

2011 Year in Review

Mountain-Plains Consortium

Region 8



Education &
Workforce
Development



Research



Outreach &
Technology
Transfer

Acknowledgements

The faculty, staff and students involved in the Mountain-Plains Consortium thank the USDOT, particularly the Research and Innovative Technology Administration for its continued support of the University Transportation Centers Program. This program has allowed us to address critical transportation infrastructure issues in the Upper Great Plains and Intermountain West through research and outreach programs. At the same time the support has allowed us to launch innovative education programs that are producing the next generation of transportation professionals. We also express our gratitude to the departments of transportation in the Mountain-Plains states of Colorado, North Dakota, South Dakota, Wyoming, and Utah. Much of our work would be impossible without their support and partnership.

The Mountain-Plains Consortium also owes gratitude to its advisory board. This dedicated group of professionals provides invaluable insight into direction for the consortium's programs, provides important outreach and contact on our behalf, and helps provide strategic vision for our efforts.

Members of the advisory board are:

Carols Bracer, Deputy Director
Utah Department of Transportation

Peggy Catlin, Deputy Executive Director
Colorado Department of Transportation

Loran Frazier, Chief Engineer
Montana Department of Transportation

Anthony R. Giancola, Executive Director
National Association of County Engineers

David Huft, Research Program Manager
South Dakota Department of Transportation

Christine Johnson, Director of Field Services West
Federal Highway Administration

Jeff Loftus, Office of Research and Analysis
Federal Motor Carrier Safety Administration

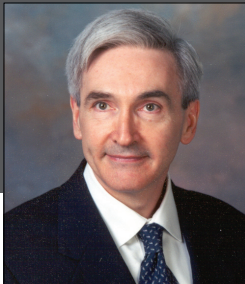
Grant Levi, Deputy Director for Engineering
North Dakota Department of Transportation

Delbert McOmie, Chief Engineer
Wyoming Department of Transportation

Mountain-Plains Consortium
Upper Great Plains Transportation Institute
North Dakota State University
Dept. 2880 • P.O. Box 6050
Fargo, ND 58108-6050
T: (701) 231-7938 • F: (701) 231-7067
www.mountain-plains.org

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Director's Message

Readers only need to review the list of MPC projects later in this report to realize the scope of the work that has been undertaken by MPC collaborators and students since the Consortium was founded in 1988. We are justifiably proud of what we've accomplished and that those accomplishments are making a difference to the transportation systems of our region and the nation.

Those accomplishments would not have been possible without the willingness of our researchers and their partners to work together. Because the consortium is made up of four universities, close collaboration is not an option, but a necessity for success. MPC faculty and staff have worked with a broad variety of stakeholders including state and local transportation agencies, businesses, associations, other universities and federal agencies. This collaboration has assured that our work addresses the key transportation needs of our region and the nation.

As a result of this collaboration and of the hard work of the faculty and staff at all of the MPC universities we have seen significant accomplishments in our research program as well as our tech transfer efforts. MPC researchers continue to probe critical issues in our region and address key needs. As a result mobility of residents is improved, transportation is safer, our communities are more liveable, and our businesses are more competitive.

One of the most critical needs faced by the transportation industry at all levels is developing and maintaining a viable workforce. In the sparsely populated Mountain-Plains region, this need is particularly important. This report details several initiatives underway at the MPC that are focused on training those already in the workforce and educating tomorrow's professionals.

For those involved in the MPC program, we count our students and graduates among our greatest points of pride. Our investment in these students is reflected in the growing transportation graduate education programs at MPC universities. The students gain a foundation in traditional transportation disciplines like engineering and logistics, but courses in areas such as transportation modeling, geographic information systems, safety and security and other emerging areas will assure that they are equipped for the next generation of transportation-related opportunities and challenges.

Thank you for your interest in the efforts of the MPC. If you have any questions about our programs or accomplishments, please contact us.

Best regards,

Denver Tolliver

MPC at a Glance

The Consortium

The Mountain-Plains Consortium is one of 10 competitively selected regional University Transportation Centers Programs sponsored by the U.S. Department of Transportation. MPC is a national resource and focal point for the support of research and training concerning the transportation infrastructure and the movement of passengers and freight. The program aims to attract the nation's best talent to the study of transportation and to develop new strategies and concepts to effectively address transportation issues. The consortium is a center of excellence for rural and intermodal transportation.

Members

Colorado State University is a land grant institution with an enrollment of nearly 25,000 students. Primary transportation graduate education and outreach activities occur in the College of Engineering, with related activities in business, applied human sciences, and natural resources. Transportation-related graduate courses are available in civil engineering, mechanical engineering, earth resources, business, remote sensing, and construction management.

North Dakota State University is a land grant institution with an annual enrollment of more than 13,000 students. The MPC is administered by the Upper Great Plains Transportation Institute, which also administers several other related transportation research centers at NDSU. Educational programs coordinated by the UGPTI include a Ph.D. degree program in transportation and logistics and master's degree programs in managerial logistics and transportation and urban systems. A certificate program is also offered in transportation and urban systems and transportation options are available for master's

level students in civil engineering and agricultural and applied economics.

South Dakota State University is a land grant institution with an annual enrollment of approximately 12,000 students. MPC-supporting programs include the Geographic Information Science Center of Excellence, which is a joint collaboration between SDSU and the U. S. Geological Survey's National Center for Earth Resources Observation and Sciences. SDSU houses the South Dakota Local Transportation Assistance Program—one of five technology transfer and outreach programs provided by the Engineering Resource Center. Moreover, the Civil and Environmental Engineering Department at SDSU houses state-of-the-art laboratory facilities.

The **University of Utah** has an annual enrollment of more than 28,000 students. The department of Civil and Environmental Engineering has well-equipped laboratories specializing in transportation, structural, geotechnical, hydraulic, environmental, and materials engineering. The Utah Traffic Laboratory is connected by fiber optic cable to the Utah DOT Traffic Operations Center. The lab has a state-of-the-art multimedia video conferencing studio with delivery, recording, and hosting capabilities for teaching, training, and research collaboration. The lab boasts the first North American installation of VISUM Online, which is an intelligent platform for traffic management.

The **University of Wyoming** has an annual enrollment of about 13,100 students. The Department of Civil and Architectural Engineering provides a core of basic engineering courses for its undergraduates and allows them to specialize in any one or a combination of the following technical areas: structures, water resources, environmental engineering, geotechnical engineering, and transportation. The transportation program at the University of Wyoming provides learning

opportunities for students in paving materials, traffic, safety, and planning. In addition, the WYDOT Material Certification Program and the Wyoming Local Technical Assistance Program are hosted at the University of Wyoming.

History

The Mountain-Plains Consortium was established in 1988 in response to the University Transportation Centers Program. MPC was selected as the center for federal Region 8 in the initial competition held by USDOT. MPC won subsequent re-competitions under ISTEA, TEA-21, and, most recently, SAFETEA-LU legislation. From 1988 through 2011, MPC produced a library of more than 200 research reports while attracting new faculty to the field of transportation. MPC universities continued to teach most of their pre-existing transportation courses and exceeded the targeted maintenance of effort funding levels specified by USDOT. During this period, MPC funds were used to leverage funding from agencies such as state and local transportation departments, USDA, FTA, FRA, and the American Association of Railroads.

Management structure

The management structure of the Mountain-Plains Consortium involves three main components – the center director and administrative staff, four university program directors, and the executive committee. In addition, the MPC Advisory Board and the TLN board and programming committee play important roles in program planning and implementation.

Center director

Dr. Denver Tolliver is the MPC program director. He is involved in planning and administrative activities at all levels and sites. Although the center director is an employee of the lead university, he represents all five institutions.

University program directors & executive committee

Each university in the consortium has a designated university program director to perform local oversight and management of approved activities

at each university. The program directors are Dr. Rebecca Atadero, Colorado State University; Dr. Kimberly Vachal, North Dakota State University; Dr. Nadim Wehbe, South Dakota State University; Dr. Peter Martin, University of Utah; and Dr. Khaled Ksaibati, University of Wyoming.

The center director, the five university program directors, and a USDOT liaison form a committee to oversee program planning and administrative functions for the grant period. The seven-member committee meets each year to monitor implementation strategies, collaborate with other centers in the region, and perform other planning and administrative functions. The executive committee has final responsibility for research project selection.

Transportation Learning Network (TLN)

The Transportation Learning Network continues to use technology to help people work together on transportation issues in the region. Each partner provides transportation programming, training, and technology transfer to the network. Efforts include technical training, transportation short courses, peer sessions, graduate-level classes, professional management and leadership courses and seminars. The five MPC universities are partners in the network which also includes three state transportation departments in Region 8: North Dakota, Montana, and Wyoming. The system carries interactive audio and video to conference rooms and classrooms at the respective sites. TLN enhances and improves the cost-effectiveness of the MPC by reducing travel costs and maximizing use of scarce faculty and administrative time. The TLN evolved from the TEL8 telecommunications network.

TLN board and programming committee

The state transportation departments in the region provide substantial input to the MPC director and executive committee regarding educational and research needs. Much of this interaction results from a close working relationship between the MPC executive committee and the TLN board of directors. The five university program directors are

members of the TLN board. The MPC executive committee and TLN board hold an overlapping meeting each year. The TLN executive director attends part of the MPC executive committee meeting and the center director attends part of the TLN board meeting. The TLN programming committee, which meets monthly, brings together representatives from the three state transportation departments and the MPC universities to plan a regional education and training program.

In addition, an advisory committee helps MPC directors identify key research needs within the region and develop a research program that addresses those needs. The committee plays a key role in setting the MPC's research agenda.

Accountability for decisions

Many key decisions and actions flow from committee meetings and other deliberations. However, the MPC executive committee retains decision-making responsibilities. All UTCB-funded activities conducted on the five campuses are approved first by the executive committee. The center director ultimately is accountable for all decisions pertaining to UTCB activities and the use of UTCB funds.

Annual site visits

The center director and USDOT liaison visit each campus annually to meet with principal investigators and program managers on each campus and to gauge progress toward program goals and objectives. The director also holds videoconferences as needed to evaluate progress and ensure that milestones are being met.

Regional coordination

The director communicates with directors of the other centers in Region 8 on a regular basis.



Education & Workforce Development

Student Program Activities

NDSU Ph.D. candidate Steve Leon named MPC Student of the Year

Steve Leon, a doctoral student in transportation and logistics at NDSU, was named the Region VIII Mountain-Plains Consortium UTC Student of the Year. The U.S. Department of Transportation honors an outstanding student each year for achievement and the potential future contributions to the transportation field. Students are selected based on their accomplishments, academic merit, research and leadership.

An Odenton, MD, native, Leon attended the University of North Dakota and received a B.S. in aeronautical studies, graduating magna cum laude in 1990. In January 2007, Leon earned an M.B.A. from Loyola University Maryland with a concentration in international business. Leon graduated from NDSU with a Ph.D. in transportation and logistics in May 2011. Leon's dissertation is titled, "Global airlines: Modeling trends and portfolio for allocation to international regions."

At NDSU, Leon worked as a research assistant for the Upper Great Plains Transportation Institute. He assisted in submitting a proposal to the North Dakota Aeronautics Commission as well as contributing to obtaining funding for air cargo research. His other research interests include economic development through air transportation as well as government policy, risk management and resource allocation in supply chain management.

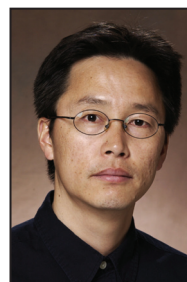
In 2009, Leon received the Transportation Research Forum Foundation Scholarship. He is also a member of the Beta Gamma Sigma Honor Society at Loyola University Maryland and the Phi Kappa Phi Honor Society at NDSU. Leon served as the president of the NDSU Transportation and Logistics student organization. He has also taught undergraduate courses at NDSU, UND, and Embry Riddle Aeronautical University in Prescott, Ariz.

In addition, Leon makes time for volunteering and is known for his work ethic and dedication to excellence. He serves as a board member on the



UND Aerospace Alumni Advisory Board and also offers his time as an assistant coach for the Fargo Youth Soccer League.

NDSU Ph.D. student presents paper at simulation conference



Lee

Eunsu Lee, an NDSU Ph.D. student in Transportation and Logistics, presented his paper, "Simulation of Base Stock Inventory Integrated with Transportation Strategy to Optimize Performance" at a December 2010 conference of simulation scholars in Baltimore. The paper was coauthored with Farahmand

Kambiz, professor of industrial and manufacturing engineering at NDSU.

The Winter Simulation Conference (WSC) is the premier international forum for presenting recent advances in the field of system simulation. Lee

was asked to present during the Ph.D. colloquium session focused logistics, transportation and health. His submission was a finalist for the Best Student Paper Award.

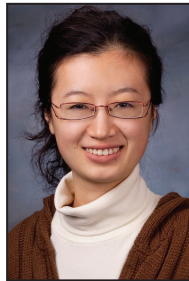
In his study, Lee applied discrete-event simulation to three layered manufacturing and distribution systems for simulating centralized and decentralized systems. He learned the balance between customer's orders and logistics considering lot-sizes, such as pallets and truck configurations, was critical for inventory and transportation costs.

NDSU Ph.D. student earns TRF Foundation scholarship

Qing Liu received the Transportation Research Forum Foundation scholarship, awarded for excellence in her studies, research and writing. The award was presented at the TRF's Annual Forum in Long Beach in March. She also presented a paper, "Incorporating Pollution in US Container Ports Efficiency Analysis," at meeting.

In 2007, Liu earned a bachelor of engineering in maritime transportation from Dalian Maritime University in Dalian, China. She then began the transportation and logistics doctoral program at NDSU. Primarily, her work focuses on maritime shipping, port operation, and container transportation and logistics. At NDSU, Liu conducts research through the Upper Great Plains Transportation Institute.

Some of her projects include a Chinese railway study and a supply chain model using FAF2 and CFS2002. Additionally, Liu presented a poster at the Transportation Research Board's Commodity Freight Survey Workshop in 2010.



Liu

NDSU transportation and logistics students selected to present at INFORMS



Chen

Two NDSU transportation and logistics Ph.D. students presented papers in November at the Institute for Operations Research and the Management Sciences (INFORMS) Simulation Conference in Austin, Texas.

leelong Peter Chen presented "Collaborative Transportation Management in the Supply Chain: Shipper and Carrier Perspectives." The paper is unique from other literature because it presents information from the carrier's perspective. The paper was co-authored by Joseph Szmerekovsky, associate professor of management at NDSU.

Sumdahur Shakya presented his paper "Valuing Pricing of Genetically Modified Traits Using Monte-Carlo Simulation: A Real Option Approach." The paper presents the Monte- Carlo approach which has the advantage of providing full distribution of values of outcome instead of presenting one of the many scenarios. The paper was co-authored by researcher Bruce Dahl and professor William Wilson, both from the NDSU Department of Agribusiness and Applied Economics.



Shakya

NDSU master's student presents at economic conference

Yan Heng attended the Missouri Valley Economic Association (MVEA) Annual meeting in October in St. Louis. At the conference, Heng presented a paper, Accounting for Greenhouse Gas Emissions in Trucking Production, which she co-authored with Siew Hoon Lim, assistant professor of economics. In addition, she participated in discussions with researchers and professors from around the world. During the meeting, Heng attended sessions covering topics such as applied macroeconomics, global economics, health economics and the

economics of water, which Heng hopes to apply to her own work in the future. She enjoyed attending the conference because she was able to connect with many people at the conference who had connections to NDSU. Heng is pursuing a master's degree in agribusiness and applied economics.

NDSU student attends railroad environmental conference

NDSU transportation and logistics Ph.D. student Nimish Dharmadhikari attended the Railroad Environmental Conference 2010 in October at the University of Illinois at Urbana-Champaign.

The conference focused factors such as pollution prevention, energy, emissions and air quality, and environmental liability, as they relate to railroads. Dharmadhikari will use this information in his research.

Ph.D. students teach operations management course at NDSU

NDSU transportation and logistics Ph.D. students, Steve Leon and Eileen Campbell, each taught a section of the Operations Management course this semester for the NDSU College of Business. The course is an introduction to the operations function of business.

Leon stresses that all businesses "have operations as their central function" and many businesses have common objectives and problems. The course provides students with the tools and understanding of operations concepts they need to be successful. Students will be challenged to develop an understanding of how operations decision making is related to other business functions.

Campbell is excited to help students understand the relationship between the environment and supply chains. Green supply chains are the focus of Campbell's dissertation, so her aim was to instill the importance of green supply chains in the minds of the students.

Additionally, Leon says that no matter what career students hold in the future, the management techniques will be applicable and useful. He believes that teaching is an invaluable way to improve his "ability to impart relevant and practical knowledge" about operations management in ways that are easy for people to understand.

NDSU students present at TRF

Five NDSU transportation and logistics students presented papers at the 52nd annual Transportation Research Forum held March 10-12 in Long Beach, CA.



T&L Students (Pan Lu, Nimish Dharmadhikari, Jeremy Mattson, Steven Leon, Qing Liu, Eunsu Lee)

Nimish Dharmadhikari presented "Agent-Based Model for Disruption of Intermodal Transportation." The paper focuses on the post 9/11 security challenges of marine vessels and ports as part of the global supply chain and the need for a response system in the event of terrorist activity.

"Resource Allocation Using Portfolio Theory: An Airline Perspective," authored by Steven Leon, aims to develop a new approach to resource allocation by employing a risk mitigation model using portfolio theory in which diversification is used to minimize risk.

leelong (Peter) Chen's paper, "The Dynamic Impacts to SCM by Practicing Collaborative Transportation Management and Implementing RFID in the Railroad Industry," addresses how to reduce overall rail supply chain in transportation time and inventory control.

"Incorporating Pollution Effects in U.S. Container Ports Efficiency Analysis" was presented by Qing Liu. He analyzes the environmental efficiency and scale properties of the container ports.

Eunsu Lee presented "Visualizing Path-Based Routes for Import Containerized Freights in U.S.," which proposes heuristic path-enumeration model for both trip generation and trip assignment dynamic programming in GIS for the large-scale networks.

Pan Lu, an NDSU transportation and logistics Ph.D. candidate, also attended the conference.

NDSU student presents on global transportation issues

EunSu Lee, a Ph.D. candidate in transportation and logistics, presented "Transportation for a Globalized and Multicultural Society" as part of NDSU's World iView Series sponsored by the Office of International Programs.

Presenters are selected to address various global issues that impact NDSU and the Fargo-Moorhead community. Lee emphasized how mobility and connectivity are important in the everyday lives of people. He discussed the transportation of freight

as well as people around the world, touching on how globalization has changed transportation.

To explain how transportation affects the lives of people in all cultures, Lee noted that people need transportation in order to have what are considered basic necessities: food, housing, and water. If the resources are not available in a particular location, then they must be transported via truck, rail or air. He also addressed how transportation affects issues such as labor migration, food costs, security concerns, and disaster relief.

