

# **2006 ANNUAL REPORT**

*Mountain-Plains Consortium*

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# The Mountain-Plains Consortium Universities

**The University of Utah** has an annual enrollment of about 29,000 students and offers 77 undergraduate degree programs, more than 80 minors and certificates, more than 45 teaching majors and minors, and 95 graduate majors. Students are enrolled from all 29 Utah counties and all 50 states. The College of Engineering is the third largest of 18 colleges on campus. It has seven academic departments – Civil and Environmental, Mechanical, Chemical and Fuels, Electrical and Computer, Bioengineering, Materials Science, and the School of Computing. There are nearly 200 regular faculty and 200 adjunct, clinical, and research faculty. Collectively, these departments receive \$30 million in external research funding annually. 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. It excels at modeling current and expected traffic conditions accurately and dynamically from real-time data. It links current and historical information intelligently.

**The University of Wyoming** has an annual enrollment of about 12,400 students and offers 85 undergraduate degree programs including eight teaching majors. The university offers 58 master degree programs and 32 Ph.D. programs. There are a total of 704 faculty members, with 651 being full-time and 53 being part-time. Students are enrolled from all 23 Wyoming counties, all 50 states and 67 foreign countries. There are seven colleges in the university with the College of Engineering being the fourth largest. It is divided into six academic departments: Civil & Architectural, Mechanical, Electrical, Computer Science, Chemical and Petroleum and Atmospheric Science. There are just over 80 full-time faculty members. The Department of Civil and Architectural Engineering trains its students by providing a core of basic engineering courses for its undergraduates and allowing 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 Materials Certification Program and the Wyoming LTAP program are hosted at UW. A significant number of funded research projects are regularly conducted by the transportation faculty members at the University of Wyoming.

**Colorado State University** is governed by the Board of Governors of the Colorado State University System as a public land grant institution and a Carnegie Doctoral/Research University-Extensive. Enrollment is nearly 25,000 students. Baccalaureate degrees are offered in 64 fields in eight colleges, including agricultural sciences, applied human sciences, business, engineering, liberal arts, natural resources, natural sciences and veterinary medicine and biomedical sciences. CSU offers 39 doctoral and 62 master's degree programs. Primary transportation graduate educational 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. The College of Engineering houses the Engineering Research Center (ERC) including world-class facilities for river mechanics and hydraulics, especially as related to major bridge construction and wind tunnel testing. The Structural Engineering Laboratory is also housed at the ERC, including an outdoor ramp facility for vehicle crash testing of safety and security barriers. A contemporary spatio-temporal test frame for simulating hurricane loadings and vehicle and train loadings is to be constructed in Fall 2006. CSU also operates the Engines and Energy Conversion Laboratory. The Motorsport program in Mechanical Engineering includes topics such as racecar vehicle dynamics, advanced engines technology, fluid dynamics, and advanced materials.

**North Dakota State University** is a land grant institution with an annual enrollment of approximately 12,000 students and more than 650 faculty at the central campus in Fargo. The university offers 41 doctorate and professional degree programs, 51 master's degree programs, and 103 baccalaureate degree programs. NDSU is also part of a tri-college system which includes Minnesota State University-Moorhead and Concordia College in Minnesota. In addition, there are six related transportation research centers at North Dakota State University which enhance the institutional resources accessible to MPC and create opportunities for synergy and leveraging resources. The Advanced Traffic Analysis Lab focuses on traffic simulation, traffic signal control, Intelligent Transportation Systems (ITS), and travel demand modeling. The DOT Support Center contains a highway design lab and provides



experiential learning for junior and senior engineering students. These students work on North Dakota Department of Transportation design projects under the supervision of a NDDOT engineer. The Rural Transportation Safety and Security Center (RTSSC) is a designated recipient of FHWA funds, while the Small Urban and Rural Transit Center (SURTC) is a designated recipient of Federal Transit Administration funds. The LTAP center is housed in the Civil Engineering Department. The Transportation Safety Systems Center (TSSC)—which is based in Lakewood, CO—develops and maintains software used by state and federal safety specialists nationwide at truck weigh stations and ports-of-entry for inspecting commercial vehicles. Moreover, NDSU is home to the Center of High Performance Computing and the Center for Nanoscale Science and Engineering (CNSE), which is located in NDSU's Research and Technology Park. CNSE's research facilities include RFID production and testing facilities. CNSE focuses on defense, transportation, agricultural, and security applications of RFID and has strong linkages to private RFID production and research companies.

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 a subsequent re-competition during the ISTEA era, as well as the most recent competition following the passage of TEA-21. From 1988 through 2006, MPC produced a library of 178 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. The following list of milestones provides a cursory view of the accomplishments of the Mountain-Plains Consortium. This year's accomplishments add to its history of achievement and growth in transportation education, research, and technology transfer activities in Region 8.

# Milestones / Historical Accomplishments

## 2006

- MPC Advisory Committee formed
- Revised vision and theme adopted
- South Dakota State University accepts invitation to join MPC beginning July 1, 2006
- DOT Technical Training Initiative launched via TLN
- First graduate from NDSU's Transportation and Logistics Ph.D. program

## 2005

- TEL8 is reorganized as the Transportation Learning Network (TLN) with upgraded transmission and classroom technologies
- A week-long program of technical seminars and videoconferences are offered via TLN
- A strategic reassessment identified future theme and focus areas and plans for an MPC advisory committee

## 2004

- RSPA site visit showcases accomplishments during the TEA-21 period
- New transportation faculty position at NDSU
- MPC partners with Northern Plains Tribal Tech Center in regional diversity initiative

## 2003

- Inaugural class of six students admitted to the transportation and logistics Ph.D. program
- Coordinated National Transportation Week program involving all four campuses, including TEL8 events

## 2002

- North Dakota Board of Higher Education approves proposal for new interdisciplinary Ph.D. in Transportation and Logistics
- Rural Transit Center established at North Dakota State University
- Colorado State University and city of Fort Collins establish new transportation planning course

## 2001

- First NDDOT engineer graduates from the Master of Science program after completing all courses via TEL8
- NDSU curricula committee approves program plan for minor in logistics
- MPC initiates short-course program for state DOT personnel and offers two short-courses via TEL8

## 2000

- MPC 5-year strategic plan approved

## 1999

- MPC universities deliver 18 graduate courses over TEL8 network under cooperative agreement
- MPC wins TEA-21 competition for Region 8
- University of Utah joins Consortium
- Memorandum of agreement signed with Southwest University Transportation Center for education and research exchanges

## 1998

- 10th year program plan approved

## 1997

- 9th year program plan approved
- Started North American Educational and Research Exchange with University of Manitoba

## 1996

- 8th year program plan approved
- TEL8 research seminar series started
- Research partnership established with AAR
- Cooperative agreement signed by MPC universities for annual exchange of graduate courses via TEL8
- Joint MPC-state DOT program planning committee established

#### **1995**

- MPC wins re-competition during ISTEA era
- TEL8 used to deliver 44 hours of TRB sessions to state transportation departments in Region 8
- 7th year program plan approved
- Partnership established with ASLRA and FRA, resulting in the establishment of a national short line railroad database
- First graduate courses exchanged among MPC universities

#### **1994**

- 6th year program plan approved
- TEL8 telecommunications network started, connecting MPC universities with state transportation departments in Region 8 and FHWA site

#### **1993**

- 5th year program plan approved
- Multi-disciplinary graduate transportation education program is started, with options in civil engineering and agricultural economics
- Non-residency graduate transportation option for NDDOT engineers initiated using Interactive Video Network

#### **1992**

- 4th year program plan approved

#### **1991**

- 3rd year program plan approved
- MPC establishes outstanding graduate student award

#### **1990**

- 2nd year program plan approved
- Reorganization of MPC to include four Region 8 universities

#### **1989**

- Regional conference and planning meetings with LTAP center directors
- 1st year program plan approved

#### **1988**

- Mountain-Plains Consortium founded and selected as Region 8 Center

# 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 TLN Board and Programming Committee play important roles in program planning and implementation. The roles and responsibilities of each administrative component are discussed in this section. The MPC Program Planning flowchart illustrates the main sources of input and process used to develop an annual program of activities and research projects.

## Center Director

The Mountain-Plains Consortium is located at the Upper Great Plains Transportation Institute at North Dakota State University. 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 four institutions. He administers the program to take advantage of the unique strengths and resources of each university and produce the greatest impact for the consortium. Kathy McCarthy of NDSU is the assistant administrator for the center. Dr. Ayman Smadi of NDSU is external programs coordinator. Beverly Trittin of NDSU provides technical support and additional administrative services. Patrick Nichols of NDSU is the center's website developer. He creates and maintains the MPC Web pages and helps design and implement Web-based applications for MPC faculty, staff and clients. Tom Jirik, MPC's communication coordinator, develops communication strategy for the center and provides editorial oversight for both traditional and electronic publications. He is also located at NDSU.

## University Program Directors

Each university in the consortium has a designated university program director to perform local oversight and management of approved activities at each university and serve as coordinators of transportation activities on their respective campuses. They implement the MPC strategic plan at each institution in a coordinated manner, which considers the vision and theme of the Center and the strategies and activities of all consortium partners. The program directors are Dr. Richard Gutkowski, Colorado State University; Dr. Kimberly Vachal, North Dakota State University; Dr. Peter Martin, University of Utah; and Dr. Khaled Ksaibati, University of Wyoming.

## Executive Committee

The center director, the four university program directors, and a USDOT liaison form a committee to oversee program planning and administrative functions for the grant period. The six-member executive committee meets several times 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 four 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 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 four 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.

### **Professional Input and Review (Review and Update)**

Although TLN is a primary source of state transportation department input each year, professionals from federal, state, and local transportation departments and private industry review MPC research problem statements. In 2005-06, practicing engineers and administrators from Colorado, North Dakota, Utah, and Wyoming state transportation departments provided key input and critical review during the research selection process. Professionals from USDA, Federal Highway Administration, Federal Transit Administration, and the American Association of Railroads also review proposed problem statements. In this way, we ensure that we are researching problems of regional and national significance, which provides value to our primary customers, the end users of the research.

### **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 UTCP-funded activities conducted on the four campuses are approved first by the executive committee. The center director ultimately is accountable for all decisions pertaining to UTCP activities and the use of UTCP 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.



# Executive Committee



Tolliver

**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 North Dakota State University, Tolliver was a rail planner for the North Dakota Department of Transportation.

Tolliver has substantial administrative, teaching, research and consulting experience. 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 Military 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 teaches the following graduate courses:

Transportation Systems I (TL 782), Transportation Systems II (TL 783), Transportation & Logistics (TL717), and Research in Transportation & Logistics (TL 788). He also co-teaches Railroad Planning & Design (CE 656) and advises graduate students.

