporation of new ideas. ATAC researchers have completed the required updates for the MPOs of Fargo-Moorhead and Bismarck-Mandan. Currently, updates of the NDDOT statewide architecture and the Grand Forks-East Grand Forks MPO are underway.

**ITS architecture training.** Regional ITS architectures are meant to be actively used as tools for the deployment of ITS projects. Information in the ITS architecture, such as operational concepts and functional requirements, serve as starting points for key steps in the systems engineering process that is required for ITS projects. ATAC researchers are working with the NDDOT on developing training to familiarize DOT central office and district staff with the architecture and its use. A portion of the training will focus on using Turbo Architecture, a software application that supports the development of regional and project architectures. Turbo provides a graphical user interface to a database that contains all information pertaining to a region's ITS architecture. Through Turbo, trainees will have a means to access the architecture to retrieve information, make required changes, and generate various reports. Once the training course is developed, NDDOT plans to make it available to MPOs in the state that are maintaining their own ITS architectures.

**North/West passage pooled fund study, phase III.** The North/West Passage Corridor encompasses the states along I-90/I-94 from Wisconsin to Washington and is an FHWA Transportation Pooled Fund (TPF) Study. The vision for the corridor is to influence ongoing standards development and utilize effective methods for sharing, coordinating, and integrating traveler information across state borders. ATAC researchers have been involved in the study since its initial phase. ATAC recently developed the North/West Passage Corridor Advanced Traveler Information System (ATIS) website. The purpose of the website is to provide one location to view corridor wide traveler information, and to link to additional detailed information for each of the member states. Having the information available from one source will help travelers make route decisions based on road conditions, and to alert travelers to potential problem areas on the corridor. The website provides a core system that, in the future, can be expanded to support additional ATIS functions and provides a test-bed for corridor-wide consistent event description.

## Traffic Operations

**Tri-level ramp operational study.** Operational deficiencies along I-94 have been developing in recent years within the Fargo-Moorhead metropolitan area. One such area is the section of I-94 between I-29 and 25<sup>th</sup> St., which experiences congestion during the afternoon peak period. ATAC assisted the NDDOT in assessing the operational performance of the existing conditions and various geometric designs between the I-94 & I-29 Interchange and the I-94 & 25<sup>th</sup> St. Interchange. The major components of the analysis included determining the vehicle paths through the study area and simulating various design alternatives for both existing and projected 2030 conditions. Key measures of effectiveness (MOE) from the simulation analysis were compared among the simulation scenarios, which provided insight for selecting the most appropriate design alternative.

**GF school safety study.** ATAC continued its effort of improving school zone safety by conducting pedestrian safety and traffic circulation evaluations at three schools in Grand Forks: Phoenix Elementary School, Lake Agassiz Elementary School, and South Middle School. The main objectives were to evaluate pedestrian safety and traffic circulation at each of the schools and provide short and long-term improvement strategies. Areas of analysis included traffic control (pavement markings, signage), pedestrian activity, parking issues, and pick-up/drop-off areas. Each school's existing conditions were documented based on site visits, so recommendations could be made regarding any potential

improvements. The study provided several short- and long-term solutions for each school. The recommendations ranged from updating pavement markings and signage around the schools, to making geometrical changes to sidewalks, parking lots, and curbs. In addition to making recommendations on engineering enhancements at each of the schools, other aspects such as education and enforcement were discussed.

**Work zone study.** The focus of this research was to meet the growing need for accurate and practical methods to support traffic analysis in work zones. Road construction and maintenance activities have become a common feature for many U.S. roads over the last few years due to aging infrastructure. This research examined the application of two classes of traffic analysis models, macroscopic sketch analysis (QuickZone) and microscopic traffic simulation (Dynasim and VISSIM), to evaluate the traffic impacts caused by work zone activities. The research evaluated the application of these tools to an urban interstate work zone. Specifically, this research examined the following: 1) how the use of traffic analysis models relates to federal requirements about considering traffic impacts of major construction projects, 2) the accuracy of model results in comparison to real-world conditions, and 3) modeling effort and data requirements of these models.

More ATACid's are used by researchers across the U.S. ATAC's controller interface device (ATACid), developed over several years, has seen a surge in interest and sales. Several new units have been sold recently to research centers at the University of Tennessee, University of Minnesota – Duluth, and the City of Edmonton, ON. Other ATACid users include the University of Nevada Las Vegas, University of Virginia, Texas Tech University, and Siemens ITS. The ATACid enables researchers/agencies to model complex traffic control problems using hardware-in-the-loop-simulation, which allows an actual traffic signal control system to be used within a traffic simulation model, such as VISSIM, Dynasim, and CORSIM.

## Metropolitan Transportation Planning

ATAC houses the regional travel demand models of the three metropolitan planning organizations in North Dakota. As such, ATAC provides, maintains, runs and updates these models to support transportation planning activities. The multi-year partnership is supported by the NDDOT, the Grand Forks-East Grand Forks Metropolitan Planning Organization, the Fargo-Moorhead Metropolitan Council of Governments, and the Bismarck-Mandan Metropolitan Planning Organization. During the 2007-2008 fiscal year, ATAC performed the following projects:

- Completed a major update of the F-M Metro COG Regional Travel Demand Model to reflect the transportation and socio-economic changes since the previous model update. Performed network and traffic data revisions to the model's structure to account for residential and commercial growth and changes in the road network and travel patterns. The updated model was calibrated to the 2005 conditions and will be used to support long-range transportation plans for the Fargo-Moorhead region.
- Completed an analysis to assist in designing the new I-94 and 9<sup>th</sup>/57<sup>th</sup> St. Interchange between Fargo and West Fargo. ATAC provided various options for expanding 9<sup>th</sup>/57<sup>th</sup> St. and Co Rd. 17 (Sheyenne St.) to accommodate the projected growth to the southwest portion of the metro area.
- Completed an analysis to assist the 25th St. Corridor study in Fargo (from 13th Avenue South to 32nd Avenue South). ATAC provided analysis which focuses primarily on the congestion that occurs in the peak hour at the 25th Street/I-94 interchange.
- Completed an analysis to assist the 64th Ave. S. (57th Street to University Drive) & 25th Street (52nd Ave S to 100th Ave S) Corridor studies in Fargo. The analysis provided future traffic projections studies where the focus is on identifying 2030 traffic conditions for the study area.
- Completed an analysis to assist the 76<sup>th</sup> Ave. S. Bridge study which included analyzing a 2030 scenario with/without the 70th/76th Ave. S. bridge in place under different area development options in the Fargo-Moorhead area. The main focus of the study was to quantify the impact of the bridge (or lack thereof) on the transportation system under the year 2030 traffic and development conditions.
- Completed a major update of Bismarck-Mandan MPO's Regional Travel Demand Model to account for transportation and socio-economic changes that occurred since the previous model update. The update included improvements in the model's ability to correctly estimate roadway capacities through the addition of intersection geometries and intersection controls as part of the modeled network. The updated model was calibrated to current conditions and is being used to support long-range transportation plans in the Bismarck-Mandan metropolitan area.
- Used the Bismarck-Mandan MPO's Regional Travel Demand Model to generate travel projections to the year 2035. These projections are used for road and traffic management planning.