NDSU Ph.D. student presents work on flood transportation

Eunsu Lee, a Ph.D. candidate in Transportation and Logistics at NDSU, was invited to present at the 2011 Geospatial Information Systems for Transportation (GIS-T) Symposium in March in Hershey, PA. Lee presented his research related to flooding in the Red River Valley of North Dakota and Minnesota in "Visualization for Transportation Network in Flood Region."

The study is unique in that it uses remote sensing datasets to create a three-dimensional (3D) transportation network for GIS application. The research includes bridges over the Red River and the interstate highways of I-29 and I-94 in the 3D model that estimates flooding over roadways. This visualization aids the public's understanding of flooding and transportation flow during a flood.

Lee also attended workshops and presentations that will contribute to further research. The conference is sponsored by the American Association of State Highway and Transportation Officials and brings together transportation students, government personnel and private industry leaders.

Former MPC student leads Peace Corps initiative in Kenya

A former MPC student and graduate of CSU is teaching physics, math and life skills in Mahuru Bay, Kenya, as a Peace Corps volunteer. He is also putting his MPC experience to use in improving sanitation, water supplies and agriculture in the surrounding area.

Chris Turnbull-Grimes has launched the "Many Small People," initiative. To date the initiative's primary efforts have been directed at installing rainwater catchment equipment at area schools. As a result the schools have reduced the need to purchase water and the amount of clean water for drinking and sanitation has increased. The money saved from no longer purchasing water and the expected revenue generated from selling excess water will be used to purchase school supplies and provide scholarships for students.



Turnbull-Grimes

Turnbull-Grimes is in the midst of a 27-month Peace Corps assignment. For more on his efforts, visit <http://www.manysmallpeople.org/current.html#rabwao>

Turnbull-Grimes specialized in structural engineering in his degree programs. While at CSU, he was involved in MPC research to test crash barriers and to study alternative materials, such as wood, for those barriers.

Electronic submission launched for NDSU Scholarships

An electronic application process was launched early in 2011 for transportation scholarships offered by the Upper Great Plains Transportation Institute at NDSU. The Institute is offering five scholarships for current NDSU juniors and seniors to be awarded for the 2011-2012 Academic Year. Four of the scholarships are funded by the MPC.

The on-line application process has already attracted the attention of students and generated a record number of applications.

The Charles E. Herman Scholarship recognizes academic achievement and promotes the education of transportation students with a preference to women and minorities at NDSU. Funding for one \$2,000 scholarship is provided by the Charles E. Herman Scholarship Endowment Fund, NDSU Development Foundation.

The Paul E.R. Abrahamson Transportation Scholarship recognizes outstanding students at NDSU with an interest in the transportation and logistics of agricultural products. Funding for two \$1,500 scholarships is provided by the MPC.

The Transportation Engineering Scholarship recognizes academic achievement and promotes the education of transportation students at NDSU. Funding for two \$1,500 scholarships is provided by the MPC.

Workforce Development

MPC sponsors MML program at NDSU

The MPC is now sponsoring the Masters of Managerial Logistics program at NDSU. The first-of-its-kind program was launched in 2006 to provide training in military logistics and transportation to public, private and joint military civilian personnel. Sponsorship by the MPC will give the program broader exposure to potential audiences and will tighten its integration with NDSU's other educational programs in transportation and logistics.

The program was originally named the Masters of Military Logistics, but the name was changed to reflect its broader focus. The program is offered in collaboration with the U.S. Army Logistical Management College in Fort Lee, VA. This program focuses on logistics and supply chain management, global-international logistical systems, enterprise resource planning, remote sensing and adaptive logistics planning, joint total asset management, logistics, and security through technologies (RFID), contract management, crisis analysis, homeland security, and transportation analysis.

In addition, the curriculum will include a synthesis course in military logistics case studies as well as logistics research methods designed to build the research and analytical skills of the students. More information on the program can be found at <http://www.ndsu.edu/transportation/mml/>.

MPC extends educational reach through Alabama partnership

The University Transportation Center for Alabama at the University of Alabama-Birmingham and the MPC are cooperating to expand the educational opportunities offered by both centers. The two UTCs are finalizing plans that will enable practicing transportation professionals and, in some cases, transportation students in the Alabama area to participate in two distance learning transportation certification programs provided through this cutting edge collaboration.

Through the cooperative program, Alabama area transportation professionals will be able to pursue and earn a Certificate in Transportation and Urban Systems. The certificate can be pursued via online courses and is targeted at practicing professionals who are unable to participate in traditional coursework.

A second option will be the Transportation Leadership Graduate Certificate which is a nationwide program sponsored by the Regional University Transportation Centers. This certificate is a distance learning opportunity introducing participants to the skills needed to be a leader in the transportation field.

SURTC program director launches mentor program for transportation students

Jill Hough, director of the Small Urban & Rural Transit Center within the Upper Great Plains Transportation Institute at NDSU, has matched students from her Public Transportation course with industry mentors from across the country. NDSU is serving as the pilot university for the mentor program which may be replicated nationally.

Hough developed the program in response to calls from industry professionals for better workforce development within higher education. Students will gather valuable insight from their mentors about real-world transportation challenges. Hough believes the greatest value of the program is that students are gaining a true understanding of how the industry works, rather than simply a theoretical, textbook understanding.

Mentors and students will discuss a variety of topics such as transportation policies, cost-effectiveness and efficiency, managing budgets, technology application, working with workers' unions, and meeting overall challenges to organizational management.

As part of the program, the students participated in a roundtable discussion on "Higher Education and Workforce Development" at the 2011 American Public Transportation Association Bus and Paratransit Conference in May. The conference will also serve as an opportunity for the students to meet their mentors. The Mountain-Plains Consortium is sponsoring the students' attendance at the conference.

Student-Mentor pairings include:

- Dilip Mistry and David Lee, General Manager of Connecticut Transit.
- Mridula Sarker and Linda Bohlinger, Vice President of HNTB Corporation, an engineering consulting firm based in Kansas City.
- Elvis Ndembe and Robert Prince, Vice President of AECOM, a professional technical management firm based in Los Angeles that specializes in several areas including transportation. Prince was formerly the director of the Massachusetts Bay Transit Authority.



Dilip Mistry



Mridula Sarker



Elvis Ndembe

TLGC: Educating the future leaders of the transportation industry



The Transportation Leadership Graduate Certificate (TLGC) program is an online graduate education program designed to expand the breadth of transportation professionals' knowledge. Since its start in the spring of 2010, the TLGC program has drawn the interest of transportation professionals and students from across the country. Recent marketing efforts have led to an increased interest in the program and TLGC administrators believe they will receive more program registrants as the TLGC's reputation grows.

NDSU serves as the administrative home for the program as well as being one of the universities to offer courses. A variety of core courses and elective courses are offered to those pursuing the certificate from NDSU and several other top universities across the country. Faculty members are excited to participate by offering classes online as a part of the TLGC curriculum. The program is an initiative of the Regional University Transportation Centers with the goal of providing accessible, graduate-level education to busy transportation professionals or those in related disciplines with an interest in transportation. The certificate is endorsed by both private and public sector organizations.

National transit curriculum being developed



Jill Hough

Jill Hough, director of the Small Urban & Rural Transit Program at NDSU, and Paul Larrousse, director of the National Transit Institute at Rutgers University, are leading an initiative to develop a semester-long public transit course that can be used at universities nationwide. Currently there are at least a half-dozen public transit classes taught throughout the United States, but there is a lack of consistency in the materials covered. At

the same time, other schools would like to offer such a course, but the time, effort, and practical expertise needed to develop the materials may not be available.

The course will improve mobility and advance the transit industry by educating future decision-makers and workers on public transit issues, Hough says. Members of the National Transit Curriculum Committee, who represent universities, transit agencies, federal government, national associations, and consultants, identified topics for the seven-module course. The curriculum will be piloted at universities in the United States and finalized by summer of 2012.

Relationship grows between MPC and Native American tribes

MPC universities are expanding collaborative efforts with Native American tribes in the region to help develop manage road assets, train workers and address infrastructure demands.

Native American Tribes in the west often face significant infrastructure challenges. Reservations are often crisscrossed by roads that are mostly gravel and dirt and tribes have had few tools or resources to manage them. In initial efforts in collaboration with tribes in the region, the MPC helped adapt information from the Indian Reservation Roads system so that roads planning tools like the state version of the Highway Economic Requirements System (HERS-ST) can be used by tribal roads managers for planning and evaluating highway improvements. MPC researchers also worked with tribal roads managers to develop and apply other tools for managing roads and related assets so that investments could be directed most effectively.

Similarly, MPC has facilitated road safety audits on reservation roads to identify key segments for improvement. The effort established a model for reservations to use in identifying locations where low-cost road safety improvements could be implemented.

The efforts have now expanded to focus on workforce development, particularly with those tribes who face unprecedented pressures on transportation infrastructure from energy development. "We are

working with Tribal Technical Assistance Program Centers and tribes to develop better strategies for workforce development. The efforts will include specific outreach to tribes that address the specific needs and issues they face,” noted MPC Director Denver Tolliver.

The MPC is one of the few University Transportation Centers working collaboratively with tribes and is exploring several possible initiatives with the Northern Plains Tribal Technical Assistance Program (NPTTAP). Examples include:

- **Cultural Awareness Training.** Under this initiative, training would be developed to help contractors and government agencies understand cultural issues that arise when dealing with tribes and Native Americans. Consequently, they would become more adept at working with tribes and integrate more Native Americans into their workforces.
- **Sustainability study.** The Three Affiliated Tribes of North Dakota (Mandan, Hidatsa and Arikara) are facing unprecedented rates of resource development on tribal lands as a result of the oil boom in North Dakota. The UGPTI and MPC propose to work with the Northern Plains Technical Assistance Program to explore and address concerns about preserving the way of life, environment, resources and infrastructure on the reservations.
- **TLN expansion.** MPC’s TLN delivers training and technical information to DOTs across the region. TLN could be expanded to provide similar training and tech transfer to tribes and contractors serving reservations. Content could be developed to address transportation infrastructure management and maintenance needs that are of primary concern on reservations.

Student Profiles

Colorado State University

Douglas Gregory Allen is an M.S. student working on MPC project 340 - Long Term Performance of FRP Repair Materials. He graduated in the spring of 2010 with a B.S. in civil engineering at CSU and is currently pursuing his M.S. in structural engineering.

Omar Amini received summa cum laude honors along with his B.S. in civil engineering in 2010 from CSU. Amini worked with professors Paul Heyliger and John van de Lindt on several MPC projects.

Susan Balogh is pursuing doctoral studies and research in the area of mechanics of solid wood deck systems and connections for interfacing with concrete in layered composite deck bridges. She earned an M.S. in civil engineering in 1995 from Budapest University of Technology and Economics. Presently, she is assistant professor at Metropolitan State College of Denver, where she serves as program coordinator for the Civil Engineering Technology academic program. Following her M.S. degree, she was principal engineer and a professional structural designer for BALO, LTD., in Budapest, Hungary. Following that, she was coordinator of the testing group for INTER-CAD, LTD., a structural software development company, also located in Budapest.

Emily Budagher earned her B.S. in civil engineering from New Mexico State University in 2010. As a student, she was active in Chi Epsilon, the Civil Engineering Honors Society, and Tau Beta Pi, the engineering honors society. Budagher also worked for the New Mexico Department of Transportation for two summers evaluating pavement distresses. She is currently an MS student in Geotechnical Engineering at Colorado State University conducting research on “MEPDG Analysis of ESR Subgrade Stabilized with Off-Specification Fly Ash” under the supervision of Antonio Carraro.

Feng Chen received his master’s degree and bachelor’s degree from China Academy of Building Research and Peking University, respectively. Chen worked on wind effects on buildings between 2004 and 2007 and he has just started his second year Ph.D. study with Dr. Suren Chen at CSU. His Ph.D.

research focuses primarily on transportation safety under adverse environmental conditions. He has been working on several research projects from different sponsors including one from MPC. He has published and presented his research findings in several conferences.

Thang Dao completed his Ph.D. in the spring of 2010 and is now a post-doctoral student in Alabama. He earned his B.S. in Vietnam and his M.S. from CSU in 2005 related to genetic algorithms applied to structural optimization. For his Ph.D., he studied spatio-temporal load control on structures such as railroad bridges.

Matt Hardman was born and raised in the state of Washington. He is currently studying for his M.S. in structural engineering. He graduated with a B.S. in civil engineering from the University of Idaho in May 2010. He has a special interest in bridge engineering which was fostered by his involvement in the AISC/ASCE Student Steel Bridge Competition. He was a part of the team at the University of Idaho for three years. Hardman will work on the bridge seismic vulnerability study sponsored by MPC with assistant professor Suren Chen. (no photo file)

Jordan Jarrett earned her M.S. degree in structural engineering from CSU in August 2009. As a student, she worked on several MPC projects including those related to flexible highway barriers. Jarrett is continuing work related to structures and dynamics as a Ph.D. candidate in civil engineering at Virginia Tech.

Oscar Mata graduated with a B.S. degree from CSU in 2010 and began work toward his M.S. in 2011. He will be working on MPC project 340 - Long Term Performance of FRP Repair Materials..

Nathan Miller worked as an M.S. student with professor Richard Gutkowski on MPC 275, Z-Spike Rejuvenation to Salvage Timber Railroad Bridge Members, and MPC 276, Use of Salvaged Utility Poles in Roadway Bridges. Miller is returning to CSU and will work with assistant professors Rebecca Atadero and Suren Chen on MPC 343, Laboratory Testing of Innovative Steel Bridge Designs.

Ryan Nelson finished his B.S. degree at CSU in 2006 and worked for a structural consulting firm

for three years before returning to CSU to get his master's degree in structural engineering. While working toward his master's degree, Nelson has been performing wind tunnel experimental studies on long span bridges.

Alivia Plankis began work in the spring semester of 2011 on her M.S. thesis on the MPC project "Off-grid MEMS Sensor Configurations for Transportation Structures." She will be collaborating with researchers at Colorado State University and National Institute of Standards and Technology-Boulder. Plankis received her B.S. in civil engineering from Iowa State University in 2010.

Ethan Wiechert earned his B.S. degree in civil engineering from Colorado State University in 2002. Professionally, he has practiced in the fields of structural and geotechnical engineering. Ethan is currently a senior project engineer at Earth Engineering Consultants, Inc. of Windsor, CO, and is registered as a professional engineer in the state of Colorado. In 2008, he started his graduate studies in the geotechnical engineering program at CSU and has worked as a research assistant. His research project is entitled "Beneficial Use of Off-Specification Coal Combustion Products to Increase the Stiffness of Expansive Soil and Rubber Mixtures."

Jun Wu finished her master's and bachelor's degrees at Chang'an University in China and is currently pursuing her Ph.D. degree in the structure group at CSU. Wu's research interest is focused on bridges and her research study focuses on lifetime analysis and damage detection of long-span bridges. She has been involved in several research projects including MPC research projects. Her research results have been reported in several journal and conference papers.

Yufen Zhou is pursuing her Ph.D. in assistant professor Suren Chen's research group. She completed her B.S. and M.S. in civil engineering from Tongji University, China. Her current research work is concentrated on multi-hazard assessment of bridges, wind engineering, and structural stochastic vibration. Prior to joining our group at CSU, she conducted research on the aerodynamic performances of long-span bridges.

North Dakota State University

Doctoral Students

Monsur Ahmed is a Ph.D. student in transportation and logistics specializing in transportation economics. While studying for his Ph.D., Monsur has been working as a graduate research assistant at the Upper Great Plains Transportation Institute since fall 2008. Ahmed received both his bachelor's and master's degrees in economics in the United States. Ahmed's research focuses on economic and financial aspects of transportation investments and operations.

Khalid Bachkar earned his Ph.D. in transportation and logistics from NDSU in 2010. He will teach global logistics and supply chain management at the California State University Maritime Academy where he will also conduct research in the area of supply chain security. Bachkar's area of research interest at NDSU was in logistics and supply chain management, maritime transportation as well as supply chain security and supply chain risk management. His dissertation was titled, "Assessing the Security Risk in Global Container Supply Chains using Analytic Hierarchy Process Model."

Charles Briggs earned his Ph.D. in transportation and logistics from NDSU in 2010. His primary area of study was supply chain management and his dissertation was titled, "Risk assessment in the Upstream Crude Oil Supply Chain: Leveraging Analytic Hierarchy Process." He is returning to Alabama A&M University where he will continue his teaching and research career in the School of Business.

Eileen Campbell received her undergraduate degree in marketing with a concentration in e-commerce and an MBA from the Florida Gulf Coast University. Campbell began her studies at NDSU in 2008. Upon completion of her degree Campbell hopes to continue her career at a research university where she will also teach. She is interested in the implications of port capacity on corporations with global operations particularly with regard to the outsourcing of manufacturing and the ports' ability to facilitate the large volume of imports to the United States. Campbell is also interested in how technology can increase

opportunities for companies to embrace the green supply chain and become environmentally responsible.

Yolanda Carson of Buffalo, NY, is working on her second Ph.D. Carson received her B.S. in industrial engineering in 1986 and M.S. in industrial engineering in 1988 both from State University of New York at Buffalo. Yolanda went on to earn her first Ph.D. in industrial engineering and systems science in 1998 from the State University of New York at Binghamton. Yolanda is interested in the research areas of transportation optimization and modeling and simulation of transportation networks. Upon completion of her Ph.D. in transportation and logistics, Carlson would like to teach, do research, publish, and consult in the area of operations research, where the focus will be on modeling and simulation, optimization, statistical analysis, and strategy development for applications in transportation, logistics, and supply chain systems. Carson spent 12 years with Lockheed Martin Corporation, working in various engineering positions. Her most recent position was project engineering manager in the logistics and sustainment organization.

Peter Chen of Kaoshiung City, Taiwan, recently started his Ph.D. in transportation and logistics. He received his MBA from California State University, in Carson, CA, in 1999. Chen became interested in understanding how practicing collaborative management (CTM) in the rail carriers and environmental context affect their operational decisions. Also, he is interested in implementing radio frequency identification (RFID) to improve overall supply chain performance dynamically. Chen is studying how to apply the CTM concept and RFID technology and integrate it with the current railroad service providers' information systems to improve the efficiency of the railroad operations. He believes that the CTM and RFID aid visibility helps increase the entire logistics performance of the supply chain. Chen aims to strengthen his analytical judgment and execution skills to meet the needs of practical operations.

Xianzhe Chen finished his Ph.D. in the summer of 2010. Chen received his B.S. in automation and business administration from the Wuhan University of Technology in China in 2003. He came to NDSU, earning an M.S. in industrial engineering in 2006.

Chen is interested in researching quality, logistics and supply chain management, forecasting, and time series.

Christopher DeHaan of Fargo, ND, is currently working on the Ph.D. in transportation and logistics. DeHaan received his B.S. in manufacturing engineering from NDSU in 2006. In 2009, he received his MBA from NDSU. He is currently working part-time as an engineering manager at a local small business. He is interested in supply chain management and transportation security issues.

Nimish Dharmadhikari is currently working on his Ph.D. in transportation and logistics after receiving his M.S. from NDSU in industrial engineering and management. Dharmadhikari also holds a bachelor's degree in mechanical engineering from University of Pune in India. His current research addresses simulation models in the healthcare system. He plans to develop a railroad simulation model in the future.