Tolliver holds a baccalaureate degree from Morehead State University (Geography, 1975), a Master of Urban and Regional Planning (1979) from Virginia Polytechnic Institute & State University and a Ph.D. in Environmental Design & Planning (1989) 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. He is a member of the Highway Economic Requirements System (HERS-ST) developers group, the Local and Regional Freight Committee of the Transportation Research Board, and past president of the Agricultural and Rural Transportation Chapter of the Transportation Research Forum. His research and consulting clients have included: North Dakota Department of Transportation, Washington State Department of Transportation, Idaho Transportation Department, Nebraska Department of Roads, USDA, U.S. Army Corps of Engineers, Canadian National Railroad, and American Crystal Sugar Company.



Gutkowski

**Dr. Richard Gutkowski**, P.E., is a professor of civil engineering at Colorado State University. 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 is director of the Structural Engineering Laboratory at CSU's Engineering Research Center. He manages research, graduate education, technology transfer, summer diversity research activities, and student internship programs. He was active in the development of a multi-site regional transportation learning network for research and graduate education, and manages CSU's site.

Gutkowski has been an invited professor at the Swiss Federal Institute of Technology (SFIT), Lausanne, Switzerland; and arranged formal university cooperation programs with the SFIT. In 1990, Gutkowski presented a workshop on design of timber bridges in Akitashi, Japan, for the Ministry of Forestry and the Japanese Society of Civil Engineers. He directed a 1994 NATO research workshop on improving a deteriorated transportation infrastructure within

Poland and its neighboring countries and was a participant in a NATO symposium on the role of NATO in scientific cooperation in central Europe. He presently is cooperating with the National Institute for Amazonian Research in Manaus, Brazil; and researchers at the University of Coimbra, Portugal; and the University of Canterbury, New Zealand, in composite wood-concrete bridge research. He was a sole recipient of a grant from the Foundation for Portuguese American Development-Lusitania for a professional development/cooperation visit to the University of Coimbra in 2004.

He has on-going cooperation in research related to design code development with the faculty of civil engineering at the Budapest University of Technology and Economics. In 2003 he co-organized and hosted the annual workshop of Working Commission W-18-Timber Structures, International Council for Research and Innovation in Building and Construction in Golden, CO.

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. He also has co-edited proceedings for the above NATO workshops.



Ksaibati

**Dr. Khaled Ksaibati** received a B.S. degree (1984) in civil engineering from Wayne State University. He later completed his M.S. degree (1986) and Ph.D. (1990) from Purdue University. While completing his doctorate, Ksaibati worked full time for the Indiana Department of Transportation as a pavement structural engineer. Ksaibati has been a member of the civil engineering faculty at the University of Wyoming (UW) 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. In 1998, Ksaibati took a one-year sabbatical from UW and joined the staff of the Florida Department of Transportation where he provided training, consulting, and technical support. Several research papers, reports, and presentations resulted from the research work done in cooperation with FDOT.

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 pavements. He also is a member of two ASTM committees related to pavement smoothness. Ksaibati also served on various ITE committees and is the faculty advisor of the student chapter of ITE at UW. In addition, he served on several NCHRP research panels.

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. His research has been supported by the Wyoming Department of Transportation, Federal Highway Administration, PacifiCorp, and other DOTs. He is also involved in consulting work on several projects for the SBIR, Florida DOT, and the Wyoming Contractor Association.



Martin

**Dr. Peter T. Martin** earned a B.S. degree in civil engineering from the University of Wales in 1975, a Master of Science 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 earned membership of the UK institution of Civil Engineers (professional registration) in 1978.

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.



Vachal

**Dr. Kimberly Vachal** joined the executive committee this year as NDSU's program director. She is a research fellow for UGPTI and has extensive background in grain production and market intelligence. She 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.

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



Smadi

**Dr. Ayman Smadi** was named MPC external programs coordinator this year. He is director of the Advanced Traffic Analysis Center (ATAC) at the UGPTI. The ATAC enhances transportation systems in small-medium size communities through the use of advanced traffic analysis and ITS solutions to safety and mobility problems. Four major programs encompass ATAC activities: traffic operations, Intelligent Transportation Systems; transportation planning and travel demand; and training. ATAC's Traffic Laboratory supports state-of-the-art traffic analysis, including traffic simulation, traffic signal control, and traffic data collection systems. ATAC is the official provider for training on the VISSIM traffic simulation model. Training on other traffic simulation and analysis models is also provided on-demand to various partner agencies.

Smadi is also involved in NDSU's graduate transportation program. As an adjunct professor in civil engineering, Smadi teaches transportation planning, advanced transportation systems, and ITS graduate courses. Smadi's research interests include traffic operations, transportation planning, ITS, and safety. He has developed and worked on federal- and state-funded projects in those areas.

Smadi, an advanced research fellow, began his work at the UGPTI in 1993. He served as NDSU's program director for the MPC from 1996 until 2006. He has been director of ATAC since 1998. He has a doctorate degree in civil engineering from Iowa State University, Ames; a master of science degree from the University of Oklahoma, Norman; and a bachelor of science degree in civil engineering from Yarmouk University, Irbid, Jordan.

# Key Faculty

## Colorado State University

**Dr. Jenó Balogh** is an affiliate faculty member in the Department of Civil 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. Wayne A. Charlie** is a professor of civil engineering. He received his Ph.D. in civil engineering at Michigan State University and is a registered professional engineer in Colorado and Maine. His current research interests are related to shallow and deep foundations, the stability of earth slopes, and the behavior of structures subjected to earthquake, explosive and impact loads. He has more than 75 refereed publications and numerous conference papers and reports. Currently, experimental tests are being conducted on a model timber railway bridge supported on timber piles and the impact resistance of structures subjected to tornado generated debris.

**Dr. Suren Chen** accepted a position as assistant professor in the Department of Civil Engineering at Colorado State University. He holds a Ph.D. degree from Louisiana State University earned in 2004, where he earned the Michael A. Clause Memorial Outstanding Ph.D. student award that year. 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.

**Dr. Marvin Criswell** is professor of civil engineering and the Associate Department Head for Academic Affairs in the Department of Civil 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 of the TLN network.



Balogh



Charlie



Chen



Criswell

**Dr. Paul Heyliger** has been on the faculty of the Department of Civil Engineering for 15 years. He was awarded his Ph.D. in engineering mechanics from Virginia Tech in 1986, 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. His research sponsors include the USDOT, National Science Foundation, NASA, USDA, the Army Research Office, AFOSR, and NIST.

**Dr. Thomas G. Sanders** is an associate professor of civil engineering. He received his master's and Ph.D. in civil engineering at the University of Massachusetts. Sanders has authored more than 125 publications and has presented 69 short-courses on hazardous waste, water quality monitoring, and activated sludge process control.

**Dr. John W. van de Lindt** is an associate professor in the structural engineering program. He earned his B.S. in civil engineering from California State University at Sacramento and both his M.S. and Ph.D., in 1995 and 1999 respectively, in civil engineering from Texas A&M University. His research interests include nonlinear dynamics, structural reliability, and woodframe structures subjected to seismic and wind loads. He currently chairs the ASCE Committee on the Reliability-Based Design of Wood Structures.



Heyliger



Sanders

## North Dakota State University

**Mark Berwick** has been involved with the Upper Great Plains Transportation Institute 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.

Since 1999 Berwick has been the director of the North Dakota Strategic Freight Analysis Program, which examines the transportation and logistics of different sectors of the economy every two years.

Berwick holds masters and bachelors degrees in agricultural economics from North Dakota State University.

**Kimberly Vachal** is currently a research fellow for UGPTI and has extensive background in grain production and market intelligence. She 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.

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

**Tamara Van Wechel** works on agricultural and freight transportation. She has interests in rural freight logistics and infrastructure, bulk grain and oilseed logistics, and railroad pricing and service. As a native of rural North Dakota, she understands the fundamental relationship between economics and agriculture. She earned her B.S. and M.S. degrees from NDSU in natural resources management. Her M.S. degree emphasis area is in agribusiness and applied economics.

### Affiliated Faculty – NDSU

Don Andersen, Civil Engineering

Amiy Varma, Civil Engineering

Magdy Abdelrahman, Civil Engineering

G. Padmanabhan, Civil Engineering

Gary Smith, Civil Engineering

Canan Bilen-Green, Industrial & Manufacturing Engr

Darsono Tjokroamidjojo, Industrial & Manufacturing Engr

Reza Maleki, Industrial & Manufacturing Engineering

Peter Odour, Geosciences

John Bitzan, College of Business Admin.

Rodney Traub, College of Business Admin.

Joseph Szmerekovsky, College of Business Admin.

Dave Lambert, Agribusiness & Applied Economics

Robert Hearne, Agribusiness & Applied Economics

Won Koo, Agribusiness & Applied Economics

Bill Wilson, Agribusiness & Applied Economics



Berwick



Vachal



Van Wechel

## University of Utah



Martin

**Dr. Peter T. Martin** earned a B.S. degree in civil engineering from the University of Wales in 1975, a Master of Science 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 earned membership of the UK institution of Civil Engineers (professional registration) in 1978.

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.

## University of Wyoming

**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 in 1983. Also at Purdue, he earned his M.S. in civil engineering. In 1990, he received his Ph.D. in civil engineering from the University of Minnesota.

**Dr. Charles M. Dolan** is professor and head of the Department of Civil Engineering. His research focuses on high-performance materials such as glass, Kevlar and carbon fibers for reinforcing new and existing structures. He was the principal investigator for research of fiber-reinforced plastics for highway structures sponsored by the Federal Highway Administration. Among his other recent work is development of anchor systems for fiber-reinforced plastic tendons; time behavior of non-metallic pressuring tendons; investigating long-term performance of non-metallic materials in concrete and evaluating bridge joint sealant materials.

His civil engineering degrees are a B.S. from the University of Massachusetts and an M.S. and Ph.D. from Cornell University. He is a registered professional engineer in Wyoming, Washington, and Ontario.

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



Dolan



Edgar

**Dr. Larry O. Pochop**, professor of civil engineering, specializes in hydrology, microclimatology, agricultural and municipal water conservation, and management. He earned his B.S. degree from South Dakota State University, and his M.S. degree and Ph.D. from the University of Missouri, Columbia. His degrees are in agricultural engineering. He is a professional engineer in Wyoming.

**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.

**Donald E. Polson**, a lecturer in the College of Engineering, specializes in structural engineering with an emphasis in the design and use of temperate and tropical woods. In addition to teaching, he is a private consulting structural engineer and facilities consultant. A Fulbright Scholar in 2000, Polson holds a B.S. in civil engineering with the architectural option and an M.S. with the structural concentration. Both degrees are from the University of Wyoming. Polson has also been honored with teaching awards.

**Dr. John P. Turner** is a professor in the College of Engineering who specializes in soil and rock mechanics, foundation engineering, earth retaining structures, slope stability and innovative materials for waste containment. He has also been a field geologist for geotechnical site investigations and an exploration geologist.