# Transit and Personal Mobility

**Brookings transit study.** South Dakota State University may be an NDSU rival on the football field, but SDSU and its home city of Brookings, SD, looked to NDSU and the UGPTI to make its transit system a winner. The Brookings Area Transit Authority (BATA) asked SURTC to explore possible opportunities to provide better transit service to students. In 2006, BATA identified the possibility that transportation needs of SDSU community members were going unmet. Researcher David Ripplinger developed a survey to gather information from SDSU students, faculty, and staff; attended public meetings; and sought the guidance of an advisory board. BATA is considering several recommendations. Based on the results of the campus transit research, the City of Brookings also asked UGPTI to help identify gaps between transportation needs and services in Brookings. The study was motivated by a desire among members of the Brookings City Council to revisit the city's role in providing community transportation, including the process of allocating local funds to support transportation service providers.

**Coordination in southwest North Dakota.** UGPTI and the NDDOT are working together to explore possibilities for region-wide coordinated transportation in southwestern North Dakota. The vision is for all transit providers in the region including schools, private operators, human services, and transit agencies, to coordinate services. Researcher David Ripplinger is identifying transportation needs and resources to determine how they match up. A project working group from the region is guiding the work. One component of the study is to determine what transit service providers need to do to facilitate the process of co-mingling riders. The study will also identify technology that will be required to make such a coordinated transportation operation work.

**Tribal transit needs assessment.** UGPTI researchers Jon Mielke and David Ripplinger conducted a needs assessment to help identify the Indian reservations across the nation most in need of transit services. The assessment identified tribal transit needs for the distribution of funding under the 2005 SAFETEA-LU federal highway bill. This bill created a new program (5311c) to provide funding for tribal transit services in non-metropolitan areas. There are approximately 332 federally recognized Indian tribes in the lower 48 states. The needs assessment is a good starting point to identify areas of high need using census based demographic data related to mobility dependent populations such as seniors and the disabled.

**Biodiesel use in Fargo-Moorhead MAT buses.** UGPTI teamed with the Fargo-Moorhead Metropolitan Area Transit (MAT) to determine how beneficial biodiesels really are. MAT has been using biodiesel mixed fuels in its buses for more than a year and is examining the effects biodiesel has had on its bus fleet and the Fargo-Moorhead community. SURTC researcher Del Peterson examined the direct effects of the F-M MAT using biodiesel mixed fuels. He interviewed MAT and city officials to identify changes they have seen since the switch to biodiesel from both a bus fleet and public relations perspective. The study found that the switch to biodiesel has been a success. Minimal maintenance problems have occurred, and marketing of their biodiesel use has resulted in considerable positive exposure throughout the community. There was little or no decrease in fuel efficiency. The study also revealed the high costs of maintaining "cutaway" buses and indicated that MAT maintenance staff has done an excellent job of controlling costs.

**What's the best transit fit?** Agencies that provide transit in small urban and rural areas are being encouraged to coordinate their services. In some areas, all transit has been consolidated with one agency. Some agencies serve one community or county while others serve an entire region. Researcher David Ripplinger is trying to determine ways in which transit services can be organized to work best in certain communities or circumstances. "Properly organizing services is a way to most efficiently meet widely varied mobility needs of rural areas," he says. He will look at the costs of various organizational structures and study the economies of scale, scope, density and capacity of transit agencies. He will use the information to develop a planning framework for policy makers and regional administrators.

**What do 'small urban' and 'rural' really mean?** When it comes to using the terms "rural" and "urban" in discussions about public policy and research related to transit, perceptions are important. "What 'rural' means to most people in Washington, DC, means something significantly different to people on the Great Plains or the Mountain West," notes researcher David Ripplinger. He worked with graduate research assistant Natalie Easterday and SURTC director Jill Hough to examine USDA, U.S. Census Bureau and FTA data to find definitions. They used those definitions to develop a transit-specific set of classifications. The two-part classification will help distinguish rural areas within counties that may otherwise be classified as urban because they contain an urban center. Ripplinger is now looking at what transit services exist within the different classifications across the country.

**Student attitudes and use of transit.** Researcher David Ripplinger continued to survey NDSU students on their attitudes toward transit and their use of campus and municipal transit services. The same group of students has been surveyed each of the past three years to monitor any changes in attitudes or behavior regarding transit. "The survey will allow us to be much more confident in determining why students do or don't use transit," Ripplinger says. In addition, the information will be useful as NDSU and other campuses look at enhancing and marketing transit services.

# Agricultural Research

**North Dakota grain movement.** The Agricultural and Industrial Freight Center summarizes grain movement reports from each elevator in North Dakota to describe distribution patterns and shipment characteristics including destination, mode (rail or truck), origin, time, and commodity. Annual reports and monthly updates are used to encourage competition within the grain industry and to identify research needs and market trends.

**Rail updates.** The UGPTI provides the USDA with updated market and service information for the rail section of the weekly Grain Transportation Report.

**Quality assurance for ND grain.** The competitive position of grain producers is continually influenced by the environment, agronomics, markets, and policy. Researchers developed an overview of the quality assurance programs commonly utilized by the grain and food industry as a resource for N.D. grain facilities to use as they seek new opportunities to market North Dakota producers' grain. The QA programs may be used by firms to exhibit that they are compliant with quality standards monitored through a third-party auditing system. The researchers described several alternatives that may be adopted based on individual business competencies, products, and goals. The research was supported by the USDA and the North Dakota Department of Agriculture.

**Ethanol's road impact.** Staff members assessed the demands that a proposed ethanol processing plant would impose on state and county highways. Researchers developed computer models to predict corn flows from farms to the plant, assign the flows to the highway network, estimate the annual truck trips and equivalent single axle loads, and estimate the highway improvement needs for individual routes and segments.