Lei Fan earned his Ph.D. in transportation and logistics from NDSU in 2010. His primary interest was in supply chain logistics for freight shipments. Fan's dissertation was titled "Optimization Model and Risk Analysis for Global Supply Chain in Container Shipments: Imports to the United States." He will pursue a career in conducting analysis and planning in the merchandising and trading industry using quantitative methodologies.

Thomas Flanagan received his B.S. from the United States Air Force Academy in Colorado Springs, CO. He also received a M.B.A. from Chapman University in Orange, CA. He earned an M.S. in global supply chain management from the University of Alaska at Anchorage. Flanagan does research at the UGPTI on remote logistics, remote disaster response, business development, military logistics, and global air logistics. In the future, Flanagan hopes to research the impacts and implications of transportation and logistics availability on the quality of life of remote arctic communities. In addition, he would like to help the development of Alaskan businesses by lowering rural logistic costs. Finally, by teaching, he hopes to help students reach their full potential.

Maher Itani of Beirut, Lebanon, is currently enrolled in the transportation and logistics Ph.D. program at North Dakota State University. His current research focuses on identifying the logistical challenges faced by today's humanitarian organizations. Itani received his bachelor's degree in mathematics from the American University of Beirut in 1992. In 1996 Itani earned a master's degree in business administration. In 2008, he received his MCIPS from the Chartered Institute of Purchasing & Supply in Stamford, United Kingdom. Upon completion of the program, Itani plans to continue his work at the United Nations

Poyraz Kayabas of Ankara, Turkey, received a B.S. in mathematics and computer science and another B.S. in industrial engineering from Cankaya University in Ankara, Turkey, in 2003. He moved to Fargo, ND, in 2004 and in 2007 completed his M.S. in industrial engineering and management at NDSU. Kayabas is interested in supply chain management and optimization.

EunSu Lee completed his Ph.D. in May 2011. He received his B.E. in computer science and engineering from Kwandong University at the city of Gangneung and M.B.A. in service and operations management from Hanyang University in Seoul, South Korea. Then, Lee received M.S. in industrial engineering and management in 2006. He has field experiences in program developing, enterprise resource planning consulting, and logistics consulting. He is currently a graduate research assistant at the Upper Great Plains Transportation Institute in the areas of general aviation planning, freight analysis, highway safety analysis, and emergency medical service routing analysis with geospatial systems. His dissertation investigates the significance and patterns of the containerized freight movement in North America based on the temporal and geospatial simulation utilizing operations research and GIS.

Steven Leon, originally from Odenton, MD, graduated magna cum laude from the University of North Dakota in 1990 with a degree in aeronautical sciences. He continued his education at Loyola College in Maryland where he received his MBA in International Business in 2006. Leon's research interests include transportation policy and its effect on global business strategic and operational decision making, network planning, and creating

customer value through strategic partnerships. Leon would like to teach, conduct research and consult in the fields of transportation and supply chain management.

Qing Liu finished her college study in maritime transportation and port management from Dalian Maritime University, China, in 2007. After that, she came to NDSU, pursuing her Ph.D. degree in transportation and logistics. Her primary research interest is port operation, container shipping, and supply chain management. She is currently working on her dissertation on container port efficiency and terminal operations, and hopes to graduate by 2012. After graduation, Qing will seek a career where she can teach and conduct research.

Pan Lu earned her Ph.D. in December 2011. She received her B.S. at North China Electric Power University in 2002. She is currently a teaching assistant in the transportation and logistics program. Her primary research interest is developing mathematical models for asset management. Currently, she is working on a transportation fuel efficiency study which examines the relative efficiencies of surface transportation modes, and is using LTPP data to test statistical models of pavement performance using LTPP data.

Jeremy Mattson began working with UGPTI's Small Urban & Rural Transit Center in 2007. He has conducted research on alternative fuels, energy prices, transit ridership, rural intercity transportation demand, and transportation issues related to aging, disabilities, and access to health care. He holds a B.A. degree in economics and business management and an M.S. degree in agricultural economics.

Dilip Mistry of Dhaka, Bangladesh, came to NDSU to complete his M.S. in computer science after receiving a degree in naval architecture and marine engineering from the Bangladesh University of Engineering and Technology. His current research as he pursues a Ph.D. in transportation and logistics focuses on the optimization of supply chain management systems by integrating GIS with ERP systems.

Elvis M. Ndembe began studying for his Ph.D. at NDSU in the spring semester of 2009. He holds an M.S. degree from NDSU in agribusiness and applied economics. He also holds a B.S. degree in banking and finance from the University of Buea in Cameroon. His research focuses on various transportation and logistics issues with his main interest being railroad economics. After obtaining his degree, Ndembe hopes to work for an international organization that promotes growth and development in developing countries. He would also like to teach and conduct research at the university level.

David Ripplinger is a research assistant in the NDSU Department of Agricultural and Applied Economics and is conducting research in the area of biofuels economics. He has previously conducted research in the areas of transit operations, transportation economics, ITS, transit coordination, and university community transportation. He is vice president-membership of the Transportation Research Forum and chair of the Paratransit Research Subcommittee of the Transportation Research Board. Ripplinger received his master's degree from Iowa State and is currently in the transportation and logistics Ph.D. program.

Mridula Sarker of Mymensingh, Bangladesh, is conducting research on terrorism and violence occurring on public surface transportation systems such as bus and train systems. She recently started her Ph.D. program in transportation and logistics. Sarker received her bachelor's degree in 2000 and her master's degree in 2002 with a concentration in computer science from the Institute of Science and Technology in Bangladesh. In 2009 she received her master's degree in software engineering from NDSU. In the future Sarker plans research on effective system security plan and program to protect passengers, employees, revenue, and property, especially for small urban and rural transportation systems.

Marc Scott earned his Ph.D. in May 2001. He received both a B.S. in business economics and an M.S. in transportation from South Carolina State University. He is currently employed in logistics at the corporate level of Walmart. Scott's major research was in procurement, purchasing, and supply management. Other research interests and experience include urban transit, freight

logistics, transportation and infrastructure finance, and strategy. Scott has work experience in the manufacturing, energy, banking, and transportation sectors.

Sumadhur Shakya of Ludhiana, India, recently started his Ph.D. in transportation and logistics. His current research is in risk analysis and integration of GIS and spatial modeling in supply chain management of transportation and logistics with focus on grain and container movement. Shakya received his bachelor's degree in crop science from Punjab Agriculture University in Ludhiana, India, in 2005. In 2009, he received his masters in international agribusiness from North Dakota State University. Upon completion of the Ph.D., Shakya plans to conduct research and teach in Land Grant Universities and do consulting work in the private sector.

Lt. Colonel **Matthew Shatzkin** is working on a Ph.D. in transportation and logistics. Originally from Kansas City, MO, Shatzkin completed a B.S. in psychology from Trinity University in San Antonio, TX, and a M.A. in procurement and acquisition from Webster University in Fort Leavenworth, KS. His current research focuses on modeling emergency expeditionary support operations. In the future Shatzkin hopes to serve at the U.S. Army Logistics University.

Meera Singh earned her Ph.D. in transportation and logistics from NDSU in 2010. Her area of study has been highway congestion and safety as well as the study of transportation facilities and efficient uses from the cost perspective. The title of her dissertation was "A Statistical Model for Fatality Rates in Large Truck Crashes." Singh is planning a career in university teaching and research.

Jeffrey Wendt received his undergraduate degree in business management from Dallas Baptist University and an MBA with a concentration in supply chain management from the University of Dallas. Wendt began his studies at NDSU in 2009. His research interests are in the improvement of the supply chain distribution systems through the use of emerging technologies. Wendt is currently employed in the school book industry and plans to use the transportation and logistics knowledge he'll be gaining to improve the current supply chain

structure within his organization. His long-term goals are to teach, concentrating on supply systems specifically focused on implementation and utilization of advanced systems and technologies. Wendt is a member of Sigma Iota Epsilon (S.I.E.) for his academic achievements.

Master's Students

Viet Doan of Bismarck, N.D., is working toward a Master of Transportation and Urban Systems. Doan previously received a B.S. in management information systems from NDSU. He plans to continue working with enrollment management at NDSU and hopes to participate in a mission trip to Central America in the future.

Erika Hedger of Killdeer, N.D., earned her Masters in Managerial Logistics in August 2011. Hedger received her B.S. in industrial engineering and management from NDSU in 2009. She worked as a research assistant at the Upper Great Plains Transportation Institute, focusing on trucking in North Dakota and rural roadway safety. Hedger now works for Killdeer Mountain Manufacturing as an engineer and logistician.

Luke Holt, originally from Grafton, ND, earned a B.A. in business management from Concordia College in 2008. He then attended NDSU, earning a B.S. in industrial engineering and management in 2010. Holt's research interests include supply chain management, traffic operations, and agricultural logistics. After earning his Ph.D., Holt plans to join the faculty at an institution in North Dakota.

John Peyrel of Devils Lake, N.D. is pursuing his master's of managerial logistics. Peyrel is a logistics officer with the Army National Guard. He holds a bachelor's degree in business management from the University of North Dakota.

Joshua Smith, a captain in the U.S. Army, is now enrolled in the Master of Managerial Logistics program. Originally from Torrington, WY, Smith completed a B.S. in criminal justice at Grand Canyon University in Phoenix, AZ, in 2002. His interest in transportation and logistics has led Smith to pursue a degree at NDSU. In the future, he hopes to serve in the U.S. Army as a logistician.

South Dakota State University

Ryan Larsen is a graduate student in civil and environmental engineering. He is a native of Elk Point, SD. Ryan entered the civil engineering program at SDSU in December 2004 and earned his B.S. degree in civil and environmental engineering in May 2008. He worked as an undergraduate research assistant with faculty members Francis Ting and Allen Jones on a study of scour simulation using the SRICOS method since the study started in January 2007. The study was co-funded by MPC. Ryan is now a graduate student at SDSU working on a co-funded project by MPC that is an extension of the work he performed as an undergraduate researcher.

Tom Larsen is a graduate student in civil and environmental engineering. He is a native of Morgan, MN. Tom entered the civil engineering program at SDSU in September 2004 and earned his B.S. degree in civil and environmental engineering in May 2009. He worked as a summer intern for Bolton and Menk, Inc. and performed surveying and construction observation during the summers of 2006-2008. Tom is now a graduate student at SDSU and is working on a project co-funded by MPC and the South Dakota Department of Transportation. The project investigates the durability and retroreflectivity of different pavement markings on roads throughout the different regions of South Dakota.

Stephanie Peters, a native of Nerstrand, MN, is currently a graduate research assistant at SDSU. She earned her B.S. degree in civil and environmental engineering in May of 2010. During the summers of 2008 and 2009, she gained pavement management experience while working for the City of Northfield, MN. The focus of Stephanie's research is mitigation of corrosion in CRC pavement, which is co-funded by MPC and the South Dakota Department of Transportation. The project includes collecting half-cell potential data and concrete samples for chloride ion testing as part of an initial assessment of CRC pavement in South Dakota. Other work includes casting concrete specimens in the laboratory to evaluate the effectiveness of corrosion inhibitors and field testing of these corrosion inhibitors. She anticipates earning her M.S. in civil engineering in December of 2011.

Brooke Postma, a native of Madison, SD, is currently a senior undergraduate student. She began at SDSU in the fall of 2005 and earned her B.S. degree in civil and environmental engineering in December 2009. Brooke began graduate school at SDSU in January 2010 and completed her M.S. degree in civil engineering in May 2011. She worked on a research project co-funded by MPC and SDDOT. Her work involved performance evaluation of jointed plain concrete pavements incorporating different construction details. Brooke plans to work in transportation engineering in the Midwest.

Ryan Rossell earned a B.S. degree in civil and environmental engineering from SDSU in May 2010. He joined the graduate school at SDSU in January 2011 to pursue a M.S. degree in civil engineering. Rossell has been working as a research assistant with Francis Ting, professor of civil and environmental engineering, on the compound channel flow project since September 2010. He has learned to conduct two dimensional flow modeling using the Surface-Water Modeling system (SMS). His graduate research will involve using SMS and the SRICOS (Scour Rate in COhesive Soils) method to conduct a flow and scour analysis of the SR 37 bridge over the James River near Mitchell, SD. This project is co-sponsored by MPC and the South Dakota Department of Transportation. Ryan is a native of Omaha, Nebraska.

Adam Wellner is a graduate student in civil and environmental engineering, with an emphasis in transportation. He earned his B.S. in civil and environmental engineering in May 2009 from SDSU. He earned his M.S. degree in May 2011. He is working on the MPC project "Development of a Safety Screening Tool for High Risk Rural Roads" under the supervision of Dr. Xiao Qin.

University of Utah

Piyali Chaudhuri received his Ph.D. in the summer of 2011. She was a student in the Utah Traffic Lab from Spring, 2008. She has received her B.S. degree with honors in Civil Engineering at the Jadavpur University in India in 2002. She began working in a Consulting firm in India from 2002 to 2005. In 2006 she began her Master's program in Civil Engineering at the University of Windsor, Canada. During her doctoral studies she was a research assistant at the Utah Traffic Lab. She worked on several UDOT projects namely evaluation of optimal spacing of traffic monitoring station on freeways, evaluation of tools for work zone user cost estimation, developing statewide work zone user delay cost manual. She also worked on the evaluation of I-15 Express Lanes Dynamic Pricing project. She has publications in ITS World Congress in Sweden 2009, TRB 2010 and in International Conference on Urban, Regional Planning and Transportation in Paris 2010. She earned the departmental graduate student scholarship for 2008-2009 and 2010-2011 and won second place in the ITE Student Paper Competition in the local ITE meeting in 2009.

Jeremy Gilbert earned a M.S. in civil engineering from the University of Utah with an emphasis in traffic engineering. He was research assistant and his project was training traffic operators for the Utah Department of Transportation. He graduated in May 2010.

Devin Heaps completed his B.A. degree in Classic at the University of Utah in May 2005. From 1997 to 2003, he served in the Army National Guard as a light-wheeled vehicle mechanic. He is currently working as the system administrator in the Utah Traffic Lab. His responsibilities include new acquisitions, software maintenance, and upkeep on the lab's 45 computers and network. In the December 2009, he will graduate with a master's of business administration with a special emphasis in network management.

Cameron Kergaye graduated from the University of Utah with a Ph.D. in civil engineering in 2010. He is a licensed professional engineer with the Utah Department of Transportation and has 20 years of experience working on some of the state's largest projects (such as I-15 design/build) as well as modest transportation studies (such as I-80 round-

abouts near Park City). The focus of his dissertation was adaptive traffic signal control systems. Currently, he splits his time evenly between project management duties for UDOT and transportation research projects for the Utah Traffic Lab (utilizing a unique University of Utah/ UDOT partnering agreement).

James Mulandi graduated with his Ph.D. in civil engineering (with an emphasis in traffic engineering) in the fall of 2011. He earned a B.S. in civil engineering from the University of Nairobi and an M.S. in civil engineering from Kansas State University. His research focused on improving signal timing control practices like optimization, delay estimation and quantification of the benefit of retiming traffic signals.

Bhagavan Nadimpalli earned his B.S. degree in civil engineering at the Jawaharlal Nehru Technological University, Hyderabad, India. He began his career as an assistant transportation planner in Halcrow Consulting India Private Ltd., New Delhi, India where he worked on traffic data collections and traffic demand forecasting for several toll revenue projects. He earned his M.S. in civil engineering (transportation) at the University of Utah working as a research assistant in Utah Traffic Lab Fall 2009. He built a microscopic traffic simulation model in VISSIM for one of the largest HOV lanes in the nation.

Tristan Pedersen began working at the Utah Traffic Lab in 2007 as an undergraduate research assistant and since then has helped at different times on a variety of projects. He completed a B.S. in civil engineering and a B.A. in geography from the University of Utah in 2009. He is currently working as a graduate research assistant for the Lab. He will graduate with an M.S. in civil engineering with an emphasis in transportation engineering in May.

Benjamin Shepherd has graduated and is now serving in the Army in Afghanistan. He was enrolled under the Army's Advanced Civil Schooling program, pursuing a master's of civil engineering and doing research at the UDOT Traffic Operations Center in Salt Lake City. Shepherd earned a B.S. degree in engineering management from the United States Military Academy, West Point, NY, in 2007. He served with the 18th Field Artillery Brigade (Airborne) at Fort Bragg, NC, from 2002 to

2007. He was deployed to Mosul, Iraq, from 2003 to 2004 and Tikrit, Iraq, from 2005 to 2006.

Jelka Stevanovic earned her Ph.D. in civil engineering. While at the Traffic Lab she investigated traffic control signal settings optimization using genetic algorithms. She also earned a M.S. degree in civil engineering from the University of Utah. She graduated with her B.S. degree in 2003 in mathematics and informatics, at the University of Novi Sad, Serbia. Stevanovic was a research assistant at the Utah Traffic Lab.

Ivana Tasic began working in the Utah Traffic Lab Fall of 2010. She has received her B.S. in traffic and transportation engineering at the University of Belgrade, Serbia in 2009. Currently, she is continuing her master's studies at the University of Utah as a research assistant at the Utah Traffic Lab. She is reviewing the Advanced Traveler Information Systems and their influence on traffic incident management.

Ivana Vladislavljevic earned her Ph.D. in civil engineering. She received her B.S. degree at the Department of Transportation and Traffic Engineering at the University of Belgrade, Serbia and Montenegro. She began her graduate studies at the Department of Transport and Traffic Engineering, at the University of Belgrade where she was awarded a scholarship for "young talents." She was a research assistant at the Utah Traffic Lab and investigated the impact of the cell phone conversation on traffic flow using microsimulation software VISSIM.

Milan Zlatkovic is a Ph.D. student of civil engineering at the University of Utah and a research assistant at the Utah Traffic Lab. He holds a B.S. degree from the Faculty of Transport and Traffic Engineering, University of Belgrade, Serbia, and a M.S. degree in civil engineering from the University of Utah, with a major in transportation. His field of interest includes traffic control systems, microsimulation modeling, public transportation, intelligent transportation systems, traffic flow theory, and highway design. He has been involved with several projects contracted with the Utah Transit Authority. His work consists of evaluating and analyzing benefits and impacts of transit signal priority for bus rapid transit and light rail transit using VISSIM microsimulation software, as well as analysis of urban traffic networks. He

presented his research at TRB in 2009 and 2010, ITE Utah Chapter, PTV Vision User Group Meeting and National BRT Institute Workshop. He has two published papers in the fields of traffic control and public transportation.

University of Wyoming

Burton Andreen is from Casper, WY, and graduated with a B.S. in civil engineering in May 2011. He is currently pursuing a master's degree in transportation and is a graduate research assistant in transportation. He has worked on validating automated data collection techniques for the measurement of shoulder slopes as well as developing default speed limits for Wyoming gravel roads. Currently he is working on a comprehensive safety project comparing Wyoming and North Dakota safety programs.