He was a visiting professor at the University of Sydney, Australia, and the University of Canterbury, New Zealand, for the 1993-94 academic year. He holds a B.S. degree in geology from James Madison University, and a B.S. and M.S. in civil engineering from the University of Wyoming and a Ph.D. in civil engineering (geotechnical) from Cornell University.

**Dr. Eugene M. Wilson** is professor emeritus of civil engineering. He was the university's 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.



Puckett



Turner



Wilson



**Dr. Cenk Yavuzturk** is an assistant professor of architectural engineering. His research interests are in HVAC-R equipment and systems, thermal systems modeling and simulation, ground source heat pumps, building energy analysis and energy management and building thermodynamics.

He holds a Ph.D. in mechanical engineering from Oklahoma State University and a Diplom Ingeniuer in energy and processing engineering from the Technical University of Berlin, Germany.

**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). Rhonda's general interests in this area focus on methods to increase the efficiency of agency spending towards 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, masters 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.



Yavuzturk



Young

# The Year in Review

## Director's Summary

Fiscal year 2005-06 was MPC's seventh year of the TEA-21 grant. The year saw the passage of the new federal highway bill, SAFETEA-LU which allowed us to begin planning for programming based on new priorities as defined by the legislation. That planning effort was aided by the creation of the MPC advisory committee. The members of that committee represent a broad cross-section of the transportation industry in our region and will be invaluable in helping us set strategic direction and program priorities. Their efforts have already resulted in an update to our vision and theme.

Faculty and staff involved in MPC programs across the region continue to be our key strength and they continued to research innovative ideas and prepare the next generation of transportation professionals. After seven years, MPC's success can be measured not only by the techniques and technology developed by our researchers and adopted by industry, but by the success of our students. Those students are becoming leaders in industry and academia and we count their contributions to transportation as MPC's legacy. That legacy will continue to grow as talented students continue to enter the workforce. This year saw the first graduate of our Ph.D. program.

MPC published 11 new peer reviewed reports and offered 72 graduate-level transportation courses at four universities. Many additional courses in civil engineering, economics, and business were offered by the participating academic departments. On-going research projects focus on topics ranging from freight movement studies and materials testing to new applications of technology such as GIS, computer modeling and adaptive signal control.

In addition to continuing this strong baseline effort, several new initiatives were launched during FY 2005-2006. Some highlights from the past year include:

- An advisory board was formed to provide guidance for the MPC's efforts. The board includes representatives from state departments of transportation from across the region, the National Association of County Engineers, the Association of American Railroads, the Federal Motor Carrier Safety Administration, the Federal Highway Administration and MPC universities. The advisory committee will provide on-going guidance and input into the development of the center's multi-year strategic plan. Members will also provide detailed input on research project selection. In initial meetings the group updated the MPC's vision statement and theme and outlined research emphasis areas and critical issues for the region.
- Sang Young Moon was the first student to graduate from NDSU's Transportation and Logistics Ph.D. program. He began his Ph.D. program in September of 2002 with a concentration on transportation economics. His dissertation is "A Mathematical Model Applied to the U.S. Soybean Industry and Its Competitiveness." The research evaluated the impacts of alternative ocean and inland transportation systems in shipping soybeans from major exporting countries to major importing regions and countries on U.S. competitiveness of soybean exports and the world soybean trade. His graduation marks another milestone for this growing program.
- The University of Wyoming has purchased two retroreflectometers to loan to local agencies so they can more easily assess the reflectivity of road signs and assure that their signs comply with new FHWA standards and regulations. The program is a cost-effective cooperative effort among transportation agencies that will improve the safety of motorists in Wyoming.
- Former students continue to exhibit excellence in their careers. Some examples: NDSU graduate Matthew Martimo is putting his traffic engineering expertise to work at a leading company in transportation planning software, Citilabs; CSU graduate Stephen J. Waldinger has been named by Forsgren Associates in Boise, Idaho, as its director of transportation; and another CSU graduate, Karol Miodonski, is an engineer at PBS&J, Denver, working in the civil engineering site/land development group.

- NDSU's Advanced Traffic Analysis Center helps transportation planning organizations across North Dakota develop models to estimate demand on the local transportation systems. The program provides MPC students with a real-world lab where they can study possible improvements to the models, enhance the collection and use of data, and test new software systems.
- With MPC support, University of Wyoming research is helping Wyoming county officials determine if rural roads were legally established. The research provides information to planners on how to legally establish a road as well as providing historical perspective on changes to the process over the years.
- The MPC and TLN launched a four-state initiative to provide technical training to professionals in departments of transportation in North Dakota, Montana, South Dakota and Wyoming. Those professionals face similar challenges. Workloads are increasing. The size of middle management is decreasing. Requirements for career-long learning and certification are escalating. Budgets are flat. And competition for trained people is fiercer than ever. TLN is one mechanism for delivering technical training and can serve as a base for complementing or branching off into other innovative training options. In 2005-2006, more than 20 technical training sessions were offered via the TLN. About 10 sessions are already scheduled for 2006-2007.
- South Dakota State University agreed to join MPC beginning with program year 2006-2007. The addition of SDSU will strengthen the capabilities of the MPC adding new areas of expertise and experience to its research, education and outreach programs. Facilities include a structures laboratory, a fluid mechanics laboratory, an asphalt laboratory and a geotechnical laboratory. Faculty at SDSU have already been awarded funding for several projects including study of the structural applications of self-consolidating concrete, an assessment of chloride injury from de-icing salts in trees along state highways in the black hills, and a study of bridge scour in cohesive soils.

# FY 2005 Program Highlights

## **MPC Advisory Board Formed, Develops New Vision and Themes**

In FY 2005-2006, an advisory board was formed to provide on-going guidance and input into the development of the center's multi-year strategic plan. Members will also provide detailed input on research project selection.

The board includes representatives from state departments of transportation from across the region, the National Association of County Engineers, the Association of American Railroads, the Federal Motor Carrier Safety Administration, the Federal Highway Administration and MPC universities. In initial meetings the group updated the MPC's vision statement and theme and outlined research emphasis areas and critical issues for the region.

The updated vision:

To be a leader in transportation by promoting its critical importance to economic viability and quality of life through research, distance learning, and interdisciplinary education; while serving the unique and critical needs of the Mountain-Plains region

The theme:

Safe, Mobile, and Sustainable Freight and Passenger Transportation Systems in the Mountain-Plains Region.

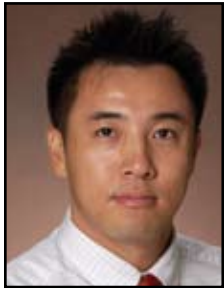
This theme reflects the unique characteristics of the Mountain-Plains region, including issues regarding safety on rural roads, maintaining a vast network of two-lane highways and railroad and dealing with a few growing metropolitan areas experiencing heavy car and freight traffic.

The advisory board also identified the following research focus areas and critical issues:

- Transportation safety and security
- High-risk rural roads
- Rural transportation operations
- Effective safety management
- Human factors
- Low-cost safety improvement
- Work zones
- Heavy vehicles/Commercial trucks
- Unpaved roads and safety
- Mobility and global connectivity
- Infrastructure renewal, longevity and safety
- Environmental stewardship
- Infrastructure that minimizes environmental impacts

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### **Sang Moon is First Graduate from NDSU Ph.D. Program**



Moon

Sang Young Moon is the first student to graduate from NDSU's Transportation and Logistics Ph.D. program. Moon earned his M.S. in agribusiness and applied economics from NDSU in 2002. He received his B.S. in agriculture economics from Korea University.

He began his Ph.D. program in September of 2002 with a concentration on transportation economics. His dissertation is "A Mathematical Model Applied to the U.S. Soybean Industry and Its Competitiveness." The research evaluated the impacts of alternative ocean and inland transportation systems in shipping soybeans from major exporting countries to major importing regions and countries on U.S. competitiveness of soybean exports and the world soybean trade. The results show that a free trade would positively affect the total soybean quantities traded in the world soybean market. The United States receives the most benefit under free trade mainly because export supply in the United States is much more elastic than those in Brazil and Argentina.

Moon has joined the staff of the Korea Institute for Industrial Economics & Trade in Seoul, South Korea.

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### **Sign Retroreflector Loan Program at UW**

The University of Wyoming has purchased two devices that measure the reflectivity of highway signs to help state and local agencies comply with new sign regulations.

The Federal Highway Administration is finalizing new standards and regulations regarding minimum levels of sign retroreflectivity. As a result, agencies will be responsible for maintaining signs to a minimum level of service. A retroreflectorometer plays a key role to ensure quality and accuracy when implementing an effective sign management program. To help local agencies who are unable to afford or don't warrant enough need to purchase their own meters, the University of Wyoming purchased two retroreflectorometers and implemented a loan program. The devices were purchased with 402 Funds from the Wyoming Department of Transportation's Highway Safety Office and the Safety Management System Committee.

The retroreflectorometers are DELTA RetroSign® 4500 Retro-reflectorometers with GPS capability. Each comes with an extension pole kit to extend the operator's reach an additional nine feet and includes a remote trigger with digital display allowing the operator to take multiple readings without having to retract the pole each time.

This new program at the University of Wyoming shows the importance of cooperation among the various levels of transportation agencies to provide cost effective services which will result in improving the safety of motorists in Wyoming.

(Contact Khaled Ksaibati, University of Wyoming, 307.766.6230 or [Khaled@uwyo.edu](mailto:Khaled@uwyo.edu))

### **Former MPC Student Finds Success in Transportation Software Company**

NDSU graduate and former MPC student Matthew Martimo is putting his traffic engineering expertise to work at a leading company in transportation planning software, Citilabs.

Martimo earned his undergraduate degree in civil engineering from NDSU in 2001. Earlier, he earned A.A. and A.S. degrees in business and pre-engineering. After completing his undergraduate degree, he enrolled in NDSU's graduate program in transportation. He now has an M.S. in civil engineering from NDSU. He was the MPC student of the year in 2002-2003.

While at NDSU, Martimo's research focused on the development of trip generation rates for college campuses and grade schools to support travel-demand modeling in small and medium-sized cities. His work continues to be used to enhance the travel-demand model of the Fargo-Moorhead MPO



Martimo

and will also benefit travel-demand modeling in other small and medium-sized MPOs. Upon earning his master's degree he continued his work as an associate research fellow with the NDSU Advanced Traffic Analysis Center.

As a student and employee at NDSU, Martimo helped undergraduate students learn to use GIS, traffic analysis programs, simulation models and travel-demand modeling software. Using his talent for working with software, Martimo was able to lead the development of software enhancements that allow for faster analysis of data.

In 2004, Martimo left his position with NDSU's Advanced Traffic Analysis Center and currently is employed at Citilabs in Stillwater, Minn., as director of the traffic engineering division. According to the Citilabs Web site, the company "develops, markets and supports software products for a broad group of professionals involved in transportation planning, traffic engineering, GIS and urban planning." Citilabs is the world's largest transportation software company with more than 2,500 agencies using its software in more than 70 countries.