## Transportation Planning

**GIS technology assessment.** UGPTI researchers collected information from state departments of transportation and metropolitan planning organizations in the mountain-plains region to learn how they were using geographic information systems (GIS) technology in transportation planning. Their effort identified GIS applications, hardware platforms, and communication technologies and how they are used by the agencies. They also identified data standards and sources. The information will help agencies explore improved uses for this powerful technology and will be a resource for DOTs and MPOs as they look for potential areas of collaboration and cooperation.

**Modeling pavement deterioration.** UGPTI and University of Wyoming researchers are studying data from highways across the region to develop a computer model that predicts how long various pavements will last, how fast they deteriorate and when they need repair or replacement. The model, designed for cold-weather regions, will use traffic counts and environmental measurements such as solar radiation, temperature extremes and precipitation. It will help highway planners manage their highway repair and replacement programs.

**Estimating road investment needs.** The UGPTI and the NDDOT analyzed highway investment needs in North Dakota and estimated the benefits of making the investments. The study provided information to citizens, transportation planners and policy makers about the state's highway system, future investment needs and the economic benefits of making necessary investments. The study found that the state will need to invest more than \$242 million annually over the next 20 years to maintain state roads and bridges. County roads and bridges will require an investment of more than \$259 million annually during that time. Roads and bridges in townships, small cities and urban centers will require an investment of more than \$136 million annually. Total investment needs across the state were estimated to be about \$539.5 million annually.

## Other Research

**Supply chain support.** UGPTI associate director Denver Tolliver along with Canan Bilen-Green and Om Yadav, faculty members in the NDSU Department of Industrial and Manufacturing Engineering, helped Border States Electric improve its ability to serve one of its biggest customers. The researchers developed a network optimization model to find ways to reduce costs for the Fargo-based electrical supplier while improving response time, reliability and other factors as Border States Electric works with Alliant Energy, an energy holding company with electric and gas utility operations in Iowa, Minnesota and Wisconsin. Several doctoral students were involved in the project.



## ACADEMIC PROGRAMS: Students and Grads Reflect Program Excellence

When NDSU launched its doctoral program in Transportation and Logistics in 2002, there were six students enrolled. Faculty and students recognized the growing need for doctoral-level graduates who could apply their intellect to transportation challenges and opportunities that were growing in complexity.

Today that foresight is reflected in a program that is continuing to grow, students who are achieving national recognition and graduates who are proving their mettle in faculty and research positions.

“National studies indicate that demand for graduates trained in transportation will continue to grow,” notes Denver Tolliver, associate director of the UGPTI and director of its education programs. “Our goal was to establish an academically rigorous program that was engaged with the unique challenges faced by transportation and logistics. Recruitment and the achievements of our students and graduates indicate that we’ve been successful.”

During the 2007-2008 academic year, enrollment had grown to 23 students. The growth in the program indicates

continued interest by students in transportation and logistics as an academic field and recognition that NDSU provides an excellent program.

Students Yolanda Carson and Chris Enyinda are earning their second Ph.D.s. Carson’s first was in industrial engineering and systems science in 1998 from the State University of New York at Binghamton, NY. Enyinda’s first was in applied economics from the University of Tennessee in Knoxville. Their willingness to pursue an additional Ph.D. in transportation and logistics is evidence that transportation and logistics is a growing field and there is a greater recognition of that field in academia.

Enyinda and Charles Briggs are on leave from staff positions at Alabama A&M University in Normal, AL, while attending NDSU. Enyinda is a professor and coordinator of the Logistics/Supply Chain Management Program at Alabama A&M.

Enyinda, Briggs and Won Koo recently received a best paper award at the Global Academy of Business and Economic Research International Conference in September 2008 for their paper, “The role of competitive intelligence leverage in supply chain risk management strategy.” Koo is a professor

of agricultural and applied economics at NDSU and Enyinda's advisor. The paper has been published in the Global Academy of Business and Economic Research Proceedings. It is also being considered for publication in the Journal of Global Business and Research.

Previous students have accomplished similar achievements.

Subhro Mitra graduated at the end of the fall 2007 semester. Mitra's dissertation was titled "Development of a Statewide Freight Transportation Model to Assess the Impact of Highway Spring Load Restrictions."

In March, Mitra won a student paper contest sponsored by the American Association of State Highway and Transportation Officials. Mitra presented the paper, "Analyzing satellite imagery to develop freight generation data," at the American Association of State Highway and Transportation Officials' Geographic Information Systems for Transportation Symposium in Nashville, TN. Mitra has also presented papers at the Transportation Research Board annual meeting and was an invited speaker at a transportation and highway engineering conference in India. Mitra has been employed by the UGPTI as a GIS-specialist/transportation engineer since November 2006 and prior to that as a graduate research assistant with UGPTI.

Junwook Chi graduated at the end of the spring 2008 semester. He, too, had served as a graduate research assistant

at the UGPTI. While earning his Ph.D., Chi conducted research including a study on airfare differences between small and metropolitan areas and a study on the evaluation of the viability of intermodal facilities. At the annual meeting of the Transportation Research Forum in Fort Worth in March, Chi was awarded the organization's Graduate Paper Award. His paper was titled "Pricing Behaviors in the U.S. Airline Industry."

Chi is now on the staff of Marshall University in Huntington, WV, as a full-time researcher. He manages research conducted for the U.S. Army Corps of Engineers on U.S. inland waterways. The projects include transportation rate analysis, commodity valuation analysis, and Ohio River basin regional input analysis. NDSU, Texas A&M, the University of Tennessee and the University of Toledo are involved in the projects and Chi serves as an independent technical reviewer.

The first graduate of the program, Sang Young Moon is on the staff of the Korea Institute for Industrial Economics and Trade in Seoul, South Korea. He graduated in 2006.

"The quality of our students and their accomplishments speaks for themselves. Recruiting students and building support for our program becomes much easier when you can point to those kinds of achievements," Tolliver says. In a relatively short amount of time, NDSU's transportation and logistics program has established itself as a program with students and graduates that are among the best anywhere."