Zebulun Coulter is a native of Wyoming, completed his B.S. in civil engineering at the University of Wyoming (UW) in 2009. Coulter is pursuing a master's degree in civil engineering (Transportation). He is a graduate research assistant, conducting research to determine the impact geometric roadway conditions have on crashes on local rural roads in Wyoming. He is also currently the cadet battalion commander of the Army ROTC program at Wyoming and will commission in May 2011 as a second lieutenant into the Wyoming Army National Guard. Upon completion of his Masters in August 2011, Coulter hopes to become a professional engineer while working in the field of transportation engineering in Wyoming.

Michelle Edwards recently completed her master's degree in civil engineering. She earned her B.S. degree in civil engineering at the University of Wyoming in December 2007. As an undergraduate, Edwards worked for the Wyoming Department of Transportation in its Laramie Design Squad for two years. Her research focused on developing a decision-support system for dynamic message signs for the I-80 corridor between Laramie and Cheyenne. She is employed as a consultant.

Scott Koch is from Parker, CO. Scott entered the civil engineering program at UW in the Fall of 2004 and graduated with a B.S. degree in civil engineering in the Spring of 2009. He worked as an undergraduate research assistant for Dr. Khaled Ksaibati and Dr.

Rhonda Young. For Dr. Young, Scott managed traffic counting equipment and performed and analyzed traffic counts. He worked on a MPC co-funded study with Dr. Ksaibati on the use of Recycled Asphalt Pavement (RAP) in gravel roads. Scott is now a graduate student at UW and is continuing work on the RAP study.

Florence Kothapalley is a graduate student from Hyderabad, India who is pursuing her master's degree in civil engineering. Her research in transportation engineering focuses on pavement materials. She is working on the laboratory tests of gravel road samples and analysis of dust on gravel roads and its impact on environment. After graduation, Kothapalley plans to gain practical experience in the United States initially and return to India to use her knowledge to bring a change to the Transportation system there.

George Dzotepe is from Ghana in West Africa. He completed his B.S. in civil engineering at the Kwame Nkrumah University of Science and Technology and then went on to complete a master's degree in construction (project) management at Heriot-Watt University in Edinburgh, Scotland. George decided to study for a second master's degree in civil engineering (transportation) in the United States after working in that field. He chose UW due to the strength of its transportation engineering program, faculty and scholarship opportunities. He is working as a graduate research assistant and his main area of research is the new Mechanistic-Empirical Pavement Design Guide (MEPDG) developed by AASHTO. He is studying the sensitivity of Wyoming weather for the MEPDG using its computer software program version 1.1 and data from weather stations in Wyoming. Upon completion of his degree, George intends to work and specialize in the field of pavement engineering and materials.

Ahmed Elghriany earned his B.S. in civil engineering from the University of Garyonis in Benghazi, Libya in 2000. Elghriany worked in survey engineering, quality control of material and transportation design. He was also a demonstrator (teaching assistant) at the University of Garyonis. He was awarded a scholarship for postgraduate studies in civil engineering from his University, and later he decided to come to United States for his higher

studies. He is pursuing his master's degree in transportation area with emphasis on pavement performance.

Richard Price recently completed his master's degree in civil engineering from the University of Wyoming. As an undergraduate, he assisted in testing laminar wood joists and led the design and construction of the AISC-ASCE student steel bridge. Price's research topic was to establish a link between wind power maps and fatigue design of traffic signal and variable message structures, and then suggest specification modifications from the results of the findings.

Paul Ringenberg earned his B.S. in civil engineering in 2009 from Colorado State University. Ringenberg chose to attend UW for his master's because of the strength of the transportation engineering program, scholarship opportunities and the atmosphere of the city. Ringenberg's research interest is in the area of travel time reliability. The goal of his research is to develop a relationship between travel time and the various factors affecting driver behavior. One major goal of this project is to assist in message selection for Dynamic Message Signs (DMS's), which help drivers take appropriate driving actions in varying weather conditions along the I-80 corridor between Cheyenne and Laramie, WY. Upon graduation, Ringenberg plans to become a Professional Engineer somewhere in the West or Midwest.

Sadeh Safaripoor is working with Stephen Boyles, assistant professor of civil and architectural engineering, as a graduate research assistant. His research interests include network optimization, decision analysis and ITS. Safaripoor holds a B.S. in civil engineering from Sharif University of Technology in Iran. As an undergraduate student he took some optional courses in transportation engineering and involved in some projects related to linear programming and decision analysis.

Promotes Saha began his graduate studies in 2009, after completing his B.S. in civil engineering from the Bangladesh University of Engineering and Technology, with an emphasis in transportation engineering. After that he worked for Sami Engineering, a structural design and detailing firm. As an undergraduate, he conducted research

on road safety trends, applying quantitative risk assessment techniques and statistical analysis, and working on several design projects. His current research interests include transportation network optimization and system optimization.

Justin Terfehr is from Cheyenne, WY, and completed his B.S. in civil engineering in May 2011. As an undergraduate student Justin was involved in ASCE, TBP, and club Rugby. He will be pursuing an M.S. in civil engineering. Justin is a research assistant evaluating WYDOT's Research Center. Upon graduation Justin plans to work in Wyoming as a professional engineer.

Benjamin Weaver is employed as a consultant after earning his M.S. in civil engineering. He studied the implementation of asset management systems in three Wyoming counties as part of his M.S. degree program. He earned a B.S. in civil engineering from the University of Wyoming in 2004 and an A.S. in engineering from Laramie County Community College in 2002. He was a member of Tau Beta Pi honor society and was named to the UW Dean's Honor Roll.

Christopher Wolffing recently earned his M.S. degree in civil engineering and is now employed as a consultant. He earned his B.S. in civil engineering from the University of Wyoming in 2003. He studied highway construction impacts on Wyoming businesses, focusing on traffic volume, tax revenue, commercial property data, and data

from surveys of business owners and engineers. He compared actual economic data to perceived data from surveys. Wolffing served as the ITE student chapter vice president.

Cheng Zhong recently earned his master's degree in civil engineering. He graduated from Nanjing University of Technology, China, with his bachelor's degree in computer science and technology in the summer of 2004. In 2006, Zhong worked on a Wyoming county roads survey of roadway classification systems and minimum geometric standards. His research focused on traffic volume data collection and estimation for rural roads in Wyoming.

Jonathan Zumwalt is from Fresno, CA. He earned B.S. in civil engineering from the University of Wyoming in 2010. While specializing in transportation engineering, he spent five semesters and two summers working for the Wyoming Department of Transportation Laramie Design Squad. He has extensive training in drafting and design. Zumwalt also has experience in presenting plans and working with different viewpoints and areas of expertise. He is in the UW civil engineering masters program for transportation engineering.



Research

Project Highlights

SDSU conducts jointed plain concrete pavement design and construction review

A research study to enhance the performance of future jointed plain concrete pavements (JPCP) in South Dakota is underway at South Dakota State University. The goal is to increase pavement durability, improve ride quality and reduce construction cost. The research team is expected to develop optimized concrete mix designs for JPCP applications, evaluate the performance of different joint sealing materials and strategies under seasonal weather and precipitation conditions, determine the load transfer effectiveness of different dowel bar arrangements, and assess the effect of the curing compound application rate on slab curling and warping.

Several mix designs were tested for workability and durability in the materials laboratory at SDSU. The laboratory study resulted in the development of two mix designs incorporating 1.5" top aggregate size and $\frac{1}{4}$ " blending chip aggregates to provide good workability at lower cement content. The proposed mix designs have been submitted to the South Dakota Department of Transportation for review and possible application in upcoming JPCP projects. In addition, the research team has been collecting data during the last two years from instrumented test sections of newly constructed JPCP in South Dakota. The test sections included in this study are located on Interstate 29, U.S. Highway 50 and U.S. Highway 212 in South Dakota.

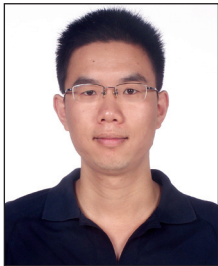
The study is co-sponsored by MPC and the South Dakota Department of Transportation.



SDSU graduate students installing joint instrumentation on U.S. Highway 212 west of Belle Fourche, SD.

CSU studies truck safety on rural highways in complex driving conditions

Studies at Colorado State University will examine factors that influence truck safety on rural roads to identify strategies to reduce the number and severity of multiple-vehicle and single vehicle truck crashes. In the United States and other developed countries, road accidents cause more injuries and casualties than any other natural or man-made hazard. In addition to multi-vehicle crashes, large trucks are vulnerable to single-vehicle accidents (e.g. rollover, sideslip) under hazardous driving environments on rural highways. These hazardous environments include inclement weather (e.g. strong crosswind gusts, snow, rain, or ice) and/or complicated terrain (e.g. steep slopes or sharp curves). How to characterize the adverse driving conditions and their interactions with single-vehicle and multi-vehicle accidents has become a challenge. Partially supported by research funds from MPC, researchers at CSU have conducted a series of studies on looking into truck safety issues on rural highways in complex driving conditions.



Feng Chen

The studies, conducted by Ph.D. student Feng Chen under the supervision of Dr. Suren Chen, include the following major parts:

1. developing a reliability-based single-vehicle accident simulation model;
2. conducting a multi-scale traffic safety study on the I-70 corridor in Colorado by looking at single-vehicle accidents and multi-vehicle accidents simultaneously;
3. developing a GIS-based interactive system to predict related safety risk and related cost; and
4. investigating the injury severity of truck drivers by looking into the different mechanisms of injuries caused by multi-vehicle and single-vehicle accidents separately.

The studies include analytical simulation, historical data analysis and GIS application, crash risk analysis, injury severity analysis and associated cost analysis. Along with the field environmental data collection technique developed in a previous MPC study, a framework to conduct the systematic truck safety assessment and prediction has been established. With such a platform, additional studies can be conducted.

To date, three journal papers have been published related to the work and another is under review.

Long term performance of FRP repair materials project underway

CSU researchers working with the Colorado Department of Transportation to investigate several issues preventing the more extensive application of Fiber Reinforced Polymers (FRP) as a repair material to concrete bridges in Colorado.



The research team includes assistant professor of civil and environmental engineering Rebecca Atadero and M.S. students Doug Allen and Oscar Mata. FRP was used to repair the arch on the Castlewood Canyon Bridge southeast of Denver in the summer of 2003. Allen is working with CDOT to plan a field evaluation of the material on the bridge including testing the bond between the FRP and the concrete, removal of some FRP for laboratory testing, and thermographic imaging of the arch. This research fills a gap in current durability research as most durability investigations of FRP use accelerated conditioning in laboratory settings.

Mata is working on laboratory experiments to answer questions about the effect of the deicing agents used by CDOT (magnesium chloride and potassium acetate) on the bond performance of FRP to concrete. The research project also includes literature review components and the development of design examples to help CDOT engineers make use of the versatile material.

Colorado researchers test various fly ashes in soil-rubber mixes

CSU researchers studied the potential use of off-specification fly ashes to increase the shear strength and stiffness of an expansive soil-rubber (ESR) mixture. Researchers Antonio Carraro and Ethan Wiechert found that the shear strength and stiffness improvements imparted by the off-specification fly ash are similar to or better than the improvements imparted by conventional Class C fly ash.

The off-specification fly ashes (so designated because they do not meet ASTM specifications for use in concrete) used included a high sulfur content fly ash and a high carbon content fly ash. A standard Class C fly ash was also used as a control fly ash to develop a basis for comparison of the effects of the off-specification fly ashes.

The ESR mixture consisted of high-plasticity clay blended with 20% 6.7-mm granulated rubber (by weight). The fly ash content required to develop pozzolanic (cement-like) reactions was determined based on the concept of lime fixation point and kept constant for all ESR-fly ash mixtures. At this selected fly ash content, ESR-fly ash mixtures were tested at a single relative compaction level and curing times of 7 and 14 days. Unconfined compression testing was performed on compacted specimens to validate the fly ash content selected and the effect of curing time on the development of pozzolanic reactions.

The effect of the fly ash type, curing time and mean effective stress was evaluated by performing isotropically consolidated undrained triaxial compression tests on saturated specimens at mean effective stress levels of 50, 100 and 200 kPa. Stiffness changes due to fly ash addition were evaluated during undrained compression. Large-strain stiffness was measured using conventional external displacement transducers. Very-small strain stiffness was evaluated from shear wave velocity measurements using a bender element apparatus.

University of Utah research examines highway design exceptions

Researchers at the University of Utah are launching a research project to improve the efficiency of the highway design process when exceptions must be made to design standards.

The project marks the first time that assistant professor of civil and environmental engineering R.J. Porter is the principal investigator of a MPC project. The project, "Safety Impacts of Design Exceptions in Utah," is also partially funded by the Utah Department of Transportation.

The research objective is to compare safety, measured by expected crash frequency and severity, on road segments where design exceptions were approved, to similar road segments where no design exceptions were approved. Research results will provide insights into the effectiveness of



R.J. Porter

UDOT's current design exception preparation and approval process as well as whether deviations from some controlling criteria have different safety impacts than others. These insights have the potential to improve the efficiency of the design exception preparation and approval process, reducing project delay and costs. Results will also contribute to FHWA/UDOT risk assessment activities and will support UDOT's ongoing practical design initiatives.

Porter is an expert on the operational and safety effects of geometric design decisions. He is a member of the TRB Operational Effects of Geometrics Committee (AHB65), Chair of the TRB Subcommittee on Performance-Based Analysis of Geometric Design [AHB65(3)], and a member of the Future Directions Subcommittee of the Task Force on the Development of the Highway Safety Manual (ANB25T). He is serving as an invited expert panel member for NCHRP 20-05/42-04: Recent Geometric Design Research and Practice for Improved Safety, Operations, and Maintenance. He is also a registered professional engineer in Utah.

Corrosion of reinforcement in CRC pavements

In an MPC-funded project at SDSU, a team of researchers is investigating corrosion of steel reinforcement in continuously reinforced concrete (CRC) pavements. The study is expected to identify the causes and extent of reinforcement corrosion in CRC pavements in South Dakota and to assess the effectiveness of corrosion mitigation products.

Crack mapping and half-cell potential measurements were performed at three CRC pavement sites on I-29 and I-90 near Sioux Falls, SD. Several concrete cores and concrete dust samples at different pavement depths were also collected from the three sites. The cores and the dust samples are being analyzed to establish chloride penetration profiles at and away from pavement cracks. Chloride profiles will be used to determine

if the use of deicing chemicals during winter maintenance is promoting the corrosion of the reinforcement. The rebar in the cores will also be subjected to scanning electron microscope (SEM) analysis to determine the extent of reinforcement corrosion.

Laboratory specimens of concrete blocks with embedded reinforcement will be tested under corrosive conditions to demonstrate the effectiveness of various mitigation strategies including crack sealing and the use of corrosion inhibitors.

The study is co-sponsored by MPC and the South Dakota Department of Transportation. The research team consists of professor of environmental and civil engineering Nadim Wehbe, associate professor Allen Jones, and graduate research assistant Stephanie Peters.



Half-cell potential measurements of CRC pavement in South Dakota

NDSU researchers compare rural and urban child car seat placement



Andrea Huseth

NDSU researchers found that children in rural areas are much more likely to be seated in the front seats of vehicles than children in urban areas.

Researcher Andrea Huseth observed vehicles at urban and rural elementary schools in North Dakota and found that more than a third of vehicles overall had children seated in the front seat, but the rates were much higher for vehicles observed at rural schools. She notes that seating children in the rear of vehicles has been shown to decrease the odds of being fatally injured in a motor vehicle crash by 36% to 40%.

Although rear seating is safer, rates of children being front-seated remain high, especially for older children. "While differences in traffic safety between rural and urban areas have been extensively researched, very little work has been done on rural/urban differences in child seat placement," Huseth said.

Huseth found that differences also exist among vehicle type, with children riding in pickup trucks more likely to be front-seated than children in any other type of vehicle. Interviews with parents indicated that, overall, parents were aware that seating a child in the rear of a vehicle is safer.

Parents gave several reasons for not having a child seated in the rear of a vehicle, including size of vehicle, number of children to be transported, differences in family guidelines, and ambiguous "rules" regarding child vehicle safety. Parents felt that child vehicle safety information should come from as many sources as possible. They were also concerned that the majority of information received regarding traffic safety focused more on much younger children, and that as their children aged, they tended to receive less and less information.

The study was limited in scope but provided enough information to suggest that future research should be conducted to determine why there are rural/urban differences in child seat placement.

Conclusions from gravel roads management study outlined in report

Led by the Wyoming T2/LTAP Center and the University of Wyoming, a group of experts collaborated to develop recommendations for those attempting to implement gravel roads management. As a result of this collaboration, a final report, an implementation guide and a programming guide were prepared and printed as report number FHWA-WY-10/03F.

Several conclusions were drawn from this effort:

- The overall effort required to implement a gravel roads management system for local agencies should be minimal.
 - Data collection efforts must be limited.
 - Analysis must be simple and transparent.
- There are four basic steps involved in implementing a GRMS:
 - Assessment
 - Inventory
 - Cost and maintenance history
 - Condition monitoring
- Cyclic maintenance programs may be developed once a network is inventoried and its maintenance history is available.
- Useful performance data are difficult to collect mainly because surface conditions change quickly due to weather, traffic and maintenance.

The next step after developing these recommendations is the process of putting them into practice. The University of Wyoming is beginning this process by collaborating with two and possibly three Wyoming counties.

Preliminary steps are the evaluation of the counties' current data collection procedures, particularly those elements that are needed to develop cyclic maintenance schedules. Using available historical data from the counties, maintenance schedules are

being developed. Through this process, the gaps and shortcomings in the counties' current data collection procedures are being identified, making future refinements and improvements possible.

Once maintenance schedules are developed and the frost is out of the ground, routine maintenance of the counties' gravel roads will begin. For selected maintenance areas, the maintainer will evaluate the condition of the roads' surfaces immediately before they blade them. Comparing these conditions to designated minimum acceptable conditions will allow future maintenance schedules to be adjusted. Roads that are in better condition than their minimum can have their maintenance period extended, while those in worse condition can have their maintenance period shortened, thus adjusting the maintenance schedule based on each road's desired and actual performance. This approach will assist the counties with both providing adequate maintenance to all roads while avoiding performing excessive maintenance on any roads. This should minimize overall maintenance costs while still providing adequate service.

Eventually, as better historical data are gathered, they may be used to assess the performance of different maintenance practices. The performance of aggregate from various sources as well as the efficiency of many practices and various other factors, such as dust suppressants, may then be assessed.

The two fundamental goals of this implementation effort are: first, to determine which data should be collected and; second, to determine how best to use the available data.

By using available data to generate preliminary maintenance schedules, gaps in the data will be identified, as will extraneous information. This knowledge will be used to recommend gravel roads management procedures and practices.