Martimo enjoys his work with Citilabs where he oversees the development, marketing and support of Cube Dynamism and Cube Voyager's Junction Modeling and Mesoscopic Assignment programs. His work frequently allows him to travel, and he has had many opportunities to visit customers and study transportation problems around the world, specifically in Europe, Asia and Australia.

(Contact Dr. Denver Tolliver, North Dakota State University, 701.231.7190 or denver.tolliver@ndsu.edu)

### Other Student Success

**Stephen J. Waldinger** has been named director of transportation at Forsgren Associates in Boise, ID. He earned his B.S. in civil engineering from Colorado State University in 1990. Waldinger will be responsible for company-wide transportation activities. During his past seven years with the company, he has played key roles on the I-84/Garrity interchange in Nampa, pavement rehabilitation projects in Boise, McCall and northern Idaho, as well as bridge replacement projects. He was lead roadway engineer for the replacement of the \$8.5 million, 1,006-foot-long Clark Fork River Bridge in Clark Fork.

**Karol Miodonski**, a 2005 graduate of Colorado State University with a B.S. in civil engineering, is an engineer at PBS&J, Denver. He started in the transportation planning group, working on several large projects, and moved to the civil engineering site/land development group.



Burgers

**Travis Burgers** has received a fellowship from the Mechanical Engineering department at the University of Wisconsin and will work with surgeons and residents at the UW hospital on the development and testing of bone implants. During the summer, Burgers is working with an orthopedic company that makes replacement knees, hips and other products. He will be doing testing on the strength of bone-implant combinations. The work builds on his research at Colorado State University where he tested shear-spike reinforcement of bridge timbers. Burgers earned his M.S. degree in civil engineering at CSU last year.

(Contact: Dr. Richard Gutkowski, Colorado State University, 970.491.8291 or Gutkowski@engr.colostate.edu)

### Students Play Key Role in Transportation Planning Efforts

The Advanced Traffic Analysis Center at NDSU helps transportation planning organizations across North Dakota develop models to estimate demand on the local transportation systems.

"Regional travel demand models are the cornerstone of effective metropolitan transportation planning," notes ATAC director Ayman Smadi. "Undergraduate and graduate students enrolled in civil engineering, computer science, transportation and logistics, electrical engineering, software and other engineering are a key part of our program. They put classroom lessons to work in our lab where we give them an opportunity to apply what they've learned to real-world applications."

ATAC's laboratory employs four undergraduate and five graduate research assistants. Several of the graduate students are enrolled in MPC-sponsored academic programs.

Partners in the program include the Bismarck-Mandan Metropolitan Planning Organization, Fargo-Moorhead Metropolitan Council of Governments, the Grand Forks-East Grand Forks Metropolitan Planning Organization and the North Dakota Department of Transportation.

ATAC staff and students provide modeling expertise to the partners and continually work to make improvements to models. The models allow transportation agencies and planners to identify potential future transportation needs, develop corridor plans, evaluate the potential effect of changes to one part of a transportation system on the overall system, estimate the impacts of improvements and explore changes in transportation policies.

Having the program provides MPC students with a real-world lab where they can study possible improvements to models, enhance the collection and use of data, and test new software systems. Some of the research recently completed by graduate students working in the program includes testing hybrid models for effective integration of transportation planning and traffic operations. This research provides a building block for enhancing travel demand models' abilities to respond to operational analysis needs, such as work zones, evacuation planning, and ITS applications.

(Contact Dr. Ayman Smadi, North Dakota State University, 701.231.8101 or ayman.smadi@ndsu.edu)

### **Wyoming Research Helps Counties Determine if Roads are Legally Established**

With MPC support, the University of Wyoming is helping Wyoming county officials determine if rural roads were legally established.

By one estimate, Wyoming county road and bridge supervisors know only 30 percent of the time whether rural roads were legally established. Addressing that question requires that two issues be addressed: First, when and how was the road established? Second, what were the legal requirements for establishing a county road at the time and were those procedures followed?

The University of Wyoming received research funding from the Wyoming Department of Transportation to explore those issues. Matching funds were obtained from the Mountain-Plains Consortium (MPC).

This project provides information to all county road programs on how to legally establish a county road in Wyoming and also how the laws have changed over the years. The history of Wyoming laws is important for Wyoming counties because the roads that were established in past years must have been created according to the laws in that year or they were not legally established.

The research was completed by Stacey Obrecht, a UW law student with an interest in rural transportation issues. She conducted research on the designation and development of county roads in Wyoming during the 20<sup>th</sup> century. As part of this research, UW distributed a state-wide survey and received excellent feed back from all counties. In addition, UW updated and distributed a report entitled "Important Wyoming State Statutes Relating to County Highways".

The University of Wyoming has just printed and distributed the final report of this study. In addition, a usable brochure/pamphlet with the laws on legally establishing county roads from the territory days until the present were prepared and distributed to all counties. This research effort demonstrates the responsiveness of UW to conduct applied research in an unconventional area to benefit the transportation community.

(Contact Khaled Ksaibati, University of Wyoming, 307.766.6230 or Khaled@uwyo.edu)

### CSU Plans 'Engineering for Safety and Security' Seminar

Colorado State University is partnering with the American Council of Engineering Companies (ACEC) to offer a two-day seminar, "Engineering for Safety and Security" in October at the CSU Denver Center. The instructors include MPC faculty members Wayne Charlie, Marvin Criswell, and John van de Lindt. The first day of the seminar will focus on earthquakes, including seismic risk, soil dynamics, near fault forces, blast loadings and structural design. Katrina flood experiences, flood hazard and recent research on this topic will also be covered. The second day of the seminar will begin with an overview of wind hazards. Code emergence, human-induced threats and safety and vulnerability assessments complete the curriculum.

(Contact: Dr. Richard Gutkowski, Colorado State University, 970.491.8291 or Gutkowski@enr.colostate.edu)

### Small Urban and Rural Transportation Operations Coalition

With support from the Mountain-Plains Consortium, NDSU's Advanced Traffic Analysis Center is leading an initiative to identify the transportation operations needs of small urban and rural areas and to create a resource center to address those needs.

About 44 percent of the U.S. population lives and travels in small urban and rural areas where agencies often lack the resources to adequately support transportation system operations. The transportation systems in those areas also play an important role in keeping the larger national transportation system connected.

"This is an effort to pull together resources, ideas and approaches from a broad variety of sources and make them available to agencies that might not be able to access them in any other way," notes Ayman Smadi, ATAC director. "In many cases, we expect that innovative ideas and approaches will come directly from those agencies and we'll serve as a clearinghouse."

The initiative, now known as the Small Urban and Rural Transportation Operations Coalition (SURTOC), has three primary goals:

- Identify high-priority transportation operations needs in small urban and rural areas
- Learn from and apply successful and tested practices
- Develop a resource of technical information and training opportunities that targets transportation operations professionals in small urban and rural areas
- Provide a forum to network and share information

ATAC originally promoted the initiative to the Institute of Transportation Engineers and the Federal Highway Administration. In June 2005, the initiative was presented at the National Transportation Operations Coalition where it was embraced as one of several key activities NTOC would focus on in the following 18 months. There are currently nine transportation organizations and several private consulting firms that make up SURTOC's steering committee: the American Public Works Association, the American Association of State Highway and Transportation Officials, the Federal Highway Administration, the Institute of Transportation Engineers, the Intelligent Transportations Society of America, the National Association of County Engineers, the National Association of Counties, the National Association of Development Organizations, and the National Association of Regional Councils.

SURTOC conducted an assessment of transportation operations in small urban and rural areas. The assessment, administered online earlier this year, provided a snapshot of rural transportation operations and the agencies designated to oversee those operations. The assessment also identified needs and issues that will guide future activities. Respondents indicated that funding constraints and low levels of support from decision makers are key concerns. The respondents also noted that methods of measuring performance are lacking or not implemented. The greatest needs were infrastructure, funding and traffic safety.

SURTOC will conduct a follow-up assessment focusing on specific agencies, coordinate efforts with the national Transportation Operations Coalition and establish an on-line discussion list and resource center. For more information, visit SURTOC's website at [www.surtoc.org](http://www.surtoc.org).

(Contact Dr. Ayman Smadi, North Dakota State University, 701.231.8101 or ayman.smadi@ndsu.edu)



### **CSU Faculty Member Completes DOT Studies**

John van de Lindt, MPC faculty member at CSU, completed two research studies for state departments of transportation in Colorado and Michigan. Contracted by the Colorado Department of Transportation (CDOT), he conducted a study of roadway lighting supports under high winds. Results were presented at the 2006 ASCE Structures Congress held in St. Louis, Missouri in a paper entitled "Effect of Extreme Wind Gusts on Fatigue Life and Structural Reliability of High Mast Lighting Structural Supports." A CDOT research report, "Development of a Reliability-based Design Procedure for High Mast Lighting Supports in the State of Colorado," was also prepared. Dr. van de Lindt also examined bridge loads for the Michigan Department of Transportation and developed the MDOT Research Report "LRFD Load Calibration for State of Michigan Trunkline Bridges."

(Contact: Dr. Richard Gutkowski, Colorado State University, 970.491.8291 or Gutkowski@engr.colostate.edu)

### **Hazardous Materials Short Course Offered**

Proper transportation and handling of hazardous materials is a key component of transportation safety and security. Tom Sanders, an associate professor at CSU and MPC faculty member, taught the Hazardous Materials/Waste Managers Short course at CSU to 23 professionals June 6-8. The course, which has been presented more than 25 times, is designed to integrate the hazardous substances, materials and wastes (HSMW) sections of the applicable federal regulations and help minimize liability from HSMW handling. In addition, those in the course listen to lectures from professionals who have experience in understanding and implementing many laws environmental managers must deal with daily.

(Contact: Dr. Richard Gutkowski, Colorado State University, 970.491.8291 or Gutkowski@engr.colostate.edu)

## Students Find Real-World Applications in Quantitative Modeling



Bilen-Green

The Fargo District of the North Dakota DOT received advice on its snow removal routes from students at NDSU while the students received a real-world introduction to applications for the theories they're learning in class.

Canan Bilen-Green, an assistant professor in NDSU's industrial and manufacturing engineering department, teaches engineering 770, a graduate-level course on quantitative modeling. The course is required for students earning a Ph.D. in transportation and logistics.

"I wanted to bring a real modeling problem to the class for them to work on," notes Bilen-Green. In consultation with faculty at the Upper Great Plains Transportation Institute, Bilen-Green approached the North Dakota DOT and asked if the class could apply their modeling techniques to snow removal in the Fargo district.

Troy Gilbertson, maintenance coordinator for the district met with the students and gave them a tour featuring stockpiles of sand and salt and snow removal equipment. He also provided information on plowing routes, plowing priorities, equipment types and capabilities, and equipment and stockpile locations.