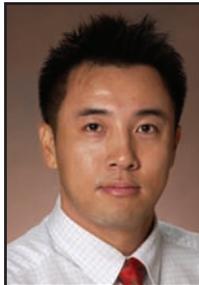
Carson



Enyinda



Briggs



Moon



Chi



Mitra



## ADVANCED TRAFFIC ANALYSIS CENTER: Buses Get the Green Light and Gain Efficiency

A pilot program to more efficiently move buses along their routes in Fargo is off to a good start, thanks to laboratory simulations by UGPTI's Advanced Traffic Analysis Center.

The Advanced Traffic Analysis Center provided technical assistance to Fargo-Moorhead's Metropolitan Area Transit (MAT) bus administrators the past year after MAT administrators expressed an interest in installing traffic signal priority devices on buses. Traffic signal priority allows buses to emit a signal that allows a green light for the bus in certain situations, thereby helping bus drivers complete routes efficiently and on time.

Transit signal priority has been used in large metropolitan areas for many years. However, traffic signal priority should not be confused with traffic signal pre-emption, which is the traffic signal changing emissions that emergency vehicles use to turn lights green and reach the emergency faster. Traffic signal priority doesn't mean buses get a green light at every traffic signal, said Shawn Birst, who led ATAC's technical assistance effort. Rather, Birst said, traffic signal priority works on certain bus routes at certain intersections and in the right circumstances to grant a bus priority at a traffic signal.

The end result of traffic signal priority is supposed to be time savings.

A real-life on-the-street pilot program by MAT, with statistics compiled by ATAC, showed that traffic signal priority devices are doing what they're supposed to do: Reduce overall travel times on the transit route.

Metro Area Transit spent less than \$10,000 on signal emitters for buses and invested transit staff and traffic engineers' time to implement the program. In exchange for the time and financial investment, Metro Area Transit gained efficiency on the pilot program bus route.

Birst said bus efficiency is especially meaningful in times of \$3.50 to \$4 per gallon gas prices. He pointed out several examples of improved efficiency:

- The bus itself is more fuel efficient because it stops and starts less frequently.
- Higher gas prices usually translate to more people parking their cars and opting for mass transit. As more people use the bus, routes can become longer because more stops are needed to pick up more people. With transit signal priority, some time lost with frequent passenger pickups can be made up if the bus stops at fewer red lights during the course of its 30- or 60-minute route.
- ATAC researchers calculated an average time savings of two minutes, 10 seconds on the pilot program route (with a 95 percent confidence rate).
- Besides identifying equipment that would be useful on the buses, ATAC also helped identify and avert a situation that would have caused a monumental traffic snarl.

Originally, Metro Area Transit hoped to test transit signal priority on 13<sup>th</sup> Avenue South, a major south Fargo arterial route that goes past West Acres Shopping Center and traverses the city's busiest commercial corridors. By conducting mock bus routes in ATAC's traffic-control laboratory at NDSU, researchers discovered traffic signal priority would benefit buses to the detriment of other vehicles. In the lab, ATAC researchers realized that going ahead with the plan to use traffic signal priority on 13<sup>th</sup> Avenue South would have caused major frustrating delays for motorists in their own cars and unsafe situations at left-turn lights on 13<sup>th</sup> Avenue.

As a result of the traffic lab findings, Birst and other researchers recommended that traffic-signal priority be used on non-arterial streets in Fargo. Consequently, the 13<sup>th</sup> Avenue South signal-priority plan was scrapped and the pilot program was put into practice on a Broadway bus route in north Fargo. Broadway is a minor arterial street that's busy but carries much less traffic than multi-lane 13<sup>th</sup> Avenue South.

Birst gives kudos to the transit and engineering departments of Fargo and Moorhead for working together so well. "The public was served and that was the No. 1 priority."

# AGRICULTURAL AND INDUSTRIAL FREIGHT CENTER: Biofuels Development, Use is More Complex Than it Sounds

State and federal legislative action is necessary if alternative fuels are to become a steadier, viable fuel option, according to a study on biofuels in the Mountain Plains Region.

The conclusion is part of a major study, "Implications of Alternative Fuel Use and Regulations in the Mountain Plains Region," prepared by the Agricultural and Industrial Freight Center in mid 2008 with support from the MPC. The study sought to provide an overview of alternative fuel use and potential in the region along with a cost-benefit analysis of switching from traditional to alternative fuels, such as ethanol and biodiesel. The report indicates that legislation will be necessary to encourage the purchase of alternative fuels when prices don't spur motorists to make that choice at the pump.

Both biodiesel and ethanol derive from crops. The states of the Mountain Plains Region include Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming – rural states with long driving distances and established agricultural industries. While agricultural producers continue to produce crops to meet food market needs, some producers are leaning more toward ethanol and biodiesel production, which can give rise to a "food vs. fuel" debate.

Developing biofuels and using them in personal and mass-transit vehicles is a hot topic for environmental and financial reasons, namely all-time high prices for fossil fuels. The study examines the direct and indirect costs associated with switching to alternative fuels, particularly the two most popular biofuels – ethanol and biodiesel.

Data indicate factories are gearing up to provide more alternative fuel products. Consider these numbers:

- Today the United States has 105 biodiesel production facilities. Another 77 are being built.
- Today the United States has 114 ethanol refineries. Another 78 are under construction.

"There's such a complexity to the topic of biofuels," said Mark Lofgren, associate research fellow at UGPTI and lead author of the study. "People are confused about alternative fuels but they're also concerned about the environment as well. Some people think they'll have better gas mileage but that's not the case." Nor are biofuels necessarily better for vehicles or easy to use in the North Country.

"While biofuels provide alternative energy sources, they need to be looked at carefully for cost-benefit analysis," Lofgren said.

Although ethanol and biodiesel fuels provide an alternative source for fueling U.S. transportation, biofuels cannot be solely relied on in any scenario, the study concludes. Even if all the corn, soybeans and canola produced in a year were put into making biofuels, the crop products would only put a dent in the fuel needs of the United States. Other alternatives are needed to completely displace traditional fuels, Lofgren said.

However, using biofuels also has advantages that should not be overlooked. First, the agricultural economy of the region could benefit from the potential for ethanol and biodiesel markets. Second, room exists for growth in the alternative fuel market if customers have an easier time finding stations that sell biofuels. Finally, the study notes that alternative fuel use is promising for the environment and for decreasing the United States' dependence on foreign oil.



# BIENNIAL STRATEGIC FREIGHT ANALYSIS CENTER: Study Shows Highways Inadequate for Manufacturing, Energy and Ag Sectors

A long, hard look at North Dakota's freight system and freight growth during the past biennium has revealed pressing needs with the state highway system.