Tests continue at CSU on highly flexible crash barriers

Testing at CSU continues on the use of flexible vertical rod networks for slowing or stopping vehicles. The basic principle of this work is to use materials that undergo large strain but small stress (as shown in the photo to the left below), allowing the accumulated nonlinear strain energy to supply the needed work to balance the change in linear momentum of the vehicles. Early attempts at using agricultural products, namely bamboo and other wood species, were supplemented by the use of small-diameter fiberglass rods, which have less tendency to deteriorate under environmental conditions. Larger-scale testing is currently in preparation using a 400-lb test cart under gravitationally induced velocities (as shown in the photo to the right below). Researchers on the project include Paul Heyliger, John van de Lindt, Doug Allen, Omar Amini, and Cameron Heyliger.



Wehbe recognized for excellence in research

Dr. Nadim Wehbe, professor of civil and environmental engineering at South Dakota State University (SDSU), was named the College of Engineering 2010 Distinguished Researcher in February. Wehbe was among 23 SDSU faculty members who were recognized at the annual SDSU Celebration of Faculty Excellence banquet for outstanding research, teaching and service.



2010 SDSU Distinguished Researchers and Scholars
(Wehbe is second from left)



Outreach & Technology Transfer

Wyoming Rural Road Safety Program being implemented statewide

The MPC and the Wyoming Department of Transportation are facilitating the implementation of the Wyoming Rural Road Safety Program on a statewide basis. The program helps counties identify high-risk rural road segments and their corresponding safety countermeasures as an efficient and cost-effective ways to improve highway safety.

Finding methods to improve the safety of the nation's rural roadways is very important. About 80 percent of the Nation's roadway miles are rural. However, many rural roads lack important safety features. Nationally, about 60 percent of traffic fatalities occur on rural highways. Two-lane roads have the highest fatality rates per vehicle-mile of travel.

The University of Wyoming is providing technical help and training to counties interested in implementing the program. So far, the University of Wyoming has helped half of the 23 counties in Wyoming to implement the WRRSP. Multiple low-cost safety projects have been approved for funding on roads with the highest risk levels. Currently, 20 safety improvement projects around the state have been funded. Eventually, all counties in the state are expected to follow the five-step procedure developed in this study to identify their high-risk rural road segments and safety countermeasures.

When the program has been fully implemented, funding requests from all counties will be ranked by the Wyoming Safety Management System committee. In this way, the distribution of available funding will be optimized. The University of Wyoming will do a follow-up study in three years on all of the improved sections to determine the effectiveness of the program in reducing crashes and fatalities. Three years is the minimum required wait time after installation of safety improvements to get meaningful results on benefits.

The methodology developed in this project has been presented nationally at the Transportation Research Board Annual Meeting and the National LTAP Association Annual Meeting. In addition,

workshops and presentations have been given in Wyoming and throughout the broader Mountain-Plains region. Other states can benefit from this procedure when they are considering the distribution of their high risk rural road funding. North Dakota has already initiated a study similar to WRRSP.

This program has made \$1.5 million available for low cost safety improvements for local governments in the State of Wyoming. In addition, the program will provide a steady stream of funding for safety improvements on local roads in the future. Providing local governments with a potential funding source for safety improvements is very important in ensuring that safety is considered at the local level.

As part of the WRRSP, a statewide sign program for local governments is being implemented. Half of the counties in the state have submitted requests for signs at high risk locations. More than 1,800 signs will be purchased by WYDOT and distributed to counties for installation to provide advanced warning to the driving public at high crash locations. The Wyoming LTAP center will conduct a follow-up study to quantify the effectiveness of all of these improvements.

"The program has truly been a success story, showing how Wyoming local governments can work closely with WYDOT and FHWA to improve the safety of rural roads across the state," notes Khaled Ksaibati, MPC program director for Wyoming and Director of the Wyoming Local Technical Assistance Program. "For the first time in the state of Wyoming, local governments can apply for safety funding by following a systematic procedure."

The University of Wyoming developed the Wyoming Rural Road Safety Program with funding by MPC and the Wyoming Department of Transportation (WYDOT) in cooperation with the Federal Highway Administration (FHWA). Program guidance was provided by a Local Road Safety Advisory Group with representatives from WYDOT, the Wyoming Local Technical Assistance Program, the Wyoming Association of County Engineers and Road Supervisors, the Wyoming Association of Municipalities, and FHWA.

The pilot phase of the research project involved data collection and participation from Carbon, Laramie, and Johnson counties. The data collected included historical crash data as well as field conditions. A five-step procedure was developed and applied in these counties. The steps are:

1. Crash data analysis
2. Level I field evaluation
3. Combined ranking to identify potential high-risk locations based on steps 1 and 2
4. Level II field evaluation to identify countermeasures
5. Benefit/cost analysis

Crash data were analyzed to identify high-risk segments with proportionately higher crashes during a 10-year analysis period. A Level I field evaluation was conducted to identify deficiencies in geometric conditions and shoulders as well as pavement markings and signage. Roadway segments were ranked on a scale from 0 to 10 in 5 risk categories based on the results of the field evaluation. The categories are:

1. General
2. Intersection and Rail Road Crossings
3. Signage and Pavement Markings
4. Fixed Objects and Clear Zones
5. Shoulder and ROW

Combined rankings based on crash data and field evaluations were used to identify segments with the highest potential crash risks. A comprehensive analysis was then conducted on each high-risk segment. The objective of this evaluation was to identify low-cost safety countermeasures for segments identified as high-risk locations. A benefit/cost analysis was performed to help identify the most cost-effective safety measures.

As a result of this successful pilot study, the Local Road Safety Advisory Group approved the WRRSP procedure as a means of improving safety on rural roads in Wyoming. Once a county has completed the five-step procedure, it has the necessary information to develop plans to fund safety improvements using the High Risk Rural Road Program or other funding sources. WYDOT is funding some of the counties' safety requests, providing incentives for other Wyoming counties to establish their own local safety programs.

Traffic safety evaluations are a first step to safety improvements on local roads

When a car crashes on one of North Dakota's rural roads, there's a good chance poor signage, outdated road design, improper or out-of-place roadside barriers or obstacles, or bad pavement markings may be at least partly to blame.

More than 40 percent of fatal motor vehicle crashes in North Dakota occurred on local roads – the two-lane gravel and pavement roads that make up the bulk of North Dakota's road system. The U.S. Department of Transportation indicates up to a third of those crashes could have been avoided if the roads, markings and signs were updated.

With support from the Mountain-Plains Consortium, the Upper Great Plains Transportation Institute at NDSU is working with local cities, counties and tribal authorities to conduct "traffic safety evaluations" on crash-prone road segments to identify safety improvements. "The idea is to implement low-cost improvements on road segments that local residents and road managers have identified as high-risk for crashes," notes researcher Kim Vachal.

"This is not a case where we go in and tell local officials what to do," Vachal says. County commissioners, road superintendents, law enforcement personnel, maintenance personnel, DOT staff and others may be involved in the evaluation. "We help them see and understand things they didn't before," she says. The team identifies three types of improvements:

- Immediate safety improvements that should be made, including vegetation removal to improve sight lines, sign replacement, etc.
- Low cost improvements that could have a positive impact on safety, such as improved signing, assuring there is an adequate clear zone around intersections, etc.
- High-cost improvements that could be considered when funds are available, such as rehabilitation or reconstruction to improve road condition and geometry.

One traffic safety audit was conducted along scenic Barnes County Highway 21 which runs south of Valley City along the Sheyenne River. Examples of resulting improvements included upgraded signs and pavement markings on several curves and the removal of vegetation to improve visibility.

Vachal notes that transportation safety evaluations are a practical and proactive approach to safety that reduces crash incidents and severity through the low-cost, high-value improvements. They also create an environment where safety is a consistent consideration in road maintenance and improvement.

SDSU Biennial Geotechnical Conference

The Department of Civil and Environmental Engineering at South Dakota State University (SDSU) held the Biennial Geotechnical Seminar on December 3, 2010 in Sioux Falls, SD. The one day seminar was sponsored by SDSU and the Mountain Plans Consortium. The seminar included a breadth of geotechnical engineering topics from micropiles to earthen embankments.

Seven speakers travelled from Minnesota, South Dakota and Nebraska to make presentations. The seminar was well attended by more than 150 engineers, managers, and public officials, as well as exhibitors demonstrating products available to the geotechnical profession. The seminar was coordinated by SDSU associate professor Allen Jones and SDSU professor Richard Reid. The next seminar will be held December 7, 2012.

Presentation on Highway Safety Screening Tool for South Dakota

Xiao Qin, assistant professor of civil and environment engineering at SDSU, and Adam Wellner, SDSU graduate research assistant presented their research paper "Application of Bivariate Ripley's K to Identify the Relationship Between Roadway Departure Crashes and Horizontal Curvature" in August at the Midcontinent Transportation Research Forum in Madison, WI, and "SD GIS Highway Safety Review Tools Demonstration" in October 2010 at the South Dakota Tribal Safety Summit in Lower Brule, SD. Both presentations are part of the research project "Highway Safety Screening Tool for South Dakota" co-sponsored by MPC and SDSU.



SDSU Geotechnical Conference

Travel time paper published

"The Effects of Detector Spacing on Travel Time Prediction on Freeways," was published in the International Journal of Engineering and Applied Sciences. Authors are Piyali Chaudhuri, Peter Martin, Aleksander Stevanovic, Chongkai Zhu of the University of Utah Traffic Lab.

Qin presents at annual GIS for Transportation Symposium

SDSU researcher Xiao Qin made three presentations at the 24th annual GIS for Transportation Symposium in Hershey, PA, in March 2011. The event provides a forum for professionals interested in the design and use of geospatial information systems for transportation. It brings together individuals from education, the private sector, and all levels of government for a full day of workshops. Qin's presentations were:

- Real-Time Arterial Traffic Performance Measures Using GPS-Instrumented Vehicles
- Development of a Statewide Crash Map: Merging and Mapping State and non-State
- Crashes onto a Single Network
- GIS-Based Highway Safety Metrics Implementation and Evaluation

Martin participates in University Research Technology Transfer Day

MPC researcher Peter Martin of the University of Utah participated in the University Research Technology Transfer Day April 6, 2011, in Washington, D.C. The event is sponsored by USDOT's Research and Innovative Technology Administration and was attended by U.S. Transportation Secretary Ray LaHood and other DOT leaders.

Each year DOT invests in university research that supports the department's strategic goals, and technology transfer efforts help ensure that these investments make ongoing positive impacts across our transportation system. The event highlights research products that have been or are in the

process of being deployed into the marketplace or impacting policy. Martin presented a poster entitled, "Distracted Driving – it's not only dangerous, but it adds to congestion," which highlighted research at the University of Utah that shows how cell phone use contributes to congestion.

The study used a driving simulator to capture the driving behavior of 36 students. This behavior was then modeled in a mathematical representation of a real traffic stream on a freeway. Results indicated that, when drivers conversed on a cell phone, they made fewer lane changes, had a lower overall mean speed and a significant increase in travel time in the medium and high density driving conditions. This driving behavior results in travel delay and increases the probability of accidents.

Utah research on freeway and interchange safety presented in Greece

R.J. Porter and student Thanh Le presented their recent work on the safety effects of ramp and interchange spacing at the First International Conference on Access Management during the summer of 2011 in Athens, Greece. The paper, titled "Performance-Based Safety Evaluation of Requests for New Access or Modifications to Existing Access on Freeways," focused on one aspect of access management: quantifying the safety effects of changes in ramp spacing expected to result from adding new access points or modifying existing access points on freeways.

Utah faculty member becomes technical member of the NCUTCD

The Executive Board of the National Committee on Uniform Traffic Control Devices (NCUTCD) voted to appoint University of Utah assistant professor of civil and environmental engineering R.J. Porter as a Technical Member of the Markings Committee in January 2011. The "National Committee" is an organization whose purpose is to assist in the development of standards, guides, and warrants for traffic control devices and practices. The NCUTCD recommends to the Federal Highway Administration and to other appropriate agencies

proposed revisions and interpretations to the Manual on Uniform Traffic Control Devices and other accepted national standards.

Porter invited to speak at Canada's Annual International Conference on Urban Traffic Safety

University of Utah assistant professor of civil and environmental engineering R.J. Porter was invited to give an extended presentation on geometric design, speed-management, visibility enhancement techniques, multi-modal safety countermeasures, and work zone design on urban streets at the third Annual International Conference on Urban Traffic Safety April 17-21 in Edmonton, Alberta, Canada. The presentation included a compilation of Porter's current and recent work for the National Cooperative Highway Research Program (NCHRP) and Federal Highway Administration (FHWA). The conference objective is to inspire novel ideas and innovative approaches to address the 21st century needs and challenges of urban traffic safety.

CSU researcher presents paper in Norway on wood-concrete composite members

Wood-concrete composite members were the focus of a dedicated session at the International Timber Bridge Conference held in September 2010 in Lillehammer, Norway. CSU affiliate faculty member Jenő Balogh presented a paper on the testing and numerical modeling of wood-concrete composite beams and decks which included MPC research results on using reclaimed utility poles in timber-concrete bridges, as well as an update on the ongoing research on the fatigue behavior of such members. The MPC fatigue research conducted at CSU by Balogh and CSU assistant professor Rebecca Atadero is performed in coordination with work done at University of Sassari, Italy, and University of Stuttgart, Germany.

Faculty and students participate in TRB Annual Meeting

MPC faculty, staff and students participated in the Transportation Research Board's 90th Annual Meeting, held January 23-27, 2011, in Washington, D.C. With more than 4,000 presentations in nearly 650 sessions and workshops, the meeting addressed topics of interest to all attendees—policy makers, administrators, practitioners, researchers, and representatives of government, industry, and academic institutions. The conference theme for 2011 was Transportation, Livability, and Economic Development in a Changing World.

George Huntington and Khaled Ksaibati, both of the University of Wyoming, authored "Unsealed Gravel Road Management System Programming and Data Management," which summarizes the processes a programmer or data manager should go through when assisting with implementing or upgrading an unsealed gravel roads management system (GRMS). To address this issue, eight dirt and gravel road maintenance tasks are proposed. Huntington and Ksaibati also collaborated on "Unsealed Gravel Road Management: State of the Practice in American Counties," providing insights into the current state of unsealed dirt and gravel roads management, with a particular emphasis on the rural counties of the American west.

"Recycled Asphalt Pavement in Gravel Roads," written by Scott Koch, University of Wyoming, and Ksaibati, explored the use of recycle asphalt pavement as a dust suppressant on gravel roads.

Stephen Boyles, University of Wyoming, presented "Comparison of Interpolation

Methods for Missing Traffic Volume Data" in a session focused on "Achieving Quality Traffic Data: Opportunities for Improvement."

Boyles, along with Ruoyu Liu and Promotes Saha of the University of Wyoming, wrote "Pricing Model for Rural Roadway Networks Incorporating Pavement Deterioration and Repair." The paper presented a model for roadway tolling in rural areas based on vehicle type to generate revenues for rural roadways.

Ksaibati, along with Burt Andreen and Cody Kalivoda of the University of Wyoming, authored "Establishing Default Speed Limits on Gravel Roads," which offered the findings of a study on gravel roads to determine if speed limits should be altered for safety.

"Development of Knowledge Tables and Learning Outcomes for the Introductory Course in Transportation Engineering," presented by Rhonda Young of University of Wyoming along with several other educators, describes the "core concepts" that should be covered in introductory transportation engineering courses. The hope is that these concepts will provide educators some guidance for course content.

"Subnetwork Trip Table Generation with Bush-Based Sensitivity Analysis," written by Boyles offers an approach for replacing a regional traffic network with a smaller network that contains the subnetworks and zones and the paper gives a cost estimating function for this.

Dr. Francis Ting, professor of civil and environmental engineering at SDSU, presented 1" Simplified Approach to Generating Hydrographs and Estimating Probability of Scour Depth Exceedance for Pier Scour Predictions in Ungaged Streams Using the SRICOS Method." The paper was co-authored by graduate student Ryan Larsen, and Dr. Allen Jones.

Xiao Qin and Adam John Wellner, both of South Dakota State University, wrote "GISbased Highway Safety Metrics Implementation and Evaluation" in a session focusing on "Advancements in Quantification of Highway Safety Performance."

Qin, along with Soyoung Jung of the University of Seoul, South Korea and David A. Noyce of the University of Wisconsin-Madison, wrote "Modeling Highway Safety and Simulation in Rainy Weather." Their research comprehensively examined the safety impacts of rainy weather conditions on multi-vehicle crash frequency and severity and validated the impact on traffic operations through micro-simulation modeling.

"Cycle-by-Cycle Queue Length Estimation for Signalized Intersections Using Sampled Trajectory Data" presented by Qin and several others uses critical points that represent changing vehicle dynamics to propose an improved queue length estimation model based on trajectory data. Queue length estimation is important in measuring intersection performance.

Hesham Mahgoub, Ali A. Selim, and KC Pramod, of SDSU, wrote "Quantitative Assessment of Local Rural Road Safety: Case Study." The paper looks at ways to improve the safety performance of local rural roads in South Dakota by analyzing the crash occurrence and potential safety treatments.

Qin and University of Wisconsin researchers Ghazan Khan, Andrea Bill and David Noyce authored "Comprehensive Safety Evaluation of Roundabouts in Wisconsin." The research aimed to use data to develop crash prediction models that can serve as guidelines and best practices for other states in understanding roundabout safety.

Dr. Peter T. Martin of the University of Utah and James Mulandi of Resource Systems Group, Inc. wrote, "Quantifying the Benefit of Retiming Traffic Signals Through Multiple Regression." Regression models were presented that can be utilized to estimate the benefit of retiming signals.

Milan Zlatkovic of the University of Utah, in conjunction with Martin and Aleksandar Stevanovi of Florida Atlantic University authored, "Predictive Priority for Light Rail Transit: University Light Rail Line in Salt Lake County, Utah." The paper assesses the operational implementation of predictive light rail priority strategies through micro-simulation.

NDSU's Jeremy Mattson presented "Transportation, Distance, and Health Care Utilization for Older Adults in Rural and Small Urban Areas." His study estimates the impacts of transportation and travel distance on utilization of health care services for older adults in rural and small urban areas.

“Technology Adoption by Small Urban and Rural Transit Agencies,” written by David Ripplinger and Bethany Brandt-Sargent of the Upper Great Plains Transportation Institute and Jill Hough of North Dakota State University, uses national survey data from transit agencies to better understand the use of technology in small urban and rural transit agencies.

“Front Seat Placement of Children Aged 12 or Younger Within Vehicles: Rural-Urban Comparison” by Andrea Huseh of NDSU analyzed rural and urban differences in child seat placement within vehicles.

Doctoral student Thanh Q. Le at the University of Utah presented “Freeway Mainline Safety Effects of Interchange Ramp Spacing.” The paper was part of a workshop designed to examine the challenges of implementing geometric designs in the real world. R.J. Porter from the University of Utah discussed safety issues at the workshop.

Porter also presented “Exploring the Relationship between Macroscopic Speed Parameters, Road Geometrics, and Traffic Control: An Empirical Study during Low-Volume Conditions in Construction Work Zones. The paper examined the interaction of speed, road geometry, and traffic control in construction work zones.