"I look forward to meeting with anyone who has a different perspective on how we do things," Gilbertson says. "And the students came up with some pretty interesting ideas."

Bilen-Green says the students researched approaches to snow-removal modeling, divided the issue into segments and each student developed modeling code for their particular segment. At the end of the class, the students presented their results to Gilbertson and others at the DOT.

"This was basically a good start," she says. "This is a complex modeling problem and we have not solved it completely by any means. "We did show the students how to approach a problem like this and apply the techniques they're learning in class. The interaction with the DOT was good for the students. They could see how to work with a real problem and see the limitations of some of the techniques we were studying."

Gilbertson agreed that much of the students' work will not have a direct application to DOT operations, but it was an opportunity to familiarize students with real-world DOT maintenance and operation challenges. "And hearing their presentations gets you thinking about how we might do things differently."

Gilbertson is likely to get more ideas from the students. Many are enrolled in engineering 771, Probabilistic and Deterministic Methods, and will apply the lessons from that class to improving the efficiency and effectiveness of snowplowing in the district. One student is adopting the issue as a topic for her master's thesis and possibly for her dissertation.

Bilen-Green has been on the faculty of the industrial and manufacturing engineering department since 1998. She teaches engineering statistics, operations research, and statistical quality control and advises general engineering students. Her research interests include: statistical quality control, time series outlier detection procedures, and layout of flexible manufacturing processes.

She holds master's and Ph.D. degrees from the University of Wyoming, a master's degree from Bilkent University in Turkey and a bachelor's degree from Middle East Technical University also in Turkey.

(Contact Dr.Canan Bilen-Green, North Dakota State University, 701.231.7040 or Canan.Bilen.Green@ndsu.edu)

## Comprehensive DOT Technical Training Initiative Planned



Berreth

The MPC through the UGPTI at NDSU and TLN is launching a four-state initiative to provide technical training to department of transportation professionals.

Departments of Transportation in North Dakota, Montana, South Dakota and Wyoming face similar challenges. Workloads are increasing. The size of middle management is decreasing. Requirements for career-long learning and certification are escalating. Budgets are flat. And competition for trained people is fiercer than ever, notes Gary Berreth. "What's needed is an innovative approach that will help the agencies in our region address these challenges," he says.

Berreth was an administrative transportation engineer when he retired from the NDDOT in 2005 after a 37-year career there. Upon retirement he joined the UGPTI. He and Julie Rodriguez of UGPTI are leading the DOT technical training initiative.

Department of transportation administrators from the four departments met to discuss their technical training concerns and agreed to cooperatively investigate the feasibility of developing a program to innovatively provide quality technical training in a more cost effective manner. Because of UGPTI's previous experience with training, especially through TLN, the Institute was a logical candidate to coordinate this effort, Berreth says.

TLN is one mechanism for delivering technical training and can serve as a base for complementing or branching off into other innovative training options, he notes. Guidance for the initiative will be provided by an advisory group consisting of an executive management representative from each of the four DOTs, the director of the MPC, and the director of UGPTI.

Berreth is working with the departments to document their training resources, processes, needs, and concerns. After this information has been compiled a report will be prepared summarizing results along with recommendations to cooperatively improve technical training efficiencies for the representative agencies. The report will be reviewed by the advisory group to determine the extent of implementation of recommendations.

In 2005-2006, more than 20 technical training sessions were offered via the TLN. Topics included Intelligent Transportation Systems, statistics for materials engineers, border security law, nanotechnology, signal timing plans, economic benefits of highway infrastructure investment and effectiveness of superpave mixes as maintenance and rehabilitation activities. About 10 sessions are already scheduled for 2006-2007.

If approved, the next phase of the project, to be implemented in 2006 and 2007, will focus on developing training curriculums and packages that may include instructor-led training, train-the-trainer programs, self-study courses, online training, distance education efforts via the TLN, or other innovative training techniques. "We'll look at a variety of educational approaches so we can come up with what is most effective and efficient," Berreth says.

(Contact Gary Berreth, North Dakota State University, 701.224.2478 or [gary.berreth@ndsu.edu](mailto:gary.berreth@ndsu.edu))

# Research Program

To address the Center's theme and vision, the research program seeks to identify topics important to the region by incorporating input from clients and peer reviewers. The MPC is working toward its goal of aligning its research priorities to those of major client groups, U.S. DOT strategic goals and the the Transportation, Science & Technology strategy. These efforts are outlined in this section of the report.

## Completed Research Projects

- 169 County Road Planning Workbook B J. Hough; NDSU, (MPC 06-183)
- 190 Grain Highway Network Analysis: Use of Satellite Imagery and USDA Data to Forecast Heavy Truck Trips Generated from Rural Land Use Zones B D. Tolliver; NDSU (Report filed with NDDOT. No MPC report due to confidentiality of data)
- 215 Support Motion Effects in a Timber Trestle Bridge: Physical and Analytical Modeling B Steven Babcock; CSU (MPC 06-184)
- 234 Impact Performance Testing of Roadway Safety and Security Barriers - Phase 2 B Don Radford; CSU (MPC 05-172)
- 238 Evaluation of Strategic Logistics of Rural Firms B M. Berwick; NDSU (MPC 05-177)
- 240 Evaluation of Moisture Susceptibility of Asphalt Mixtures Containing Bottom Ash B K. Ksaibati; U of WY (MPC 06-179)
- 241 Evaluation of Pavement Crack Filling Materials B K. Ksaibati; U of WY (MPC 06-180)
- 243 Assessment of Thermal Stresses in Asphalt Pavements Due to Environmental Conditions Including Freeze and Thaw Cycles B D. Yavuzturk; U of WY (MPC 06-181)
- 249 Pultruded Composite Shear Spike for Repair of Timber Bridge Members B R. Gutkowski; CSU (MPC 05-173)
- 251 Adaptive Signal Control IV B P. Martin; U of U, (MPC 06-182)
- 253 Effectiveness of Traveler Information B P. Martin; U of U (MPC 05-175)
- 254 Utah Intersection Safety: Issues, Contributing Factors and Mitigations B W. Cottrell; U of U (MPC 05-176)

## Ongoing Research Projects

- 175 An Evaluation of ITS/CVO Application Technology in Logistics and Supply Chain Management B B. Lantz; NDSU
- 179 Full-Scale Laboratory Testing of a Timber Railroad Bridge B R. Gutkowski; CSU
- 193 Rigorous Computer Modeling of Timber Trestle Railroad Bridges B R. Gutkowski; CSU
- 201 Updating the Uniform Rail Costing System Regressions B J. Bitzan; NDSU
- 207 An Evaluation of Region 8 State Departments of Transportation and Metropolitan Planning Organizations= GIS Technology Application B D. Benson; NDSU
- 221 Trip Generation Rates for Grain Elevators: A Tool for State and Local Highway Planners B D. Tolliver; NDSU
- 228 Trucking Industry Churn and It=s Impact on Communities and ITS Adoption B J. Rodriguez; NDSU
- 247 Utilizing Recycled Glass in Roadway B K. Ksaibati; Uof WY
- 248 Wyoming Freight Movement System Vulnerabilities and ITS B R. Young; U of WY
- 250 Interactive Effects of Traffic- and Environmental-Related Pavement Deteriorations B D. Tolliver; NDSU/ K. Ksaibati; U of WY
- 252 High Occupany Vehicle Lanes Evaluation III B P. Martin; U of U
- 255 Network Planning Model for Local and Regional Railroad Systems B D. Tolliver; NDSU
- 256 Legal Establishment of County Roads (year 1) B K. Ksaibati; U of WY

- 257 Legal Establishment of County Roads (year 2) B K. Ksaibati; U of WY
- 258 Utilizing Recycled Glass in Roadways B K. Ksaibati; U of WY
- 259 Relating Vehicle-Wildlife Crash Rates to Roadway Improvements – R . Young; U of WY
- 260 Impact Performance Testing of Roadway Safety & Security Barriers - Phase 3 B R. Gutkowski; CSU
- 261 Time-Dependent Loading of Repaired Timber Railroad Bridge Members R. Gutkowski; CSU
- 262 Cambering of Wood-Concrete Highway Bridges – R. Gutkowski; CSU
- 263 Traffic Operations in Small Urban and Rural Areas – A. Smadi; NDSU
- 264 Evaluation, Definition, and Identification of the Criteria for Establishing Freight Corridors B M. Berwick; NDSU
- 265 Design/Build vs Traditional Construction User Delay Modeling: An Evaluation of the Cost Effectiveness of Innovative Construction Methods for New Construction B P. Martin; U of U

### **New Research Projects**

- 266 Small Urban and Rural Transportation - Phase II B A. Smadi; NDSU
- 267 Estimating Local Economic Impacts of Rail Investments and Rail Capacity Constraints in the HRS Wheat Market B K. Vachal; NDSU
- 268 Accessing International Container Markets from the Northern Plains B K. Vachal; NDSU
- 269 Economic and Environmental Implications of Alternative Fuel Use and Regulations in the Mountain-Plains Region B M. Berwick; NDSU
- 270 Serviceability Limits and Economical Steel Bridge Design – M. Barker; U of WY
- 271 A Comprehensive Transportation Safety Evaluation Program in the State of Wyoming B K. Ksaibati; U of WY
- 272 Use of Wind Power Maps to Establish Fatigue Design Criteria for Traffic Signal and Variable Message Structures – J. Puckett; U of WY
- 273 Low-Cost Soft Crash Barriers B P. Heyliger; CSU
- 274 Beneficial Use of Waste Tire Rubber in Low-Volume Road and Bridge Construction – J. Carraro; CSU
- 275 Z-Spike Rejuvenation to Salvage Timber Railroad Bridge Members B R. Gutkowski; CSU
- 276 Use of Salvaged Utility Poles in Roadway Bridges B R. Gutkowski; CSU
- 277 Safety Factor Increase to Fatigue Limit States through Shear Spiking for Timber Railroad Bridge Rehabilitation B J. van de Lindt; CSU
- 278 Bus-Stop Shelters - Improved Safety B W. Charlie; CSU
- 279 Structural Applications of Self-Consolidating Concrete B N. Wehbe; SDSU
- 280 Bridge Scour in Cohesive Soils B F. Ting; SDSU
- 281 The Assessment of Chloride Injury from De-Icing Salts in Trees Along State Highways in the Black Hills B J. Ball; SDSU
- 282 Analysis of the I-15 Express Lane Pilot Project B P. Martin; U of U
- 283 Seismic Vulnerability and Emergency Response of UDOT Lifelines B P. Martin; U of U
- 284 Adaptive Signal Control Evaluation V B P. Martin; U of U
- 285 Calibration and Validation of I-15 VISSIM Model Through A Genetic Algorithm – P. Martin; U of U

# Human Resource Development

## MPC Students

### Colorado State University

**Steve Babcock**, a graduate research assistant in the Department of Civil Engineering, completed his M.S. in August 2005. In spring 2003, he earned a B.S. in civil engineering at Colorado State University. During his undergraduate studies, he was lead designer for the steel bridge team that twice qualified for the National ASCE Steel Bridge Competition, after winning regional competitions. In summers 2000 and 2001 he was an Engineering Co-op Student with Central Federal Lands Highway Division of the FHWA, and was involved in highway and bridge construction. His thesis work was derived from an MPC project studying sub-structure performance of timber trestle railroad bridges. Presently, he is employed by the Washington Group, an international engineering firm.