During the first half of the 2007-2009 biennium, the UGPTI's Strategic Freight Analysis Center conducted a study to provide information pertaining to freight and freight growth the past 50-60 years.

Mark Berwick, program director of the Biennial Strategic Freight Analysis Center, said, "The highway system that exists in North Dakota was developed long ago for lower freight volumes moving in smaller vehicles over short distances." Berwick sites a pressing need for a system of freight transportation and logistics that provides for efficient movement of goods as the key to economic health in the state and region.

Key points of the study include:

- **Gross state product:** North Dakota's gross state product (adjusted for inflation) more than tripled from 1963 to 2005.
- **Ag production:** Tonnage of agriculture production more than tripled from the 1940s to today on a decade average annual basis. Better crop inputs, enhanced crop genetics and changes in planting choices contributed to the tonnage increases. Another finding is that changes from small grains to sugarbeets, potatoes or even corn have bumped up the tonnage of crop commodities coming off the land. For example, 50-bushel-per-acre wheat nets about 3,000 pounds per acre, but sugar beets can produce 20 tons per acre or more, equating to 40,000 pounds per acre. Consequently, higher production necessitates larger and heavier trucks on all roads. Plus, crop commodity trucks often now travel longer distances. However, Berwick points out that larger, heavier trucks may cause less damage to roads than smaller trucks hauling the same amount of product.
- **Manufacturing sector:** Employment in manufacturing grew 144 percent from the 1960s to today, according to the study. While it is easy to quantify agricultural tonnage, it is more difficult to equate manufacturing in terms of tonnage increases on the roadways. Best estimates are that the tonnage of manufacturing-related freight moving over the transportation system has more than tripled since 1960.
- **Coal, oil and gas:** Coal mining and related coal-fired electricity plants are a relatively stable industry in the



state because the demand for electricity is constant or increasing. On the other hand, oil and gas exploration is a volatile industry. Oil was discovered in Williams County in western North Dakota in the early 1950s, igniting the first oil boom in the state. The second oil boom was a result of the Arab oil embargo of the 1970s. Today a new boom is occurring because of technological innovation in extraction that have accompanied the new assessments of the Bakken Formation.

Coal mining, concentrated in the central part of the state, has minimal impact on the highway system because coal-fired plants are near the mines and coal exports move via rail. The oil industry, though, creates a major impact on the highway system. Often, oil wells are drilled in places where infrastructure — rural state highways and township roads — is inadequate to support the weight and volume of trucks, Berwick notes. The study reveals that roads and bridges in areas of heavy oil exploration require much more frequent maintenance.

In all, the study provides a picture of a road and highway system that is 50-80 years old and has not kept up with advances in the state's main economic engines: Agriculture, manufacturing and energy production. "As freight traffic increases so does the need for infrastructure," Berwick said. "Transportation is the core of many businesses in the state and without the infrastructure future growth may be hampered."

# DEPARTMENT OF TRANSPORTATION SUPPORT CENTER:

## Helping Determine Pavement Performance

Managing transportation assets like roads and bridges is a constant challenge for local, state, and federal agencies that must decide where to invest funds to maintain and improve their transportation networks.

“Making investment decisions related to transportation assets has become very difficult because of rising construction costs and limited funding,” notes Kurt Johnson, director of the UGPTI Department of Transportation Support Center. “Those decisions become even more complex when trying to determine how various investment strategies impact the total life cycle of assets.” To address that challenge, the UGPTI is in the process of updating the NDDOT forecast of pavement performance with a recently developed performance modeling tool.

Performance criteria for all the preservation, rehabilitation and reconstruction strategies the NDDOT employs are important to develop and understand in managing the current highway network and planning for the future. Previously UGPTI developed these performance models by evaluating

roughness and pavement distresses on the 3,200 miles of pavement rehabilitated by various strategies over a nine-year performance period.

“The time has come to update that original work with three more years of data,” Johnson notes. To facilitate a much more rapid update of the performance, UGPTI developed a comprehensive performance modeling tool. The tool is capable of modeling any selected pavements to determine the best way to predict future performance. The system can draw on 21 years of pavement distress history and 15 years of roughness history.

“Pavement deterioration is a relatively complex mechanism to define,” Johnson says. “This new performance modeling tool will greatly enhance the ability to model performance of the state’s highway system.”

“The result of our effort is a very realistic 20-year forecast of performance measures,” Johnson notes. “An added benefit is the time savings that using this modeling tool offers.”





## MOUNTAIN-PLAINS CONSORTIUM: Panels Convened to Focus on Research Topics

As outlined in its strategic plan, the Mountain-Plains Consortium convened two advisory panels in workshops to identify key research topics and opportunities.

The first of those panels, focusing on pavements, was March 27-28. The second, focusing on bridges, was April 29. Both panels were held in Denver.

The panels included university experts, department of transportation staff, MPC university specialists, and representatives from the Federal Highway Administration and other agencies. The panels had three primary objectives:

- To collaboratively identify critical research issues in the region.
- To identify priority issues which the MPC universities have the facilities and expertise to research
- To foster long-term working relationships among MPC researchers, state transportation department research engineers, and the Federal Highway Administration.

“The advisory panels are not replacing the peer-review project selection process that the MPC has used, but will strengthen it,” comments MPC director Denver Tolliver.

“The Advisory Committee will continue to provide ongoing guidance and input to ensure that the center addresses the educational, research, and work force development needs of the region,” Tolliver notes. “The advisory panels will provide detailed input on project selection. It will formalize the input process from our stakeholders.”