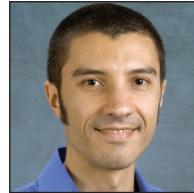
Key faculty



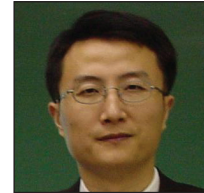
Atadero



Balogh



Carraro



Chen

Colorado State University

University Program Director

Dr. Rebecca Atadero is an assistant professor in the area of structural engineering in the Department of Civil and Environmental Engineering at Colorado State University. She earned her bachelor's degree in civil engineering from Colorado State University. Atadero's master's and doctoral degrees are from the University of California in structural engineering. She developed research interests in the areas of fiber reinforced polymer composites (FRP) for civil engineering; structural reliability methods and reliability-based design; and transportation structures while working on her dissertation studying the development of load and resistance factor design (LRFD) for externally bonded FRP reinforcement for concrete bridges at the University of California, San Diego. At CSU, Atadero has continued to study reliability considerations for design with RTP materials, while also conducting research in new areas including development of sustainable materials. She has studied the use of coal fly ash for the manufacture of building products and in a new project is studying concretes made with high volumes of fly ash.

Dr. Jenó Balogh is an affiliate faculty member in the Department of Civil and Environmental Engineering. He has B.S. and Ph.D. degrees from Budapest University of Technology and Economics (Hungary). Presently, he is an assistant professor at Metropolitan State College of Denver, teaching in structural engineering. His research interests are computational mechanics, CAD, steel structures, and timber structures. Dr. Balogh is involved in several MPC projects including composite repair of

bridge members, laboratory studies of timber railroad bridge members, and layered wood-concrete systems among others. He also teaches advanced finite element modeling using commercial software.

Dr. Antonio Carraro is an assistant professor in the Department of Civil and Environmental Engineering. He earned his B.S. and M.S. degrees from Universidade Federal do Rio Grande do Sul. He earned his Ph.D. degree from Purdue University. Dr. Carraro has extensive experience on laboratory testing of geo-materials and has served as a consultant for the Department of Public Works in Brazil. He is a member of the International Society for Soil Mechanics and Geotechnical Engineering, the American Society of Civil Engineers, and the Earthquake Engineering Research Institute. His research interests include soil behavior and experimental methods, geotechnical earthquake engineering, foundation engineering, and beneficial use of waste materials.

Dr. Suren Chen is an assistant professor in the Department of Civil and Environmental Engineering. He holds a Ph.D. degree from Louisiana State University where he earned the Michael A. Clause Memorial Outstanding Ph.D. student award. His doctoral dissertation was "Dynamic Performance of Bridges and Vehicles under Strong Winds." His research interests include performance of transportation infrastructure and vehicles under natural hazards, natural hazards using GIS, new materials application and health monitoring, and structural control of vibrations. He has worked on projects funded by the National Science Foundation, the National Research Council-NCHRP IDEA program, and the FHWA-IBRC program. Prior to accepting the CSU appointment, he was a civil engineer with Michael Baker Jr. Corporation, a major international firm.



Criswell

Dr. Marvin Criswell is professor of civil engineering and the associate department head for academic affairs in the Department of Civil and Environmental Engineering. He earned a B.S. degree from the University of Nebraska, Lincoln, and M.S. and Ph.D. degrees from the University of Illinois Urbana- Champaign. He served as an ABET engineering accreditation visitor and has served on the ASEE Board of Directors, as geographic zone (Zone IV) chairman, and as chairman of the ASEE Civil Engineering Division. His research interests include development of buildings and design code provisions related to reinforced concrete. Marvin advises on MPC supported research on composite wood/ concrete bridge systems and timber trestle railroad bridges. He assists with graduate education activities on the TLN network.

Dr. Richard Gutkowski is a professor emeritus of civil engineering at CSU. He has B.S. and M.S. degrees in civil engineering from Worcester Polytechnic Institute and a Ph.D. from the University of Wisconsin- Madison. Gutkowski was formerly MPC program director at CSU and was director of the Structural Engineering Laboratory at CSU's Engineering Research Center. He managed research, graduate education, technology transfer, summer diversity research activities, and student internship programs. He has published and presented more than 160 papers and reports and guided numerous theses and dissertations. Gutkowski wrote "Structures: Fundamental Theory and Behavior" (two editions) and co-authored the chapter "Composite Construction in Wood and Timber" in the Handbook of Composite Construction.

Dr. Paul Heyliger has been on the faculty of the Department of Civil and Environmental Engineering for 15 years. He was awarded his Ph.D. in engineering mechanics from Virginia Tech and subsequently did a two-year National Research Council post-doctorate at the National Bureau of Standards. He has been a visiting faculty at the University of California at Santa Barbara, the University of Stuttgart, and the University of Hamburg. His primary research interests are in structural mechanics and analysis with special applications to highly flexible structural elements for energy absorption with application to transportation structures and crash barriers. He has more than 60 refereed journal articles and has been presented with several teaching awards.



Gutkowski



Heyliger



Liu

His research sponsors include the USDOT, National Science Foundation, NASA, USDA, the Army Research Office, AFOSR, and NIST.

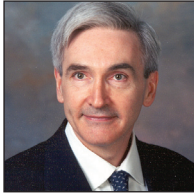
Dr. Juhua Liu is a research scientist in the Department of Civil and Environmental Engineering. Liu's research and teaching interests are in the areas of off-road vehicle engineering, power and machinery systems, biological and agricultural engineering technology, instrumentation and sensor, control and system engineering, precision farming, GPS/GIS application in engineering. Liu holds a B.S. degree from Jiangsu Institute of Technology, an M.S. from Wageningen University and a Ph.D. from CSU.

Dr. Hussam Mahmoud is an assistant professor in the Department of Civil and Environmental Engineering with expertise in the field of structural engineering. He received his bachelor's and master's degrees from the University of Minnesota and his Ph.D. from the University of Illinois at Urbana-Champaign (UIUC). His research at UIUC focused on conducting system-level seismic assessment of steel frames with energy dissipative connections using hybrid simulation and nonlinear dynamic time-history analysis. Hussam was also involved with various other projects at UIUC as manager of the Mutli-Axial Full-Scale Sub-Structured Testing and Simulation facility. Hussam conducted various small-scale and large-scale experimental testing and evaluating complex control algorithms and loading protocols used in the tests. Before arriving at UIUC, he was a research scientist at the ATLSS Research Center at Lehigh University. At Lehigh, he worked on fatigue and fracture evaluation of steel bridges and focused on field monitoring and nonlinear finite element analysis.

Dr. Don Radford is an associate professor in the Department of Mechanical engineering. He earned his B.S. in mechanical engineering and his M.S. in metallurgical engineering from the University of British Columbia. He earned his Ph.D. in materials engineering from Rensselaer Polytechnic Institute. His research interests include process-induced distortion in composites, viscoelastic constitutive modeling, advanced polymer processing, and polymer foams, damage assessment and repair of composites and high temperature composites.



Radford



Tolliver



Vachal



Benson



Berwick

North Dakota State University

MPC Director

Dr. Denver Tolliver is director of the Mountain-Plains Consortium. He is also associate director of UGPTI, where he has been employed since 1980. Before joining the faculty of NDSU, Tolliver was a rail planner for the North Dakota Department of Transportation. He has been the director of the Mountain- Plains Consortium since 1997. Moreover, he is the director of the Transportation & Logistics graduate program at NDSU– which includes an interdisciplinary Ph.D. in Transportation & Logistics (TL) and a Master of Managerial Logistics degree. He is a member of the Interdisciplinary Program Directors group at NDSU and coordinates the TL program with the transportation degree options in agribusiness and applied economics and civil engineering. Tolliver holds a baccalaureate degree in geography from Morehead State University and a master of urban and regional planning and a Ph.D. in environmental design and planning from Virginia Polytechnic Institute & State University. His primary research interests are: highway economics and planning, railroad planning and capacity analysis, cross-modal impact assessment, and energy and environmental analysis.

University Program Director

Dr. Kimberly Vachal is an advanced research fellow for UGPTI and works with local, regional, and national freight groups to identify logistical opportunities and assess policy implications. Her work focuses on promoting a competitive logistical system that will enhance the position of the region's products in both domestic and export markets. In addition, Vachal has completed many research studies on grain and oilseed transportation issues, and she has worked on a number of projects in cooperation with the USDA. She has published more than 30 research papers and journal articles related to agricultural logistics and rural economic development. She also directs the UGPTI's Rural Transportation Safety

and Security Center. Vachal received M.S. and B.S. degrees in agricultural economics at North Dakota State University. She received her Ph.D. in Public Policy from George Mason University in 2004.

Doug Benson is an associate research fellow at the UGPTI. Benson earned B.S. degrees in psychology, history, education, and computer science from the University of North Dakota in 1978, 1986, 1987, and 1988 respectively. He earned his M.S. in computer science from North Dakota State University in 1996. Some of his recent research involvements include development of a database management system for the American short line railroad industry, software analyst for a branch line benefit/cost modeling system, and Uniform Rail Costing System (URCS) analyst for the study of time-series grain railroad revenue/cost ratios. He also served as executive director for TEL8 (now TLN) from 1997 to 2004. His research interests include computerized transportation analysis, railroad operations, transportation database, and GIS transportation applications.

Mark Berwick has been involved with the UGPTI since 1995, specializing in the areas of logistics and transportation management, specifically in the areas of motor carrier costing, economic development, and business logistics. Most recently, he has been involved in studying cross-border transportation issues and intermodal transportation challenges and issues in North Dakota and surrounding states and provinces. Additional research has focused on motor carrier economics, the logistics of the North Dakota potato industry and characteristics of the farm truck fleet in the Upper Great Plains states. Berwick is the director of the UGPTI's Agriculture, Energy and Industrial Freight Center. Berwick holds master's and bachelor's degrees in agricultural economics from North Dakota State University.



Bitzan



Brachman



Dybing



Hough



Huseth-Zosel

Dr. John Bitzan is an assistant professor of management. He earned his B.S. degree in economics from St. Cloud State University, his M.A. in applied economics from Marquette University, and his Ph.D. in economics from the University of Wisconsin – Milwaukee, where he specialized in industrial organization and labor economics. Before joining the College of Business, he worked as a transportation economist with the UGPTI and an adjunct professor in agricultural economics.

Jarrett Brachman previously worked for the Central Intelligence Agency and West Point and has one published book on terrorist strategies. He received his undergraduate degree in government and international affairs from Augustana College in 2000 and went on to receive his master's and Ph.D. from the University of Delaware in political science and international relations. It was during his time at the University of Delaware that the attacks on the Twin Towers occurred. The attacks sparked Brachman's interest in why the event happened and what he could do to keep it from happening again. He is establishing a center for transportation and homeland security and teaches courses in the transportation and security fields for the master's of managerial logistics program.

Alan Dybing is an associate research fellow at the UGPTI. He is working toward his Ph.D. in transportation and logistics from NDSU. He earned his M.S. in agribusiness and applied economics and his B.S. in agricultural education from NDSU. He is a member of the Transportation Research Forum and has been doing research relating to the HERS-ST analysis of the North Dakota Highway System, the NDDOT rail plan update, economic impacts of transportation in North Dakota, and truck trip generation of large elevators in North Dakota.

Dr. Jill Hough is an advanced research fellow at the UGPTI and the director of UGPTI's Small Urban & Rural Transit Center (SURTC), which focuses on research, education, and training for the public transportation industry. She earned her Ph.D. in the transportation technology and policy program at the University of California - Davis. She earned B.S. and M.S. degrees in agricultural economics at NDSU. She has published more than 35 reports and journal articles in the areas of public transportation, low-volume roads, logistics, and economic development. Her primary research areas presently relate to mobility of the elderly and disadvantaged as well as transit planning and management. She serves on the National Academies of Science Transit Cooperative Research Program Oversight Project Selection Committee and the National Transit Institute Board of Directors at Rutgers University in New Jersey.

Andrea Huseth-Zosel joined the Upper Great Plains Transportation Institute as an associate research fellow at UGPTI. She was previously a research analyst with MeritCare Health System in Fargo, ND. Huseth-Zosel holds a B.S. in secondary social studies education from Minnesota State University-Moorhead and B.A. and M.S. degrees in sociology from North Dakota State University. She is working with the UGPTI's Rural Transportation Safety and Security Center which promotes and enhances the region's transportation safety and security through research, education, and outreach. Her work focuses primarily on studying and enhancing rural traffic safety by addressing driver behavior issues. She is currently involved in an MPC project partnering with the NDSU Extension Service that is designed to raise awareness and reduce traffic deaths and injuries for North Dakota youth through a pilot educational program.



Lantz



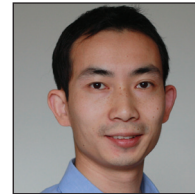
Wehbe



Jones



Mahgoub



Pei

Dr. Brenda Lantz is an associate research fellow at the UGPTI and is the program director for the Transportation Safety Systems Center. She earned her Ph.D. in business administration and supply chain and information systems at Pennsylvania State University in 2006. She also received a M.S. in applied statistics and a B.S. in sociology from NDSU. She specializes in the areas of intelligent transportation systems for commercial vehicle operations, business logistics and commercial vehicle safety - subjects on which she has authored and presented numerous articles.

South Dakota State University

University Program Director

Dr. Nadim Wehbe is an associate professor in the Department of Civil & Environmental Engineering, the director of the Mountain-Plains Consortium Program at SDSU, and the coordinator of the J. Lohr Structures Laboratory. He earned a B.E. in civil engineering from the American University of Beirut in 1980. He earned a M.S. and Ph.D. in civil engineering from the University of Nevada – Reno in 1992 and 1997 respectively. His areas of research interest relate to reinforced and pre-stressed concrete structures, earthquake resistant bridges, and advanced composites structural systems.

Dr. John Ball is part of the Department of Horticulture, Forestry, Landscape & Parks. He earned a B.S. in forest management from Michigan Technological University. He earned a M.S. and Ph.D. in forest entomology from Michigan State University. His areas of research interest include the influence of urban development on forest fragmentation; the influence of tree cover on residential heating and cooling cost; the competitive

relationships between ornamental trees and turf grasses; and industry training opportunities such as utility line clearance electrical hazards, logger education to advance professionalism (LEAP), and plant health care for arborists.

Dr. Allen Jones is an associate professor in the Department of Civil & Environmental Engineering. He earned his B.S. and M.S. in geological engineering, geotechnical option from the University of Idaho. He earned his Ph.D. in civil engineering from the University of Washington. His research interests include the following: probabilistic seismic hazard assessments, liquefaction induced ground damage, paleoliquefaction, time series analysis, probability and spatial statistics, lateral earth pressures and earth retaining structures, abandoned mine lands (AML) reclamation, AML data integration, and mine subsidence.

Dr. Hesham Mahgoub joined the Department of Civil and Environmental Engineering at SDSU as an assistant professor soon after the university became a partner in MPC. His previous research work includes virtual commercial vehicle inspection stations, sustainable infrastructure development for rural communities, pavement materials and construction, infrared technology in pavement evaluation, and recycled materials properties. Before joining SDSU in August 2006, Mahgoub was a visiting professor at the University of Central Florida in Orlando from 2001 until 2006. Mahgoub has a B.S., M.S., and Ph.D. degrees in civil engineering, all from the Cairo University, Egypt.

Shiling Pei, PE, joined SDSU in August 2010 and is currently an assistant professor of civil and environmental engineering. He obtained his BS in civil engineering from Southwest Jiaotong University, Chengdu, China, and his Ph.D. degree in civil engineering (structural engineering) at CSU. Prior to joining the SDSU faculty, Pei was



Reid

a post-doctoral researcher at CSU working on performance-based seismic design of residential structures. He developed the Seismic Analysis Package for Woodframe Structures (SAPWood), which was designed for seismic performance evaluation of North American light-frame wood buildings. He also served a critical role in supervising the design, planning, and shake table testing of the 17,000-squarefoot, seven-story, wood-steel hybrid building at Japan's E-defense facility (world's largest shake table) as part of the NSF (NEESR) funded NEESWood project. Pei's main research interests are seismic resiliency of infrastructure systems, structural safety and reliability under extreme loads and harsh environments, large scale structural testing, and performance based engineering. He is a member of American Society of Civil Engineers and serves on ASCE technical committee on design of wood structures. He is also a licensed professional engineer in California.

Dr. Richard Reid has extensive experience in design and construction of rigid pavement. He is investigating optimized design and construction methods of concrete pavement for South Dakota highways. The study, which will extend over a period of three years, is co-sponsored by South Dakota Department of Transportation and SDSU. Reid is the assistant dean of engineering and professor of civil and environmental engineering at SDSU. He has a B.S. in civil engineering from the Citadel, and his M.S. and Ph.D. degrees in civil engineering were earned at The Georgia Institute of Technology. He spent 13 years serving as an engineering officer in the US Air Force where he developed experience as an environmental, pavement and research engineer. His previous research includes investigating the effects of explosions on reinforced soil systems, performance of integral bridge abutments, pavement maintenance and soil testing. Since coming to SDSU in 1995, Reid



Sigl

has served as a civil engineering faculty member, interim department head and assistant dean. He has been named College of Engineering Teacher of the Year three times and was also recognized as Brookings Area Educator of the Year. He is a licensed professional engineer and also serves in the South Dakota Air National Guard.

Dr. Arden Sigl is a professor in the Department of Civil & Environmental Engineering. He received his B.S. and M.S. in civil engineering. He earned his Ph.D. in civil engineering from Northwestern University. His research has been in areas relating to concrete materials, high-performance concrete, instrumentation and assessment of the performance of full-scale structures, non-linear structures, and structural stability. Sigl retired in 2009.

Xiao Qin joined SDSU faculty and is leading a MPC project to develop a safety screening tool for the identification of high-risk rural roads with the aid of computer techniques, GIS, and statistical modeling. Qin is an assistant professor of civil and environmental engineering. He holds B.S. and M.S. degrees in civil engineering from Southeast University, Nanjing, China, and a Ph.D. degree in civil engineering (Transportation and Urban Engineering) from the University of Connecticut. Prior to joining the SDSU faculty, Qin was an assistant scientist at the University of Wisconsin-Madison where he managed the traffic safety program at the UW Traffic Operations and Safety Laboratory. Qin also spent two years working as an ITS/safety engineer for Maricopa Associations of Governments (MAG) in Phoenix, AZ. Qin's main research interests are traffic operations and safety, statistical modeling and application in transportation, GIS and GPS application and spatial data analysis, and sustainable transportation planning. He is a member of the Institute of



Qin



Ting



Martin

Transportation Engineers, the American Society of Civil Engineers, Intelligent Transportation Systems America and is a licensed professional engineer in Arizona.

Dr. Francis Ting is a professor in the Department of Civil & Environmental Engineering. He earned his B.S. in civil engineering from the University of Manchester Institute of Science and Technology. He received his M.S. and Ph.D. from the California Institute of Technology. His research interests include breaking waves, fluid turbulence, sediment transport, bridge scour, and open-channel hydraulics.