**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.

**John Boulden** is presently conducting research on the time-dependent behavior of cambered wood-concrete beams as a predecessor to examining short span bridge system. He is an M.S. level graduate student and was supported as a research assistant by MPC funding. Presently, he is employed at the firm of CTL Thompson Structural Consulting Engineers as a Staff Engineer, after previous experience as a field technician with that firm. Before his experience with CTL he was a Pavement Management Intern with the City of Fort Collins, Colo. John was the recipient of a Computer Science, Math and Engineering Scholarship from CSU in 2002.

**Travis Burgers** completed an M.S. degree in Civil Engineering at Colorado State University in August 2005. He earned a B.S. degree in Engineering from Dordt College in Iowa. At CSU he has been a graduate teaching assistant and is presently a graduate research assistant. He has received numerous academic awards, among them the All-American Scholar Award, Dordt College Presidential Scholarship, and Pella Corporation Engineering Scholarship. He was a Co-Captain and 1st Team All Conference in Men's Soccer at Dordt College. He worked as a Test Lab Assistant at Behr Heat Transfer in Canton, S.D., and Surveying Assistant at Wilsey & Associates in Sioux Falls, Iowa. He completed a thesis based on an MPC-supported research project on the effects of environmental exposure on connections in timber railroad bridge systems. Presently, Travis is a doctoral student in Mechanical Engineering at the University of Wisconsin, Madison, involved in bio-engineering.



Steve Babcock



Susan Balogh



John Boulden



Travis Burgers

**Misty Butler** earned a B.S. in Civil Engineering from New Mexico State University, in spring 2003. She participated in the 2003 Undergraduate Summer Research Experience of the Colorado Peaks Alliance at Colorado State University, a program fostering women and minority students to enter graduate studies and pursue careers as a professor in higher education. She chose to continue graduate studies at CSU. She has summer internship experience in housing and land development with Conklin Associates Engineering in New Jersey. Misty was a graduate research assistant and conducted research on wood-concrete bridge deck systems and supervised construction of a ramp facility for testing roadway safety and security barriers.

**Xianzhe Chen** earned two bachelors degrees from the Wuhan University of Technology in China in 2003. The degrees are in automation and management. He is currently conducting research on supply chain operations related to inventory management and routing.

**Henrik Forsling** is an M.S. student in civil engineering. He earned his B.S degree in civil engineering at Colorado State University in 2004 and is a member of Chi Epsilon, the civil engineering honors society. The research area for his thesis is shear spike rejuvenation of timber railroad bridge members. He is conducting full-scale laboratory tests to examine durability of the method under repeated loading. He was graduate teaching assistant from that time through Spring 2006. He is presently a graduate research assistant and hopes to complete his M.S. in Fall 2006. In 2001-2002 he was awarded the Engineering Scholars Scholarship and in 2002-2003 the George T. Abell Scholarship from CSU. In 2003-2004 he was selected as a member of the President's Leadership Class at CSU. In 2001 he was an engineering intern with Water and Waste water works in Malmo, Sweden. In addition, he served as Battle Tank Commander in the Swedish Army in 1998-1999.

**John Kienholz** is a graduate student in the Department of Civil Engineering. He has worked as a teaching assistant facilitating the laboratory sections of the introductory course for civil, agricultural and bio-resource engineering students. His research is modeling the frequencies and acoustic modes of layered pyramids as applied to quantum dots. In the summer of 2003 he conducted research on modeling long, slender wooden members for use in destructible crash barriers. He received his B.S. in civil engineering from CSU in spring 2002. He was also a recipient of the Robert D. Wilson Memorial Scholarship as an undergraduate and is a member of the Chi Epsilon Honor Society. He has held internships with Sear Brown (recently purchased by Stantec) and Shear Engineering, both of Fort Collins. He also has experience in construction of residential homes steel buildings. He hopes to begin his career in structural engineering.



Misty Butler



Henrik Forsling



John Kienholz

**Matthew LeBorgne** is a research assistant working on various projects at the Structural Engineering Laboratory. He is pursuing an M.S. Degree in civil engineering. He earned a B.S. degree in manufacturing engineering at Cal Poly State University in 2004. From 2004 to early 2006 he was general manager/design engineer for Precision on Demand LLC, a small design and manufacturing company. He has a variety of work experience in construction ranging from apprentice to project manager positions.

**Fernando Ramirez** is a Ph.D. student and instructor at CSU. He earned a bachelor degree in civil engineering from the School of Engineering of Antioquia (Colombia), and has an M.S. in civil engineering from Colorado State University. After receiving his bachelor's degree, Ramirez worked as a structural design engineer for almost 10 years. His research interests are focused on the area of computational structural mechanics. Some of his current projects include low-density fibrous composites, smart materials and adaptive structures, and the mechanics of inorganic nanotubes. He was the recipient of the 2004 Chi Epsilon Gold Key Award for Excellence in teaching.

**Giang Lam To** is a graduate research assistant in civil engineering, pursuing a doctoral degree. His research interest is in advanced structural modeling of layered composite wood-concrete systems. He is studying time-dependent behavior and rheological phenomena under structural loading; including creep, shrinkage, swelling, humidity, mechano-sorptive effects, etc. He completed his M.S. degree in 2001 at the University of Transport and Communications in Hanoi, Viet Nam. His thesis was "Programming to Analyze Girder System with Arbitrary Boundary under Lateral Load by Finite Element Method." He is attending CSU in part because of a competitive-based funding from his government for gifted, outstanding students.



Matthew LeBorgne



Fernando Ramirez



Giang Lam To

## University of Utah

**Daniel Hadley** graduated from the University of Utah, Salt Lake City in Middle Eastern studies in spring 2006. He has won various awards including the Louis and Ethel Zucker Memorial Award for excellence in the study of Hebrew, and The Marion Farouk Sluglett Paper Competition Prize for "Catholicism, France and Zionism: 1895-1904". He will continue his education at Harvard University working towards a MTS (Master of Theological Studies) degree. He is a research assistant for the Utah Traffic Lab, and also provides technical support.

**Lisa Hadley** attended Brigham Young University in Hawaii and earned her B.A. in English from the University of Utah. She is working toward her master of fine arts degree in creative writing. She is an editor for the Traffic Lab.

**Venkateshwar S. Jadhav** is a research assistant at the Utah Traffic Lab. He received his B.S. at the National Institute of Technology in Surathkal Mangalore, India. He is working on his MS degree in civil engineering specializing in transportation engineering and is expected to graduate in 2008.

**Dejan Jovanovic** completed his B.S. degree at the Department of Transport and Traffic Engineering at the University of Belgrade, Serbia and Montenegro in 2005. He is working on two projects: VISUM Online and Fast Track IV (I-15 and 11400-new Interchange; I-80 State Street to 1300 East). VISUM-Online is a mesoscopic traffic flow simulation



software used for prediction. It computes traffic conditions and travel times used for dynamic route guidance. The Fast Track IV project researches the impact of construction on traffic flow. Dejan is a research assistant for the Utah Traffic Lab.

**Megan Sessions** attended the University of Utah and has earned bachelor degrees in both mass communication and English. She is working towards her M.A. in Education. She is an editor for the Utah Traffic Lab.

**Aleksandar Stevanovic** graduated for the University of Belgrade, Yugoslavia. He received a B.S. with honors in applied sciences and civil engineering in 1998. He earned his M.S. in civil and environmental engineering in 2003. He earned his Ph.D. from the University of Utah in civil and environmental engineering in 2005. Aleksandar is a post doctorate Traffic Lab research associate and has researched the deterioration of adaptive traffic control systems, the reliability of macroscopically optimized timing plans through microsimulation, and developing a forecasting model for managed manes using data from Utah's high occupancy vehicle (HOV) lanes.

**Jelka Stevanovic** is investigating traffic control signal settings optimization using genetic algorithms and is working on modification of the program so that it can be applied to a real network rather than a model network. She is a student at the University of Utah in civil and environmental engineering and is working on her M.S. degree in transportation. She graduated with her B.S. degree in 2003 in mathematics and informatics, at the University of Novi Sad, Serbia. Jelka is a research assistant at the Utah Traffic Lab.

**Ivana Vladislavljevic** 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 is continuing her graduate work at the University of Utah and is currently a research assistant at the Utah Traffic Lab. She is investigating the impact of the cell phone conversation on traffic flow using microsimulation software VISSIM, and has won the Intermountain Section Student Paper Contest and The District 6 Student Paper Competition for her research in this area.

## University of Wyoming

**Kamrul Ahsan** is working toward his second M.S. in civil engineering. The first he earned from the Bangladesh University of Engineering and Technology. He also holds a M.S. in computer science from Montclair State University in New Jersey. He is studying soil stabilization of the subgrade and the effect of different agents on that process. He is also studying dust control. He plans to work as a transportation engineer in design or research. He was recognized for excellent performance as a teaching assistant at Montclair State.

**Steven Carter** received his M.S. in civil engineering in 2004. He helped the Wyoming Department of Transportation study the effectiveness of crack surfacing material for asphalt pavements including the performance of thermal stress restrained specimen test, data collection and statistical analysis. He also earned his B.S. in civil engineering from the University of Wyoming. He is a member of the Tau Beta Pi Engineering Honor Society and is a registered engineer-in-training for the state of Wyoming.



Kamrul Ahsan



Steven Carter

**Vinod Kumar Sunchu Keshava** received his B.E. degree in chemistry from the Regional Engineering College in Tiruchirappalli, India. He ranked first in his class in the chemistry curriculum. He worked as a research student at the University of North Carolina in Charlotte on the Duke Power Project studying the leachability of fly ash. At the University of Wyoming he is working as a graduate researcher studying Wyoming freight movement and wind vulnerability. Vinod plans to pursue a career that will use his knowledge and skills in the fields of design, planning and transportation.

**Joel S. Liesman** is investigating freight movement and commodity flows in Wyoming while pursuing his M.S. degree in civil engineering. He will also analyze accidents involving trucks and will identify infrastructure critical to freight movement. He earned his B.S. in civil engineering from Colorado State University in 2003, graduating cum laude. He is a member of the Tau Beta Pi and Chi Epsilon Honor Societies. He received the CSU Civil Engineering Achievement Award in 2003. He is planning a career in design and planning improvements to the transportation infrastructure.