**Pavement panel.** In the pavement research workshop, discussion focused on escalating construction and maintenance costs. Consequently, many of the topics identified focused on extending pavement life, identifying cost-saving techniques and materials, and limiting pavement deterioration. Topics identified included:

- Pavement preservation
- Controlling construction & maintenance costs
- Low-cost rehabilitation options for low-volume roads
- Spring load restriction prediction models
- Improved ride quality through materials or methods
- De-icer impacts – pavement, vehicles, roadside vegetation
- Bridge deck cracking
- Use of recycled pavement materials
- Use of various materials such as fly ash or various classes/ types of concrete to attain lower maintenance pavement
- Justifying the use of continuously reinforced concrete pavement over jointed concrete pavement
- Use of warm asphalt, as it saves energy and expands paving season
- Incorporating new materials (synthetics or natural) to produce modified asphalt
- Life cycle cost optimization
- Effects of superwide tires
- Use of manufactured sand as a substitute for silica sand in Portland Cement Concrete
- Mechanistic-Empirical Pavement Design Guide implementation/calibration/validation
- Crack sealants/fillers/bumps

- Nondestructive testing for pavements
- Characterization of common materials for M/E design
- Mechanistic empirical pavement design implementation
- Materials conservation
- Quantification of in-place properties of pavement sections for rehab
- Use of marginal materials to develop high-quality pavements
- Low-volume road design in Mechanistic-Empirical Pavement Design Guide
- Use of Mechanistic-Empirical Pavement Design Guide to evaluate load limits during weak periods
- Benefit and cost-effectiveness of quality assurance specifications

**Bridge Panel.** The collapse of the I-35 bridge in Minneapolis has focused a spotlight on bridge maintenance and construction. Participants identified topics related to bridge maintenance and management as well as inspection strategies. Topics identified in the session included:

- Concrete cracking/bridge deck cracking
- Construction practices and design
- Asset management: strategic failure risk
- Inspection vs. NBIS inspection and sufficiency rating

- Alternatives to current deicing techniques/neutralize deicer
- Scour of soft rocks
- Effectiveness, monitoring, durability of thin overlays
- Cost benefits of self consolidating concrete
- Cumulative damage due to overweight trucks
- Signal mast arms performance testing of state-specific connections
- Culvert durability/plastic/concrete pipe group
- Deck treatments
- Inspection timing and reliability
- Bridge health monitoring
- Rehabilitation using advanced composites
- Performance of thin bond overlays
- LRFD calibration and strut & tie model

“There is a two-fold benefit to this approach,” remarked Tolliver. “The first is the synergy of bringing these people together to brainstorm on common concerns and opportunities. The second will be to raise awareness among DOT staff and others of the research capabilities within the MPC.”

The input from the workshops is already reflected in the list of projects undertaken by the MPC for the coming year.



# NORTH DAKOTA LOCAL TECHNICAL ASSISTANCE PROGRAM:

## Combining Creativity and Collaboration



Now in its second year as part of the UGPTI, the North Dakota Technical Assistance Program is using creativity and collaboration to leverage the combined resources of the now fully merged organizations.

Bringing LTAP into the family has resulted in a greater array of training opportunities for more transportation professionals and related professionals at a lower price, according to NDLTAP director Gary Berreth.

For decades the boundaries of transportation training programs were limited by the size of the conference room at a given state department of transportation office – and the number was usually 30 people. Berreth and program manager Dave Levi blew the lid off that numerical cap during the past year, hosting training sessions for 200 and 300 people at a time. They did so by teaming with UGPTI's interactive videoconference capabilities and by tapping any business or organization that had the technical equipment to host a videoconference.

Berreth and Levi's willingness to move outside DOT offices for training had several effects — some humorous — but most just plain useful and efficient:

- Under the heading of somewhat unusual, Levi and Berreth hatched the idea of hosting a training session in Jamestown at the State Hospital, which specializes in treating people with mental health and addiction

problems. Initially, some work zone traffic control conference attendees were surprised by the location, but after the training session attendees remarked they had no idea the State Hospital was so well equipped for video conferences. "We've taken the philosophy that our clients will get the training they need," Berreth said. "It doesn't matter where they are, we'll get the training to them."

- Work zone traffic control training was the chief focus of NDLTAP the past year, part of the federal government's push to reduce the number of accidents and deaths in work zones. However, the work zone training was a tall order since the federal government required anybody who works in a road construction zone to have the training but did not have money to provide the training in sparsely populated rural states. NDLTAP, based in Bismarck, partnered with UGPTI's Transportation Learning Network, based in Fargo, to deliver training to federal, state and local government construction zone workers who needed the training to comply with the federal regulation.
- In the process of searching for good videoconference sites, Berreth and Levi also played diplomats, bringing together long-standing competitive engineering firms. For example, Levi identified a certain engineering firm with good videoconference facilities. Once the firm learned that its employees could obtain needed training at a bargain price the firm was willing to meet NDLTAP's request to open its facilities to competitors who needed the same training. "The biggest advantage is saving on travel time and travel expenses," Levi said. "Plus, the cost of hiring the instructor is spread over 300 students instead of 30."

"There's been a tremendous increase in the number of people receiving training," Berreth noted, nearly a tenfold increase in participant numbers for some types of training. Berreth said training clientele has grown to include local governments such as city, county and township staff, contractors, consultants, utility workers and the Federal Highway Administration. Additionally, NDLTAP responded affirmatively to requests for specialized training from the North Dakota Association of Counties, National Association of County Engineers-North Dakota Chapter, American Public Works Association-ND Chapter, North Dakota Traffic Engineers, Associated General Contractors of North Dakota and the Tribal Technical Assistance Program.

# RURAL TRANSPORTATION SAFETY AND SECURITY CENTER:

## Young Male Drivers Call for Stricter DUI and Seat Belt Enforcement

Neighboring states North Dakota and Minnesota claim unique distinctions in traffic crash fatality statistics. Minnesota ranks best in the nation for decreased traffic fatality rates the past few years.

North Dakota, on the other hand, ranks worst in the nation for increased fatalities per drivers' miles traveled per year.

Concerned about the unacceptably high crash death rate, the North Dakota Department of Transportation commissioned a study to pinpoint causes of the problem, specifically focusing on young males. Men 18 to 34 are involved in more fatal crashes than females and other age groups.

Staff at the DOT want to understand the behaviors and mindsets of the young male high-risk group.

The NDDOT's Office of Traffic Safety asked UGPTI's Rural Transportation Safety and Security Center in Fargo to tackle a study on the topic. Tamara VanWechel, a research associate at UGPTI in Fargo, conducted 14 focus groups throughout North Dakota. The focus groups — basically guided group interviews — gathered input and opinions from 92 young men.



The research report, co-authored by VanWechel, her assistant Laurel Benson and center director Kim Vachal, focused on two themes: Driving while impaired by alcohol and seatbelt use.

Here is what the researchers found:

### Seat belts

- Only half the men in the focus groups reported using seat belts.
- Young men in larger cities (vs. small cities or rural areas) were more likely to use seat belts.
- Young males are more likely to use seat belts when on highways or long trips.
- Young men are more likely to buckle up if their wives, children or family members are in the car.
- Becoming a father was the event that most often prompted a man to begin buckling up.
- Although young men tend to ignore North Dakota's secondary seat belt enforcement law, the group still identified seat belt use as an important public safety issue and they said penalties should be stiffer to encourage compliance.