University of Utah

University Program Director

Dr. Peter T. Martin earned a B.S. degree in civil engineering from the University of Wales in 1975, an M.S. degree in transportation engineering from the University of Wales in 1987 and a doctorate in "Real-Time Transportation Modeling" from the University of Nottingham, England, in 1992. From 1975 to 1984, he practiced as a civil engineer in highway planning, design and construction. He has built the "Utah Traffic Laboratory," which allows real-time connection to the Utah DOT ITS Traffic Operation Center. Currently, Martin is working on innovative funding methods through Intelligent Transportation Systems, and modeling and evaluation of Advanced Adaptive Traffic Signal Control Systems.

Dr. R.J. Porter joined the University of Utah's Civil and Environmental Engineering Department as an Assistant Professor in July 2009. He comes to Utah following two years of post-doctoral research work at the Texas Transportation Institute of the Texas A&M University System. Dr. Porter holds a B.S. (1999), M.Eng. (2000) and Ph.D. (2007) in



Porter



Tikalsky

Civil Engineering from The Pennsylvania State University. He was a full-time research assistant at the Pennsylvania Transportation Institute during completion of his doctoral degree. Prior to that, Dr. Porter was a Research Associate at the Virginia Tech Transportation Institute in Blacksburg, Virginia and a Research Assistant at the Last Resource Inc., in Bellefonte, Pennsylvania. Dr. Porter is a member of the Transportation Research Board (of the National Academies) Operational Effects of Geometrics Committee [AHB65] and Chair of the Subcommittee on Performance-Based Analysis of Geometric Design [AHB65(3)]. He was honored as a Leadership Fellow of the Eno Transportation Foundation in May 2005. He was also recognized at the 2006 Council of University Transportation Centers Awards Banquet as the Student-of-the-Year for the Mid-Atlantic Universities Transportation Center.

Dr. Paul J. Tikalsky is professor and chair of the Department of Civil & Environmental Engineering. He joined the University of Utah in that position in 2006. Previously, he was professor of civil and environmental engineering at Pennsylvania State University, deputy director of the Pennsylvania Transportation Institute at Penn State; senior research fellow at the Czech National Academy of Sciences, and associate professor of civil engineering at Santa Clara University. He is a registered professional engineer in the State of California and a Fellow of the American Concrete Institute (ACI). He received his B.S. degree in civil and environmental engineering from the University of Wisconsin at Madison and his M.S. and Ph.D. degrees in structural engineering from the University of Texas at Austin. Tikalsky's research is in the area of the development and implementation of higher durability concrete structures and the use of admixtures and supplementary cementitious materials.



Zhou



Ksaibati



Barker



Boyles

Xuesong Zhou is an assistant professor in the Department of Civil and Environmental Engineering at the University of Utah. He received his Ph.D. degree in civil engineering from the University of Maryland in 2004. Prior to joining the University of Utah, Zhou worked as a traffic data architect and senior software engineer at Dash Navigation Inc., designing and developing real-time traffic estimation and prediction algorithms for the first commercialized internet-connected GPS navigation system in the United States. Zhou's research interests include modeling and simulation of dynamic traffic systems, estimation and prediction of network traffic conditions using advanced sensor technologies. For the past seven years, he has been assisting the FHWA to develop and provide technical support for a large-scale simulation-based dynamic traffic assignment system, namely DYNASMART-P, which is one of FHWA's 24 priority, market-ready technologies and innovations.

University of Wyoming

University Program Director

Dr. Khaled Ksaibati received a B.S. degree in civil engineering from Wayne State University. He later completed his M.S. degree and Ph.D. from Purdue University. Ksaibati has been a member of the civil engineering faculty at the University of Wyoming since 1990. He started his academic career as assistant professor and was promoted in 1997 to associate professor. He was promoted to the rank of full professor in 2001. Ksaibati is director of the Wyoming DOT Certification program at the UW. Between 200 and 250 highway professionals are certified every year in aggregate, asphalt, and concrete studies. He is a member of five Transportation Research Board committees dealing with various aspects of pavement. Ksaibati is the author or co-author of more than 29 technical refereed papers primarily in the areas

of pavement design, performance, maintenance, and rehabilitation. Ksaibati also is the author or co-author of 33 other publications.

Dr. Michael Barker is a professor of civil engineering. He specializes in steel bridges and bridge engineering and also does experimental and field testing. Barker's research centers on bridge serviceability and performance. Barker received his B.S. in civil engineering from Purdue University. Also at Purdue, he earned his M.S. in civil engineering. He received his Ph.D. in civil engineering from the University of Minnesota.

Stephen Boyles joined the Department of Civil and Architectural Engineering as an assistant professor in the Department of Civil and Architectural Engineering in August 2009. He is originally from the Seattle area and earned degrees in civil engineering and mathematics from the University of Washington in 2004. He was an intern with the Washington State Department of Transportation, working at a traffic management center where he gained experience in ITS operations, working with ramp meters, variable message signs, and recording highway advisory radio messages and traffic reports on WSDOT's hotline. He earned his master's and Ph.D. from the University of Texas, focusing network analysis and transportation planning under uncertainty. He was also involved in several projects with the Texas Department of Transportation on incident management, traffic data archiving, and large-scale simulation of the Austin metropolitan area. Boyles says the most exciting part of transportation research is its multidisciplinary nature, bringing together economics, mathematics, electrical engineering, structural and geotechnical engineering, psychology, public policy, statistics -- and a host of other fields -- in order to solve highly practical and urgent problems in society. Within all of these fields, his primary interests are in planning



Edgar

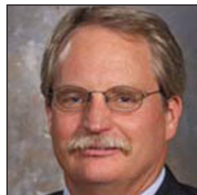
and optimization. He is interested in the possibility of developing a very large-scale simulation model, perhaps encompassing an entire state or multistate region, combining aspects of dynamic assignment planning models and operational microsimulators. Recent advances in mesoscopic traffic modeling and in computing make such a large-scale model feasible in rural areas such as those comprising most of the MPC states, and can allow the statewide impacts of different alternatives to be measured, as well as making planning and operations models more consistent with each other.

Another topic of interest is roadway tolling, which is especially topical as states are struggling to find alternate revenue streams at a time when freight volumes are increasing. This is especially important in the MPC region, which is crossed by several major trucking corridors, and also because relatively little research has been done on how roadway tolling uniquely impacts rural regions.

Dr. Boyles conducts research in transportation network analysis, infrastructure management, and the application of optimization techniques to transportation problems.

His research has been recognized by awards from the Institute of Transportation Engineers and Council of University Transportation Centers, and his doctoral studies were supported by a fellowship from the Federal Highway Administration.

Dr. Thomas V. Edgar works with flow, deformation and pollutant migration in saturated and unsaturated porous media, slope stability, and expansive soils. An associate professor in the College of Engineering, Edgar recently worked with soil additives for unpaved road stability and long-term maintenance, investigated effects of freeze and thaw on highway soils, studied protection of wellhead areas for public water supplies and conducted research on consolidation of partially saturated soils due to applied stress, moisture and thermal gradients. His B.S. degree is from



Puckett



Wilson



Young

the University of Colorado and his M.S. and Ph.D. are from Colorado State University, all in civil engineering.

Dr. Jay A. Puckett is a professor of civil engineering and a licensed engineer who has worked in research and development for 22 years. He was a subconsultant in the development of the LRFD Bridge Design Specification. Puckett has conducted numerous research projects in the area of software development and physical testing of bridges and bridge components ranging from lightly reinforced bridge decks, fiber-reinforced approach embankment fills, asphalt joints, temperature effects and wood girders. Software development efforts include analysis, design and rating tools for steel, concrete, pre-stressed concrete and wood. He has been honored with research, graduate teaching and Most Outstanding Professor awards. His B.S. degree is from the University of Missouri and his M.S. and Ph.D. degrees are from Colorado State University, all in civil engineering.

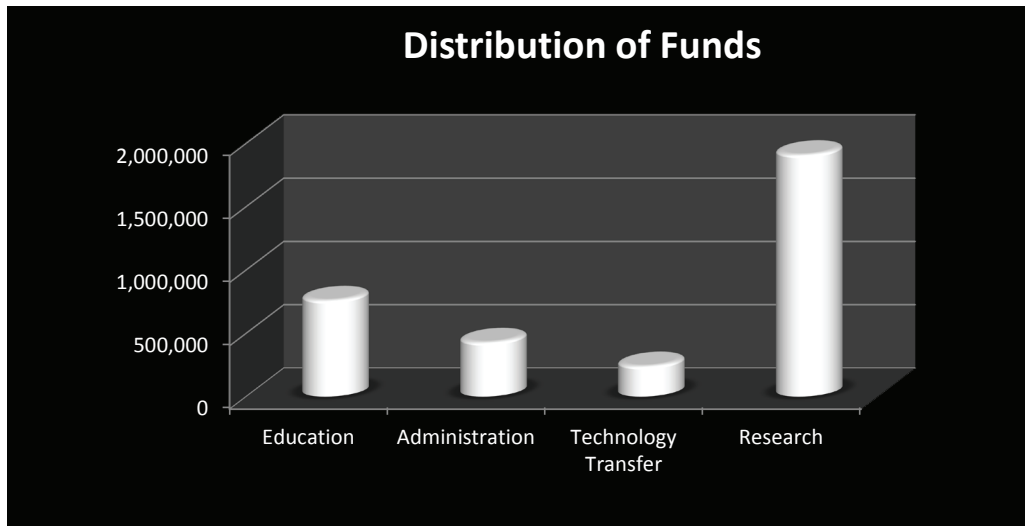
Dr. Eugene M. Wilson is professor emeritus of civil engineering and past program coordinator for the Mountain-Plains Consortium—Rural Transportation Research Program. Since 1975, he has been a traffic-engineering consultant working with both private and public sectors. Wilson is nationally certified as a Professional Traffic Operations Engineer. Named the 59th honorary member of ITE's international board of directors, he also earned the ITE Lifetime Achievement Award for the Colorado-Wyoming section. His B.S. and M.S. degrees were earned at the University of Wyoming and his Ph.D. is from Arizona State University, all in civil engineering. Iowa, Wyoming, and Colorado awarded him status as a professional engineer.

Dr. Rhonda K. Young is an assistant professor of civil engineering. Her research interests include transportation decision-making, statewide multimodal planning, and freight transportation. Her research efforts in transportation decision-making and multimodal planning stem from her work with the Washington State Department of Transportation in developing a computer-based tool to aid in funding decisions entitled Multimodal Investment Choice Analysis (MICA). Young's general interests in this area focus on methods to increase the efficiency of agency spending toward transportation infrastructure. Her work in the area of freight transportation deals with freight mobility issues and how freight transportation stakeholders can be brought into the statewide planning process. She received her bachelor degree in civil engineering from Oregon State University, master's and Ph.D. degrees in civil engineering from the University of Washington, and has a graduate certificate in transportation, trade, and logistics (GTTL) from the University of Washington.

University of Wyoming Staff

George Huntington works with the Wyoming T2/ LTAP Center where he has taught workshops on erosion and sediment control, soils, work zone traffic control, pavement design, and other topics. He has also worked extensively on the Center's asset management project. Huntington received his bachelor's and master's degrees in civil engineering from the University of Wyoming. He spent eight years with WYDOT, including five years as a materials engineer in Cheyenne and three years as a project engineer in Sundance and Rawlins.

Resources and Funding | July 1, 2010 – June 30, 2011



Funding Sources

North Dakota Department of Transportation
Utah Department of Transportation
Wyoming Department of Transportation
Colorado State University
North Dakota Wheat Commission
South Dakota Department of Transportation
Utah Transit Authority
North Dakota State University
Fargo-Moorhead Council of Governments
Safe Kids Fargo/Moorhead
Meritcare
North Dakota Department of Health
Safe Communities of the Red River Valley
AAA
South Dakota State University
University of Utah
University of Wyoming
Upper Great Plains Transportation Institute
Colorado Department of Local Affairs
BNSF Railroad
TLN Telecommunications Network (includes the NDDOT, WYDOT, MTDOT)

Research Project Status

New Research Projects

MPC-339	MEPDG Analysis of ESR Subgrade Stabilized with Off-Specification Fly Ash (CSU, A. Carraro)
MPC-340	Long Term Performance of FRP Repair Materials (CSU, R. Atadero)
MPC-341	Off-grid MEMS Sensor Configurations for Transportation Structures (CSU, P. Heyliger)
MPC-342	Seismic Vulnerability Analysis of Bridges in Mountainous States (CSU, S. Chen)
MPC-343	Laboratory Testing of Innovative Steel Bridge Designs (CSU, R. Atadero)
MPC-344	What Can We Learn About Making Driving Safer for Teen Drivers from Crashes in Three Rural States? (NDSU, K. Vachal)
MPC-345	Systems Analysis to Improve Local Road Safety; Phase I (NDSU, K. Vachal)
MPC-347	Misinformation Contributing to Safety Issues in Vehicular Restraints for Children (NDSU, A. Huseth-Zosel)
MPC-349	Modeling, Analysis and Evaluation of Urban Arterial Work Zone (NDSU, A. Varma)
MPC-350	Modeling and Evaluation of Traffic Signal Preemption near Railroad Crossings in Small Urban Areas (NDSU, A. Varma)
MPC-351	Concrete Structure Design Alternatives for Rural State and Local Roads (SDSU, N. Wehbe)
MPC-352	Evaluation of Ice Loads on Bridge Piers in South Dakota (SDSU, S. Pei)
MPC-353	Comparing Crash Trends and Severity in the MPC Region (UWY, K. Ksaibati)
MPC-354	Geotechnical Limit to Scour at Spill-Through Abutments (UWY, R. Ettema)
MPC-355	Quantifying the Impact of Very High Heavy Vehicle Proportion on Rural Freeways (UWY, S. Boyles)
MPC-356	Truck Size and Weight Education (NDSU, M. Berwick)
MPC-357	Freight Railway Track Maintenance Cost Model (NDSU, D. Tolliver)
MPC-358	Connecting Supply Chain Interregional Freight Flow (NDSU, D. Tolliver)
MPC-359	Regional Roadway Surface Management Guidance Documents (NDSU, D. Tolliver)
MPC-360	Safety Impacts of Design Exceptions in Utah (UUT, R. Porter)

On-going Research Projects

MPC-179	Full-Scale Laboratory Testing of a Timber Railroad Bridge (CSU, R. Gutkowski)
MPC-193	Rigorous Computer Modeling of Timber Trestle Railroad Bridges (CSU, R. Gutkowski)
MPC-207	An Evaluation of Region 8 State Departments of Transportation and Metropolitan Planning Organizations' GIS Technology Application (NDSU, D. Benson)
MPC-248	Wyoming Freight Movement System Vulnerabilities and ITS (UWY, R. Young)
MPC-250	Interactive Effects of Traffic- and Environmental-Related Pavement Deteriorations (NDSU/UWY, D. Tolliver/K. Ksaibati)
MPC-262	Cambering of Wood-Concrete Highway Bridges (CSU, R. Gutkowski)
MPC-266	Small Urban and Rural Transportation - Phase II (NDSU, A. Smadi)
MPC-268	Accessing International Container Markets from the Northern Plains (NDSU, K. Vachal)
MPC-271	A Comprehensive Transportation Safety Evaluation Program in the State of Wyoming (UWY, K. Ksaibati)
MPC-277	Safety Factor Increase to Fatigue Limit States through Shear Spiking for Timber Railroad Bridge Rehabilitation (CSU, J. van de Lindt)
MPC-278	Bus-Stop Shelters - Improved Safety (CSU, W. Charlie)

MPC-281	The Assessment of Chloride Injury from De-Icing Salts in Trees Along State Highways in the Black Hills (SDSU, J. Ball)
MPC-287	Effectiveness of Using Recycled Asphalt Materials and other Dust Suppressants in Gravel Roads (UWY, K. Ksaibati)
MPC-290	A Comprehensive Transportation Safety Evaluation Program in the State of Wyoming (UUT, A. Stevanovic)
MPC-291	A New Generation of Emergency Escape Ramps (CSU, J. van de Lindt)
MPC-293	Development of GIS Multimodal Capacity Model for Northern Tier Freight Corridor (NDSU, S. Mitra)
MPC-294	Indian Reservation Roads (IRR) and Local Roads Modeling and Management Databases (NDSU, D. Benson)
MPC-297	Understanding Influence of Transportation and Other Factors on the Economic Growth on Non-metropolitan Cities (NDSU, K. Vachal)
MPC-300	Demand Estimation for Corn Transportation: A North Dakota Case Study (NDSU, A. Dybing)
MPC-301	Sustainable Concretes for Transportation Infrastructure (CSU, R. Atadero)
MPC-305	Jointed Plain Concrete (JPC) Design and Construction Review (SDSU, N. Wehbe)
MPC-306	Optimization of Pavement Marking Performance (SDSU, N. Wehbe)
MPC-308	Phase I: Pilot Project to Develop Rural Youth Occupant Protection Education Platform (NDSU, T. VanWechel)
MPC-309	Rural Road Signage: Simulated Driving to Evaluate Low-Cost Safety Improvements for Older Drivers (NDSU, K. Vachal)
MPC-310	Evacuation Modeling for Small to Medium Sized Metropolitan Areas (NDSU, S. Birst, M. Lofgren)
MPC-311	Forecasting Bridge Deterioration Rates and Improvement Costs (NDSU, S. Mitra, D. Tolliver, K. Johnson)
MPC-312	A GIS Model for Bridge Management and Routing (NDSU, S. Mitra, A. Dybing, K. Johnson, D. Tolliver)
MPC-315	Analysis of Compound Channel Flow with Two-Dimensional Models (SDSU, F. Ting)
MPC-316	Mitigation of Corrosion in CRC Pavement (SDSU, N. Wehbe, D. Medlin)
MPC-318	Investigating Crashes and Geometric Conditions in the State of Wyoming (UWY, K. Ksaibati)
MPC-320	Pricing Strategies for Rural Freeways (UWY, S. Boyles)
MPC-321	Salt Lake City Internship (UUT, P. Martin)
MPC-322	Driver Simulation (UUT, P. Martin)
MPC-325	Fatigue Testing of Wood-Concrete Composite Beams (CSU, J. Balough, R. Atadero)
MPC-327	Seismic Risk Assessment for the (-25/I-70 Corridor in the Mountain Plains Region of the U.S. (CSU, J. Lindt)
MPC-328	Low-Impact High-Toughness Transportation Barriers (CSU, P. Heyliger)
MPC-330	Integrate Supply Chain Model in Urban Freight Planning (NDSU, S. Mitra, D. Tolliver)
MPC-332	Estimation of the Generalized Truck Freight Elasticity of Demand: Case Study of the Seattle-Tacoma to Chicago Corridor (NDSU, A. Dybing)
MPC-333	Implementing Traffic Safety Evaluations to Enhance Roadway Safety (NDSU, J. Baker, K. Johnson, M. Berwick, K. Vachal)
MPC-334	Proper Seat Placement of Children Aged 4 to 12 within Vehicles (NDSU, A. Huseeth)
MPC-335	Misinformation Contributing to Safety Issues in Vehicle Restraints for Children (NDSU, A. Huseeth)
MPC-336	ND Wheat Transportation Knowledge for Market Enhancement (NDSU, K. Vachal, D. Benson)