**Shiva Rama Krishna Sayiri** is studying moisture susceptibility of bottom ash asphalt mixes using bottom ash from power plants. He earned his B.E. degree from Muffakham Jah College of Engineering and Technology near Hyderabad, India, in 2002.

**Benjamin Weaver** is studying 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 is a member of Tau Beta Pi honor society and was named to the UW Dean's Honor Roll.

**Christopher Wolffig** earned his B.S. in civil engineering from the University of Wyoming in 2003. He is pursuing his M.S. in civil engineering. He is studying 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 is comparing actual economic data to perceived data from surveys. Wolffig served as the ITE student chapter vice president and plans to pursue a career in civil engineering.



Vinod Kumar  
Sunchu Keshava



Joel Liesman



Shiva Rama  
KrishnaSayiri



Benjamin Weaver



Christopher Wolffig

## North Dakota State University – Ph.D. Students

**Hua Chen** is a graduate student researching logistics and supply chain management and intermodal freight transportation planning. Chen earned his B.S. in economics at Renmin University of China, Beijing, in 1999. He earned an M.S. in management from Northern Jiaotong University, Beijing, in 2002.

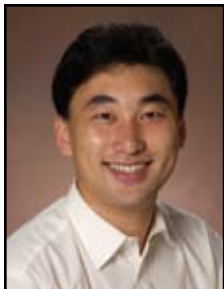
**Xianzhe Chen** is working to finish his Ph.D. and expects to graduate in 2007. Chen received his B.S. in automation and business administration from the Wuhan University of Technology in China in 2003. He came to NDSU, earning a M.S. in industrial engineering in 2006. Chen is interested in researching quality, logistics and supply chain management, forecasting and time series. Chen and Dr. Canan Bilen-Green presented their findings on the "Evaluation Methods for Autocorrelated Processes" at the 2006 Industrial Engineering Research Conference in Orlando, Fla.

**Junwook Chi's** research interests include economic characteristics of the airline industry and strategic freight analysis. Chi's work at the Upper Great Plains Transportation Institute has included a study on airfare differences between small and metropolitan areas and a study on the evaluation of the viability of intermodal facilities.

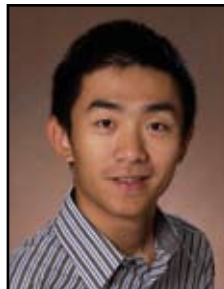
Chi received his B.S. in forest resources from Kon-kuk University in South Korea in 1998 and a M.S. in agricultural economics and business from the University of Guelph in Ontario, Canada, in 2002. Also in 2002, he received the Outstanding Masters Thesis Award from the Canadian Agricultural Economics Association.

**Alan Dybing** is a researcher at the Upper Great Plains Transportation Institute focusing on the areas of regional economic impacts of transportation infrastructure investment in North Dakota and on modeling intermodal facility locations. Dybing received his B.S. in agricultural education from North Dakota State University in 1999, followed by his M.S. in 2002. Currently, Dybing is working on his doctoral dissertation.

**Lei Fan** is working to finish his Ph.D. in transportation and logistics. In addition, Fan researches material handling, warehousing and grain terminal engineering. He is interested in modeling border crossing, port terminal trip generation and strategic planning for supply chain systems. He earned his B.S. in engineering in 1985 at Zhengzhou Grain College, now known as Henan University of Technology, in China. In 2005, Fan received his M.S. in engineering from the University of Manitoba in Canada. In the future, Fan wants to conduct consulting works in transportation and logistics engineering with a focus on research, design and evaluation of engineering projects.



Hua Chen



Xianzhe Chen



Junwook Chi



Alan Dybing



Lei Fan

**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, Calif. He earned a 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.

**Weijun Huang** of Zhangjiagang, China, received his M.S. from North Dakota State University in 2004. Prior to that, Huang studied at the University of Oklahoma City, where he received his M.B.A. In China, Huang received his B.S. in engineering at Zhengzhou Grain University. Huang is interested in researching motor carriers, logistics and economic development, grain logistics and regional economic development. His goal is to be a researcher or consultant in transportation or logistics.

**EunSu Lee** received his B.S. in computer engineering from Kwandong University in South Korea in 1996. Lee received his MBA from Hanyang University, also in South Korea, in 1999. Currently, Lee is working on his M.S. in industrial engineering. Lee conducts research at the UGPTI in the areas of multimodal routing, logistics network simulation and aviation planning. After graduation, Lee plans to work as a consultant to enhance business or work for other institutions as a researcher.

**Pan Lu** earned her B.S. at North China Electric Power University in 2002. Her research focuses on transportation and logistics and snow removal.

**Subhro Mitra** has been working as a graduate research assistant at the Upper Great Plains Transportation Institute since 2003. He received his B.S. in civil engineering at North Bengal University in India in 1993 and a M.B.A. at the Indian Institute of Social Welfare and Business Management in India in 1997. Currently, he is working on his Ph.D. in transportation and logistics at North Dakota State University. In his research at UGPTI, Mitra focuses on the development of statewide freight modeling, optimizing logistics networks for the agricultural industry and capacity assessments for the railroad network.



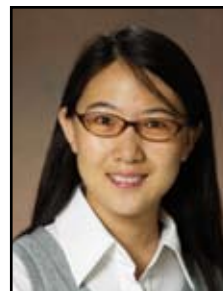
Tom Flanagan



Weijun Huang



EunSu Lee



Pan Lu



Subhro Mitra

**Sang Moon** was the first Ph.D. student to graduate from the transportation and logistics program at North Dakota State University in 2006. Moon first got his B.S. at Korea University in 2000. He went on to earn his M.S. at North Dakota State University in 2002. During his time at NDSU, Moon researched the effects of transportation systems in the major grain exporting countries on U.S. grain export and the world grain market. Moon also researched transportation systems and economics. He has joined the staff of Korea Institute for Industrial Economics & Trade in Seoul, South Korea.

**Diomo Motuba**, of Buea, Cameroon, earned his M.S. in agribusiness and applied economics from North Dakota State University, and may pursue a career in teaching or research. Motuba received his B.S. in botany from the University of Buea in Cameroon in 2000. At the UGPTI, Motuba researches freight transportation planning and the development and incorporation of freight into transportation planning models. In addition, he researches the use of GPS technology and logistics in improving planning models.

**David Ripplinger** is a researcher at the Upper Great Plains Transportation Institute in the areas of community transportation systems, intelligent transportation systems, student transportation and public transportation economics. Ripplinger received his B.S. from North Dakota State University in 2001, and his M.S. from Iowa State University in 2003. Ripplinger was awarded a scholarship from the Transportation Research Forum in 2006.

**Meera Singh** is researching the logistical and economic implications of increasing highway congestion. She received a B.A. in economics from Banaras Hindu University, India, in 1993, and her M.A. in economics from Ch. Charan Singh University, India, in 1995. She also received her M.S. in statistics from North Dakota State University in 2003. She is expected to graduate in the fall of 2006. Upon completion of her Ph.D., Singh plans to work as a transportation analyst and planner in transportation and logistics.



Sang Moon



Diomo Motuba



Dave Ripplinger



Meera Singh

**Napoleon Tiapo** earned his Ingenieur Agronome (a five-year post-graduate degree with concentration in agricultural economics) from the University of Dschang in Cameroon in 1993. At NDSU, Tiapo earned his M.S. in agribusiness and applied economics in 2002. Tiapo's research interests include transportation and economic development, the environment and investments in transportation infrastructure and the impact of social and economic returns. Tiapo plans to pursue a career in research and teaching, the private industry or promoting development-related issues with an international organization.

**Hai Zeng** expects to finish his Ph.D. in 2008. Zeng does research on the use of Radio Frequency Identification (RFID) in pharmaceutical loss management, as well as research on long-term pavement performance. Zeng earned his B.S. at the Guilin University of Electronic Technology in June 2003, and went on to earn his M.S. from NDSU in 2006. Zeng hopes to work at a logistics and supply chain consulting firm dealing with logistics and supply chain design and optimization or work with the applications of RFID.

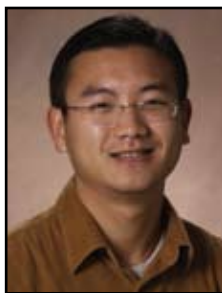
## Masters Students

**Asnan Afrasiab** is currently working on his M.S. in agribusiness and applied economics. He is expected to finish in 2007. He earned his B.A. in political science and mathematics from the University of Punjab in Pakistan in 2001. Next, he went to Concordia College in Moorhead, Minn., where he received a B.A. in economics in 2003. Afrasiab researches the role of transportation in trade diversion and trade creation effects of regional preferential free trade agreements. He plans to pursue a Ph.D. in international trade and economics and would like to work in the area of fiscal planning and international trade.

**Jian Gong** is working on his M.S. in Agribusiness and Applied Economics. He received his bachelor of economics degree with a specialization in finance from in 2002 from Fuzhou University in China. He worked as a marketing analyst with the China Construction Bank from 2003 to 2005 and was a junior stock analyst with Xingye Securities Exchange from 2002 to 2003. As a research assistant at NDSU since 2005 he has been involved in research to assess the impact of rising energy prices on agricultural fuel demand and the farm product cost structure in the United States.

**Scott Schram**

**Udit Molakatalla**



Hai Zeng



Napoleon Tiapo



Asnan Afrasiab



Jian Gong

# Student Program Activities

## Awards, Honors and Scholarships

### MPC Student Named Outstanding Civil Engineering Student

In May 2006, CSU undergraduate student Chris Turnbull Grimes was recognized as an Outstanding Civil Engineering Student by the Colorado Section of ASCE and its Northern Colorado Branch. Chris is active as a research aide on MPC research projects involving bridges and is currently President of the ASCE Student Chapter of ASCE.

### Dybing Named UTC Student of the Year



Dybing

NDSU Student Alan Dybing was named 2005 Region VIII Student of the Year at the Transportation Research Board annual meeting in Washington in January. Each year, the U.S. Department of Transportation (USDOT) honors the most outstanding student from each participating University Transportation Center (UTC) for achievements and promise for future contributions to the transportation field. Students of the Year are selected based on their accomplishments in such areas as technical merit and research, academic performance, professionalism, and leadership. Each student receives a certificate from DOT and \$1,000 from the student's UTC.

Dybing's Mountain-Plains Consortium nomination was based on his thesis work focusing on estimating transportation demand generated by the production and marketing of agricultural commodities in the state. He also worked on MPC-funded projects designed to estimate truck trips generated by the state's grain elevators.

"The work will be useful in road planning to evaluate the draw of trucks to elevators based on the elevators' characteristics," Dybing explained. For example, larger elevators that ship on unit trains, draw significantly more traffic than small elevators. That traffic may also include larger and heavier trucks. "Our work will be a planning tool for state and local officials looking at road maintenance and improvements."