### Drinking and driving

- The young men identified drinking and driving as a serious problem.

- Participants said drinking and driving is a problem because people think they are "OK" to drive, but after a few drinks their perception of "OK" is off.
- Police officers either "look the other way" in smaller communities or enforcement is inadequate in rural areas.
- The drinking culture in North Dakota makes drinking and driving seem acceptable.
- DUIs are socially accepted in the state and not viewed as a "big deal."
- Participants said when they go out for an evening of drinking they try to have a designated driver, a friend on hand to call for a ride, walk home or call a cab.
- However, roughly eight of the groups brought up problems with taxis. Many people said they would use a taxi to get home from the bar if they were more readily available and ran later.
- Approximately 10 of the groups believed that DUI penalties need to be stiffer to be effective in decreasing drunk driving.
- Job-retention was important for participants; the men said keeping their jobs was a motivator to avoid drinking and driving.
- Another common theme involved drinking-establishment responsibility. The groups thought bars should carry some responsibility for their patrons.

### Ready for action

"Driving under the influence and failing to use seat belts are large contributors to crashes and fatalities in North Dakota," VanWechel said. "We anticipate that our findings from these focus groups will help the DOT make the most effective investment it can in an effort to reduce those crash numbers and improve safety."

VanWechel also advised considering short-term and long-term solutions for the drinking-and-driving problem. "Something needs to be done in the short term to decrease accidents resulting from drinking and driving," she said, "but a cultural shift seems necessary in order to delve into the root of the problem, as it was perceived by the focus group deliberations. Parenting and family values were noted as being at the heart of making real changes."

The results will allow the state Office for Traffic Safety to customize media campaigns and education programs for the at-risk drivers' group. The knowledge gained will hopefully be used to reduce fatalities and injuries in the target group and for all people on the road who potentially could be affected by poor driver behavior, VanWechel said.

The project was financed by the NDDOT, the Mountain-Plains Consortium and UGPTI's Rural Transportation Safety and Security Center.

# SMALL URBAN & RURAL TRANSIT CENTER:

## Rising Gas Prices and the Effect on Bus Ridership



As gas and diesel prices climbed to \$4 per gallon and higher in late 2007 and early 2008, a researcher at the Small Urban & Rural Transit Center was on the topic, analyzing how rising gas prices affect bus ridership.

Jeremy Mattson, an associate research fellow at SURTC, spent December 2007 to June 2008 exploring the effect rising gas prices have on 11 small- to medium-size transit agencies in the Midwest and Mountain-Plains region.

It's a fact that bus ridership has been increasing across the country and some observers have linked rising gas prices to increased transit ridership. However, few studies have been conducted to confirm the relationship of rising gas prices to higher bus ridership, or measure the extent of the increase – until now.

UGPTI's study findings include some expected and not-so-expected scenarios:

- A potential positive aspect of the rising cost of fuel is an increase in transit ridership because some drivers park their vehicles and opt for the bus to save money on gas.
- Mattson says study results indicate a 10 percent increase in gas prices generally leads to an increase in ridership of about 1 to 2 percent, though in some cases the increase was as high as 5 percent.

- People do not necessarily respond immediately to a spike in gas prices. If someone decides to start riding the bus, he or she may not begin riding until a few weeks or months after the initial gas price spike.
- Residents of smaller cities are slower to move toward mass transit in response to higher gas prices compared to people in large urban areas. Mattson surmises the difference is due to small town residents being less familiar with their transit options. In the long run, however, Mattson predicts that ridership in small urban and rural areas can increase as much or more as in large cities.
- Ridership on long-distance commuter routes may be more sensitive to gas prices since those who travel longer distances are more affected by rising petroleum prices.
- Over the past several years, fuel expenses increased more than 20 percent per year for most transit agencies. For most transit agencies, the increase in fuel expenses has been much greater than the increase in fare revenues.

The hidden hurt of rising fuel prices is felt by transit agencies. While headlines and press releases herald rising bus ridership rates because people are parking their cars, what doesn't get much attention is the fact that the buses need the same amount – or more – of that expensive fuel, particularly if ridership increases enough to warrant more or longer routes. The question then becomes a conundrum: Do transit agencies absorb fuel prices by requesting more money from government funding sources? Or do transit agencies reduce services, such as curtailing hours or operation or the number of routes?

The results of the study indicate that higher gas prices have led to increases in bus ridership, but other factors often have greater impacts, such as service changes or changes within the community that create increased demand for transit.

While the study answered the initial question "What effect do rising gas prices have on bus ridership?" the study's author already knows what needs to be examined next: How can transit agencies best resolve the financial and client service conundrum caused by higher fuel prices?

- Mattson believes additional research would be useful to help transit systems manage increasing fuel costs and the associated financial uncertainties.

# TRANSPORTATION LEARNING NETWORK: Blending High-Tech and Hands-on Learning

More training for more people at more places. That was the chief accomplishment of the Transportation Learning Network the past year. Expect even more next year.

Next year the network's director hopes to touch more people in the name of preventing work zone crashes.

Julie Rodriguez, director of the Transportation Learning Network (TLN), knows that something as simple as how and where orange cones are placed in a work zone can save lives.

Plenty of motorists, whizzing past orange cones and workers on the roadway, recognize highway work zones as danger zones. However, motorists wrongly assume that work zones are primarily dangerous for construction workers. The fact is, motorists — not road workers — more frequently suffer injuries and even death in work zone crashes, says Rodriguez, citing work-zone crash statistics.

In spring 2008 TLN scheduled multiple training sessions via video conferencing, which allowed workers ranging from transportation planners, heavy-equipment operators, utility workers, temporary traffic signers and emergency first responders to take training sessions that would otherwise have been prohibitive because of travel costs.

The workshops included:

- A traffic control technician course;
- Work zone traffic control for maintenance operations;
- Occupational Safety and Health Administration (OSHA) work zone safety;

- Advanced work-zone management;
- Traffic safety workshops;
- A traffic control supervisor's training course

The traffic-control technician workshop proved wildly popular with 339 participants at sites in North Dakota, Montana and Wyoming. "It was the largest training event we had this year," Rodriguez said, largely because the federal government required the course for almost anybody involved with roadwork.