MPC-337 Analysis of Freight Fuel Efficiency with Comparisons to Waterways and Truck Transportation (NDSU, D. Tolliver, D. Benson, P. Lu)

MPC Completed Research Projects

MPC-175 An Evaluation of ITS/CVO Application Technology in Logistics and Supply Chain Management (NDSU, B. Lantz) **MPC Report No. 06-186**

MPC-176 Road Dust Suppression: Effect on Maintenance, Stability, Safety and the Environment (CSU, T. Sanders) **MPC Report No. 04-156**

MPC-177 Moment-Rotation Tests of High Performance Steel (HPS) I-Girders (CSU, B. Hartnagel) **MPC Report No. 03-148**

MPC-178 Experimental Wood-Concrete Railroad Bridge (CSU, R. Gutkowski) **MPC Report No. 04-165**

MPC-180 North Front Range Transportation Research Internships (CSU, R. Gutkowski) **MPC Report No. 01-124**

MPC-181 University Transportation Survey (CSU, R. Gutkowski) **MPC Report No. 03-150**

MPC-182 Evaluating the Long Term Pavement Performance Data (UWY, K. Ksaibati) **MPC Report No. 02-130**

MPC-183 Defining a Road Safety Audit Program for Enhancing Safety and Reducing Tort Liability (UWY, E. Wilson) **MPC Report No. 00-113**

MPC-184 Accident Data Availability (UofU, P. Martin) **MPC Report No. 01-118**

MPC-185 Incident Detection Algorithm Evaluation (UofU, P. Martin) **MPC Report No. 01-122**

MPC-186 Evaluation of Road Weather Information System Data & Dissemination of Data to the Public (UofU, P. Martin) **MPC Report No. 01-119**

MPC-187 Survey of Educational and Human Capital Needs of the Transportation Construction Industry (NDSU, O. Salem) **MPC Report No. 02-134**

MPC-188 An Evaluation of the Impacts of ITS/CVO Technologies Throughout the Supply Chain (NDSU, B. Lantz) **MPC Report No. 01-117A**

MPC-189 The Differential Effects of Deregulation on Rail Rates (NDSU, J. Bitzan) **MPC Report No. 03-144**

MPC-191 Transportation and Logistics Characteristics of the Potato Industry: Implications for Highway Planning (NDSU, M. Berwick) **MPC Report No. 01-123**

MPC-192 Biennial Strategic Transportation Analysis (NDSU, G. Griffin) **MPC Report No. 01-127.1-5**

MPC-194 Effects of Environmental Exposure on Timber Railroad Bridge/Track Members and Connectors (CSU, R. Gutkowski) **MPC Report No. 04-167**

MPC-195 North Front Range Transportation Research Internships (CSU, R. Gutkowski) **MPC Report No. 01-124**

MPC-196 Moment-Rotation Tests of High Performance Steel I-Girders (CSU, B. Hartnagel) **MPC Report No. 03-148**

MPC-197 Road Dust Suppression: Effect on Maintenance, Stability, Safety and the Environment (CSU, T. Sanders) **MPC Report No. 04-156**

MPC-198 Predicting the Fluctuations in Temperatures of Asphalt Pavements (UWY, C. Yavuzturk/K. Ksaibati) **MPC Report No. 02-136**

MPC-199 Low Volume Roads and Bridges (UWY, K. Ksaibati) **MPC Report No. 02-130**

MPC-200 Defining a Road Safety Audit Program for Enhancing Safety and Reducing Tort Liability (UWY, E. Wilson) **MPC Report No. 02-129**

MPC-201 Updating the Uniform Rail Costing System Regressions (NDSU, J. Bitzan) **Terminated 8/31/03**

MPC-202 Truck Costing Model for Transportation Managers (NDSU, M. Berwick) **MPC Report No. 03-152**

MPC-203	Containerized Grain & Oilseed Exporters - Industry Profile and Survey (NDSU, K. Vachal) MPC Report No. 02-132 and MPC Report No. 03-151
MPC-204	Strategies for Improving DOT Retention and Motivation among Professional Staff (NDSU, G. Griffin) MPC Report No. 02-137
MPC-205	Predicting and Classifying Voluntary Turnover Decisions for Truckload Drivers (NDSU, G. Griffin) MPC Report No. 02-135
MPC-208	Surface Street Level of Service Using Existing Detector Infrastructure (UofU, P. Martin) MPC Report No. 02-133
MPC-209	Advanced Traffic Management System Evaluation Data Collection Methodology (UofU, P. Martin) MPC Report No. 03-142
MPC-210	Adaptive Signal Control for Downtown Salt Lake City (UofU, P. Martin) MPC Report No. 03-141
MPC-211	Evaluating and Improving the Safety of Pedestrian Crossing in Utah (UofU, W. Cottrell) MPC Report No. 04-157
MPC-213	Paratransit Coordination for Rural Communities (UofU, P. Martin) MPC Report No. 04-161
MPC-214	Pultruded Composite Shear Spike for Repair of Large Timber Members (CSU, D. Radford) MPC Report No. 04-163
MPC-215	Support Motion Effects in a Timber Trestle Bridge: Physical and Analytical Modeling (CSU, R. Gutkowski) MPC Report No. 06-184
MPC-216	Experimental Thick-Deck Wood-Concrete Highway Bridge Construction Year 1 and 2 (CSU, R. Gutkowski) MPC Report No. 04-165
MPC-217	Road Dust Suppression: Effect on Maintenance, Stability, Safety and the Environment (CSU, T. Sanders) MPC Report No. 04-156
MPC-220	Costs, Pricing, and Regulatory Alternatives for Mergers (NDSU, J. Bitzan) MPC Report No. 03-145
MPC-221	Trip Generation Rates for Grain Elevators: A Tool for State and Local Highway Planners (NDSU, D. Tolliver) MPC Report No. 06-185
MPC-222	Strategies for Improving DOT Employee Retention and Motivation (NDSU, L. Kalnbach) MPC Report No. 02-137
MPC-223	Evaluating the Impact of DOTs QC/QA Programs on Pavement Performance: Year 2 (UWY, K. Ksaibati) MPC Report No. 03-146 and MPC Report No. 04-160
MPC-224	Utilizing the GLWT in Evaluating Moisture Susceptibility of Asphalt Mixes (UWY, K. Ksaibati) MPC Report No. 02-138
MPC-225	Evaluation of the I-15 High Occupancy Vehicle Lanes (UofU, P. Martin) MPC Report No. 04-158
MPC-226	Adaptive Signal Control for Downtown Salt Lake City, Part II (UofU, P. Martin) MPC Report No. 03-141
MPC-227	Small Urban University Transit: A Case Study (NDSU, J. Hough) MPC Report No. 05-169
MPC-228	Trucking Industry Churn and Its Impact on Communities and ITS Adoption (NDSU, J. Rodriguez) MPC Report No. 08-193
MPC-229	Asset Management of Roadway Signs through Advanced Technology (NDSU, Kellee Kruse) MPC Report No. 03-149
MPC-231	Automated Data Collection, Analysis, and Archival (UofU, P. Martin) MPC Report No. 03-153
MPC-232	Detector Technology Evaluation (UofU, P. Martin) MPC Report No. 03-154
MPC-233	Evaluate Effectiveness of Dilemma Zone Advanced Signal Warning (UofU, P. Martin) MPC Report No. 03-155
MPC-234	Simplified Impact Testing of Traffic Barrier Systems (CSU, R. Gutkowski) MPC Report No. 03-143 & 05-172
MPC-235	Highly Flexible Crash Barriers (CSU, P. Heyliger) MPC Report No. 04-162

MPC-236	Evaluation of Moisture Susceptibility of Asphalt Mixtures Containing Bottom Ash (UWY, K. Ksaibati) MPC Report No. 04-159
MPC-237	Affordable Trip Feasibility Scheduling for Rural Paratransit Systems (UofU, W. Grenney) MPC Report No. 05-171
MPC-238	Evaluation of Strategic Logistics of Rural Firms (NDSU, M. Berwick) MPC Report No. 05-177
MPC-239	Investment in Rural Roads: Willingness-to-Pay for Improved Gravel Road Services in Freight Transportation (NDSU, T VanWechel) MPC Report No. 04-168
MPC-240	Evaluation of Moisture Susceptibility of Asphalt Mixtures Containing Bottom Ash (UWY, K. Ksaibati) MPC Report No. 06-179
MPC-241	Evaluation of Pavement Crack Filling Materials (UWY, K. Ksaibati) MPC Report No. 06-180
MPC-242	Wyoming Freight Movement and Wind Vulnerability (UWY, R. Young) MPC Report No. 05-170
MPC-243	Assessment of Thermal Stresses in Asphalt Pavements Due to Environmental Conditions Including Freeze and Thaw Cycles (UWY, D. Yavuzturk) MPC Report No. 06-181
MPC-245	Video Imaging System Evaluation (UofU, P. Martin) MPC Report No. 04-166
MPC-246	High Occupancy Vehicle Evaluation II (UofU, P. Martin) MPC Report No. 04-164
MPC-247	Utilizing Recycled Glass in Roadway (UWY, K. Ksaibati) MPC Report No. 07-192
MPC-249	Pultruded Composite Shear Spike for Repair of Timber Bridge Members (CSU, R. Gutkowski) MPC Report No. 05-173
MPC-251	Adaptive Signal Control IV (UofU, P. Martin) MPC Report No. 06-182
MPC-252	High Occupancy Vehicle Lanes Evaluation III (UofU, P. Martin) MPC Report No. 05-174
MPC-253	Effectiveness of Traveler Information (UofU, P. Martin) MPC Report No. 05-175
MPC-254	Utah Intersection Safety: Issues, Contributing Factors and Mitigations (UofU, W. Cottrell) MPC Report No. 05-176
MPC-255	Network Planning Model for Local and Regional Railroad Systems (NDSU, D. Tolliver) Published in the State Rail Plan (2005)
MPC-256	Legal Establishment of County Roads in Wyoming (UWY, K. Ksaibati) MPC Report No. 07-191
MPC-257	Legal Establishment of County Roads (UWY, K. Ksaibati) MPC Report No. 07-191
MPC-258	Utilizing Recycled Glass in Roadways (UWY, K. Ksaibati) MPC Report No. 07-192
MPC-259	Relating Vehicle-Wildlife Crash Rates to Roadway Improvements (UWY, R. Young) MPC Report No. 07-189
MPC-260	Impact Performance Testing of Roadway Safety & Security Barriers - Phase 3 (CSU, R. Gutkowski) Formal Report, Letter on File 6/2/10
MPC-261	Time-Dependent Loading of Repaired Timber Railroad Bridge Members (CSU, R. Gutkowski) MPC Report No. 07-190 <i>New Title: Durability and Ultimate Flexural Loading of Shear Spike Repaired, Large-Scale Timber Railroad Bridge Members</i>
MPC-263	Traffic Operations in Small Urban and Rural Areas (NDSU, A. Smadi) Website: www.surtoc.org with on-line survey 11/1/07
MPC-264	Evaluation, Definition, and Identification of the Criteria for Establishing Freight Corridors (NDSU, M. Berwick) MPC Report No. 08-201
MPC-265	Design/Build vs. Traditional Construction User Delay Modeling: An Evaluation of the Cost Effectiveness of Innovative Construction Methods for New Construction (UofU, P. Martin) MPC Report No. 07-187A and MPC Report No. 07-187B
MPC-267	Estimating Local Economic Impacts of Rail Investments and Rail Capacity Constraints in the HRS Wheat Market (NDSU, K. Vachal) Project Terminated 2/7/08
MPC-269	Economic and Environmental Implications of Alternative Fuel Use and Regulations in the Mountain-Plains Region (NDSU, M. Berwick) MPC Report No. 08-203

MPC-270	Serviceability Limits and Economical Steel Bridge Design (UWY, M. Barker) MPC Report No. 08-203 (I)
MPC-272	Use of Wind Power Maps to Establish Fatigue Design Criteria for Traffic Signal and Variable Message Structures (UWY, J. Puckett) MPC Report No. 08-201
MPC-273	Low-Cost Soft Crash Barriers (CSU, P. Heyliger) MPC Report No. 08-198
MPC-274	Beneficial Use of Waste Tire Rubber in Low-Volume Road and Bridge Construction (CSU, J. Carraro) MPC Report No. 08-202
MPC-275	Z-Spike Rejuvenation to Salvage Timber Railroad Bridge Members (CSU, R. Gutkowski) MPC Report No. 08-208
MPC-276	Use of Salvaged Utility Poles in Roadway Bridges (CSU, R. Gutkowski) MPC Report No. 08-197
MPC-279	Structural Applications of Self-Consolidating Concrete (SDSU, N. Wehbe) MPC Report No. 11-194
MPC-280	Bridge Scour in Cohesive Soils (SDSU, F. Ting) MPC Report No. 08-195
MPC-282	Express Lane Genetic Algorithm Microsimulation Modeling (UofU, P. Martin) MPC Report No. 09-210
MPC-283	Seismic Vulnerability and Emergency Response of UDOT Lifelines (UofU, P. Martin) Project Postponed
MPC-284	Adaptive Signal Control Evaluation V (UofU, P. Martin) MPC Report No. 08-200
MPC-285	Structural Performance of Self Consolidating Concrete Made with Limestone Aggregates (SDSU, N. Wehbe) MPC Report No. 08-186
MPC-286	Developing System for Consistent Messaging on Interstate 80's Dynamic Message Signs (UWY, R. Youngs) MPC Report No. 09-211
MPC-288	Utah Department of Transportation Traffic Operations Center Operator Training (UUT, P. Martin) MPC Report No. 10-229C, 10-229D, 10-229E, 10-229F
MPC-289	Evaluation of Optimal Traffic Monitoring Station Spacing on Freeways (UUT, P. Martin) MPC Report No. 09-214
MPC-292	Traffic Safety Vulnerability Information Platform for Highways in Mountainous Areas Using Geospatial Multimedia Technology (CSU, S. Chen) MPC Report No. 08-209
MPC-295	Integrating Security into Small MPO Planning Activities (NDSU, M. Lofgren) MPC Report No. 08-199
MPC-296	Phase II, Driver Knowledge, Attitude, Behavior and Beliefs: Focus Group - Young Male Drivers (NDSU, T. VanWechel) MPC Report No. 08-204
MPC-298	Generating Public Involvement in Transportation Policy and Funding Decision Making Process (NDSU, J. Mielke) Report on file with NDDOT due to confidentiality of data.
MPC-299	Integrating Planning and Operations Models to Predict Work Zone Traffic (NDSU, A. Smadi) MPC Report No. 08-205
MPC-302	Enabling Innovate Steel Plate Girder Bridges: Simple Made Continuous (CSU, J. van de Lindt) MPC Report No. 11-234
MPC-303	Seed Project- Beneficial Use of Off Specification Coal Combustion Products to Increase the Stiffness of Expansive Soil-Rubber Mixtures (CSU, A. Carraro) MPC Report No. 11-235
MPC-304	Feasibility Study of Mobile Scanning Technology for Fast Damage Detection of Rural Bridges Using Wireless Sensors (CSU, S. Chen) MPC Report No. 10-219
MPC-307	Maximum Velocity and Shear Stress in Flow Fields around Bridge Abutments in Compound Channels (University of Wyoming, R. Ettema) MPC Report No. 11-237
MPC-313	Evaluation of LRT and BRT Impact on Traffic Operations in Salt Lake City Metropolitan Region (University of Utah, A. Stevanovic, P. Martin) MPC Report No. 09-213, 09-213B
MPC-314	Assessing the User Impacts of Fast-Track Highway Construction (ABC) (University of Utah, P. Martin) MPC Report No. 10-228A, 10-228B

MPC-317	Development of Safety Screening Tool for High Risk Rural Roads (SDSU, X. Qin) MPC Report No. 11-231
MPC-319	Gravel Roads Management: Developing a Methodology (UWY, K. Ksaibati, G. Huntington) MPC Report No. 11-238
MPC-323	Risk-based Advisory Prevention System for Commercial Trucks Under Hazardous Conditions (CSU, S. Chen) MPC Report No. 11-242
MPC-324	Reliability-based Safety Risk and Cost Prediction of Large Trucks on Rural Highways (CSU, J. Balough, R. Atadero) MPC Report No. 11-243
MPC-326	Rapid Load Rating of Short Rural Bridges (CSU, J. Lindt) MPC Report No. 11-236
MPC-329	Traffic Safety: Pilot Study to Assess Sustained and Multifaceted Activity on North Dakota's Rural Roads (NDSU, K. Vachal, A. Huseeth) MPC Report No. 11-233
MPC-331	Using ND Traffic Records to Identify Higher Risk Teen Drivers (NDSU, K. Vachal, D. Malchose) MPC Report No. 11-232
MPC-338	Use of Wind Power Maps to Establish Fatigue Design Criteria for Traffic Signal and High Mast Poles-Phase II (UWY, J. Puckett, M. Barker) MPC Report No. 11-240
MPC-346	Marginal Cost Pricing and Subsidy of Transit in Small Urbanized Areas (NDSU, J. Mattson) MPC Report No. 11-241
MPC-348	Transit Ridership and the Built Environment (NDSU, D. Peterson) MPC Report No. 11-239

(Before TEA21 Funding)

MPC-042	Dynamic Impact Load Tests on a Moderate-Weight Bridge Guardrail (CSU, R. Gutkowski) MPC Report No. 07-188
MPC-125	Factors Affecting Rail Car Supply (NDSU, K. Vachal) MPC Report No. 01-121
MPC-137	Railroad Bridge Strengthening Needs - Year 2 (CSU, R. Gutkowski) MPC Report No. 03-147
MPC-138	Full Scale Laboratory Testing of a Timber Trestle Railroad Bridge (CSU, R. Gutkowski) MPC Report No. 02-139
MPC-140	Shear Key for Strengthening Bridges (CSU, R. Gutkowski) MPC Report No. 01-126
MPC-149	ATM for Non-Metro Communities During Special Events and Severe Weather Conditions Using Remote Weather Information Systems (USU, B. Grenney) MPC Report No. 01-120
MPC-154	An Assessment of Rural Road Needs in the Mountain-Plains Region (NDSU, J. Hough) MPC Report No. 03-140
MPC-156	Short Line Railroad-Factors Contributing to Success (NDSU, J. Bitzan, D. Tolliver, P. Fisher) MPC Report No. 01-128
MPC-162	Field Evaluation of Cement Treated Bases (UWY, K. Ksaibati) MPC Report No. 00-115
MPC-164	Refining the Road Safety Audit Process for Local Rural Roads (UWY, E. Wilson) MPC Report No. 00-114
MPC-169	County Road Planning Workbook (NDSU, J. Hough) MPC Report No. 06-183
MPC-171	An Evaluation of ITS Transit Applications Used to Facilitate the Welfare to Work Program (NDSU, J. Hough) MPC Report No. 02-131
MPC-174	Assessing Agriculture's Long-Term Rail Needs (NDSU, J. Bitzan) MPC Report No. 01-116

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