A native of Maddock, ND, Dybing came to NDSU 10 years ago to major in agricultural education and minor in agricultural economics. Once he earned his B.S. degree, he began work on his master's degree in agricultural economics with the transportation option, a program jointly administered by the Department of Agribusiness and Applied Economics and the Transportation Institute.

Dybing was in the first class when NDSU launched its doctoral program in transportation and logistics in 2002. He is now an associate research fellow at the Upper Great Plains Transportation Institute at NDSU and is continuing to work on his Ph.D. in transportation and logistics.

### MPC Supports Scholarships at NDSU

Transportation Scholarship winners were recognized at the NDSU Upper Great Plains Transportation Institute annual awards banquet in October. The \$1,500 scholarships are funded by the Mountain-Plains Consortium through a grant from the U.S. Department of Transportation.

The University Transportation Engineering Scholarship recognizes academic performance and interest in the area of transportation. Recipients were Molly Holleman and William Doerr. Holleman is a junior at NDSU from Benson, Minn., pursuing a major in civil engineering and works as an engineering intern during breaks in the school year with the Swift County Highway Department in Benson, Minn. Holleman is currently employed with the Department of Transportation Support Center (DOTSC) and is working on a roadway design project.

William Doerr, originally from Hettinger, N.D., is a senior at NDSU pursuing a double major in civil and construction engineering. He works for the Department of Transportation Support Center (DOTSC) on an Interstate reconstruction design project.

The Abrahamson Transportation Scholarship recognizes individuals demonstrating academic achievement and leadership as well as an interest in the areas of agricultural transportation and logistics. The scholarship is given in honor of Paul Abrahamson, a pioneer in the ND Wheat Commission who served as its first administrator. Recipients were David Heinz and Chad Wegner. Heinz, a native of Cooperstown, is a senior at NDSU in agribusiness and applied economics. Following graduation in May, Heinz plans to join his family's farm operation. Wegner, a native of Fargo, is a senior at NDSU in business administration. He plans to start his own firm as a marketing consultant specializing in new product distribution.



Holleman



Doerr



Heinz



Wegner

### **University of Utah Student Wins First Prize in Paper Competitions**

Ivana Vladislavjevic's paper, "Impact of Cell Phone Conversation While Driving on Car Following Behavior" won first prize in two ITE student paper competitions: the Intermountain Section Student Paper Contest and the District 6 Student Paper Competition. Vladislavjevic is a M.S. Student in the Department of Civil and Environmental Engineering at the University of Utah. She also presented her paper to the Annual District Meeting on June 28 in Honolulu.

Aleksandar Stevanovic was invited to present a paper he coauthored with Peter T. Martin, and Jelka Stevanovic entitled, "Optimization of Pre-timed Signal Timing Plans Using Genetic Algorithms" at the PTV User Group Meeting in St Louis in May.

Also, a Vissim-Online paper authored by Dejan Jovanovic, Aleksandar Stevanovic, and Peter T. Martin was presented at the PTV User Group Meeting in St. Louis Missouri.



## Other Activities

### French Students Hosted at CSU

Three students from the Ecole National Supérieure Des Technologies Et Industries Du Bois in Nancy, France, will be hosted at CSU from June to August 2006. Guillaume Rousselet, Fabian Sowula and Cyrille Pondaven are supported by their institution for a Professional Training Period requirement of their studies in Wood Science and Technology. They will be involved in several MPC supported laboratory projects involving highway and railway bridge construction.



### NDSU Student Involved in ENO Project

NDSU student Junwook Chi is working with Kimberly Vachal and Doug Benson to update and improve ENO's Transportation in America publication. This report provides transportation statistical data for all modes of transportation and various facets of the transportation industry. Chi is collecting data, improving methods, and calculating transportation statistics to provide a comprehensive report.

# Faculty Activities

## Journal Articles/Conference Presentations

### Colorado State University

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## Other Activities

**Peter Martin**, University of Utah, was invited to Orange County to review the new Traffic Management Center. July 5, 2005. He also taught several short courses including:

- "PE Review Course" in Fall 2005 and Spring 2006
- "General Intro to Statistical Methods"
- "Technical Writing: Helpful writing skills for State DOT People"

**Sandra Woods**, head of CSU's department of civil engineering and MPC faculty member, was named interim dean of the CSU College of Engineering.

"Dr. Woods is an excellent leader who is clearly dedicated to the university and devoted to improving the College of Engineering," said Anthony Frank, senior vice president and interim provost. "I am confident that Sandy's dedication and experience will serve the college well during this time of transition."

Woods is a respected administrator, educator and researcher. Her service to the university includes serving on the Council of Deans, Diversity Coordinating Council, Commission on Women and Gender Equity and the College of Engineering Executive Committee. She served as interim vice provost from February 2004 to June 2005. In that role, she had responsibilities for the Graduate School, Office of International Programs and the Division of Continuing Education.

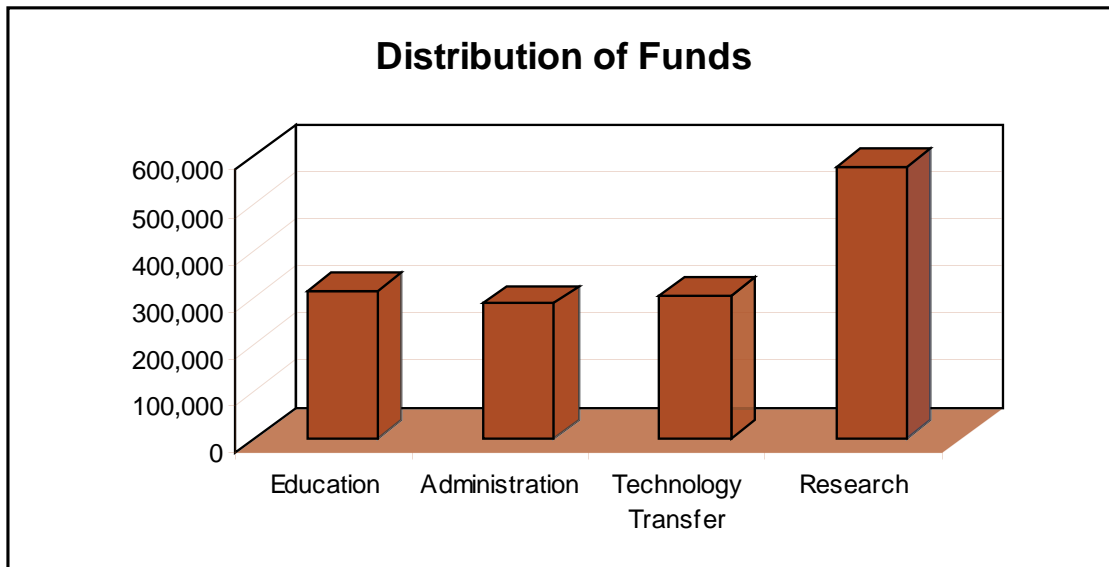
She came to CSU from Oregon State University, where she was a faculty member in the Department of Civil Engineering. During her 16 years at Oregon State, Woods also served as interim dean of Distance and Continuing Education and faculty associate to the provost.

Woods earned her M.S. in Civil Engineering in 1980 and her doctorate in civil engineering in 1985 from the University of Washington. She serves on the Executive Committee of the American Society of Civil Engineers Department Heads.

**Antonio Carraro** received an ASCE ExCEED Fellowship in summer 2005. This fellowship allowed him to attend the ExCEED Teaching Workshop held at the University of Arkansas and to become one of the newest ASCE ExCEED Fellows. In fall 2005, Dr. Carraro offered a new course, Engineering Properties of Soils.

# Resources and Funding

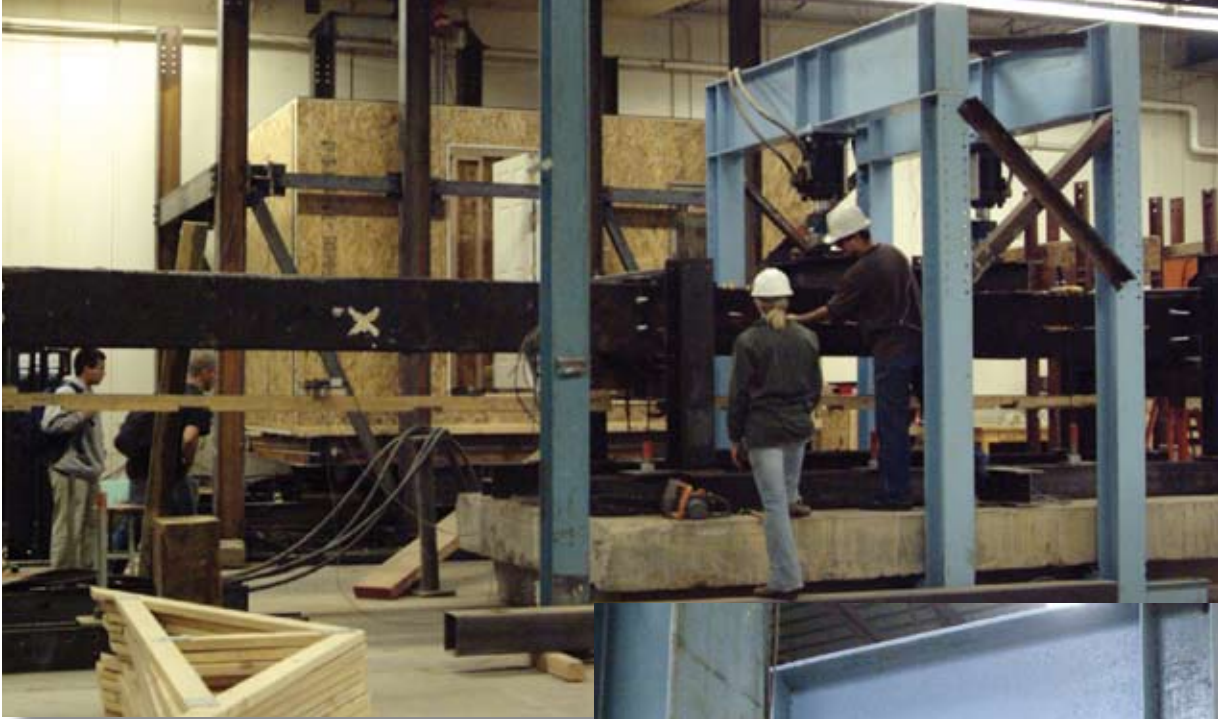
**July 1, 2005 – June 30, 2006**



## Funding Sources

North Dakota Department of Transportation  
Utah Department of Transportation  
Wyoming Department of Transportation  
Colorado State University  
North Dakota State University  
University of Utah  
University of Wyoming  
TLN Telecommunications Network (includes the NDDOT, SDDOT, MTDOT)





Shear Spike Test  
Research





Timber Trestle  
Research



Wood-Concrete  
Bridge Deck  
Research