The instructor, a professional engineer from Washington, D.C., flew into Fargo and presented the traffic-control technician workshop March 3 in Fargo. The workshop also was filmed and transmitted live to 27 interactive video conference sites.

Rodriguez and colleague Dave Levi innovated to reach past broadcasting workshops only to state Departments of Transportation in TLN's four-state region of North Dakota, South Dakota, Montana and Wyoming. Besides broadcasting to DOT offices, the workshop was beamed to the 27 pre-determined gathering places chosen for attendees' convenience.

"We used some unconventional sites we hadn't used before — Ulteig Engineering's conference room in Fargo, the State Hospital in Jamestown, a rural electric cooperative conference room in Hettinger and several others," Rodriguez said. "We've also reached beyond our network for training, and that's something we're proud of this year. Traditionally, training has been limited to 30 people gathered in a classroom. We expanded that reach tenfold and brought safety training to people who wouldn't have been able to attend."



# TRANSPORTATION SAFETY SYSTEMS CENTER:

## Improving Safety Through Software



### COMPASS Provides Direction for Safety Software

With technology advancing daily, the 10-year-old collection of software that the Federal Motor Carrier Safety Administration (FMCSA) uses to collect and analyze commercial vehicle company census and safety data is due for a makeover.

To date, the TSSC's expertise has been primarily in developing the mission critical software for laptop computers used by federal and state commercial vehicle inspectors and investigators. So it makes sense that the center would play a pivotal role in transforming and updating that software. Having functional systems is critical to tracking the more than 3.5 million commercial vehicle inspections every year. Currently commercial transport companies and enforcement personnel use up to 20 different programs to query, check, and enter data, file required reports and schedule compliance reviews and safety audits.

The effort, called COMPASS, is more far-reaching than updating software. "FMCSA's initiative will transform the way FMCSA does business and implement an information technology solution that improves the agency's ability to save lives," notes TSSC director Brenda Lantz. "The initiative will create a single source for safety data while improving data quality."

The FMCSA is in the third year of a long-term process of consolidating and updating its computer operations into a system that closely aligns with the agency's objectives. "Combining those systems will make them much more efficient and user friendly," Lantz says. While the existing applications have functioned well, compatibility with new security requirements and computer operating systems is adding urgency to the effort.

The COMPASS system is being designed so that it will be flexible enough so that its data and capabilities can be used in new applications designed by other state and federal agencies. A prototype of the software should be ready in 2009. In the early stages of the process, TSSC and FMCSA staff along with clients defined strengths and weaknesses of the existing suite of software so those could be considered in the COMPASS initiative. FMCSA and other clients will test the prototype to help refine the system, making it more functional and user-friendly.

Each member of the TSSC staff has expertise in specific software related to enforcement and compliance. Because COMPASS consolidates those applications, TSSC staff members are working together to assure their components are compatible and work together efficiently. "This is really a team effort for us," Lantz notes.

# PUBLICATIONS

## Staff Papers

- SP-166 Campus Transit Development Planning: A Case Study
- SP-167 City of Brookings: Transportation Gap Analysis & Recommendations
- SP-168 North Dakota Grain Facility Supply Chain Quality Assurance Project

## Department Publications

- DP-183 North Dakota Strategic Freight Analysis: Summary Report
- DP-184 North Dakota Strategic Freight Analysis
- DP-185 North Dakota Strategic Freight Analysis: Truck Size and Weight Issues in North Dakota
- DP-189 Neighborhood Design and Aging: An Empirical Analysis in Northern California
- DP-190 Gender-Role Based Differences in Time Allocation: A Case Study of Shenzhen, China
- DP-191 Hedonic Value of Transit Accessibility: An Empirical Analysis in a Small Urban Area
- DP-192 Realized Travel Demand and Relative Desired Mobility of Elderly Women in Rural and Small Urban North Dakota
- DP-193 Feasibility of a Logistics Center Including Container/Trailer Intermodal Transportation in the Fargo/Moorhead Area
- DP-194 Business Plan for River Cities Public Transit
- DP-195 Advanced Small Transit Vehicle Technology Study
- DP-196 Underride Safety Protection: Benefit-Cost Assessment of Rear-Impact Guards for the North Dakota Farm Truck Fleet
- DP-197 Tribal Transit Demographic Need Indicators
- DP-198 North Dakota Grain and Oilseed Transportation Statistics, 2006-07
- DP-199 Annual North Dakota Elevator Marketing Report, 2006-07
- DP-200 Biodiesel Use in Fargo-Moorhead MAT Buses
- DP-201 Effects of Rising Gas Prices on Bus Ridership for Small Urban and Rural Transit Systems

## MPC Publications

- MPC 07-188 Dynamic Impact Load Tests of a Bridge Guardrail System
- MPC 07-189 Relating Wildlife Crashes to Road Reconstruction
- MPC 07-190 Durability and Ultimate Flexural Loading of Shear Spike Repaired, Large-Scale Timber Railroad Bridge Members
- MPC 07-191 Legal Establishment of County Roads in Wyoming
- MPC 07-192 Recycled Glass Utilization in Highway Construction
- MPC 08-193 Trucking Churn Industry
- MPC 08-197 Load Testing of Wood-Concrete Beams Incorporating Recycled Utility Poles
- MPC 08-198 Flexible Highway Barriers
- MPC 08-199 Integrating Security into Small MPO Planning Activities
- MPC 08-200 Adaptive Signal Control V: SCATS Evaluation in Park City, Utah

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Aaron Axvig  
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Daniel Farnsworth  
Amelia Felz  
Paul Fiechtner  
Kyle Fitterer  
Nicole Flint  
Michael Grundman  
Amy Hardy  
Garrett Hartl  
Anthony Hafner  
Adam Helsene  
Amie Karjala  
Leah Kent  
Adam Konieska  
Brian Kujala  
Nicholas Laney  
Joel Longanecker  
Kevin Novacek  
Lelan Olsen  
Tyler Peterson  
Kelsey Sand  
Justin Schoenberg  
Ryan Schumacher  
Nakul Sehgal  
Craig Wald  
Greg Wolter  
Anne Zmyslinski

## Part Time Staff and Students

Anne Coleman  
Michael Crawford  
Luann Dart  
Deneen Gilmour  
Kirsten Galt  
Eric Gunderson  
Ben Hanson  
Lynn Kalnbach  
Marie Lucero  
Emily Lawson  
Donald Malchose  
Heidi Reichert  
Patricia Ryberg  
Amber Spiekermeier  
Michael Stein