

Region 8

# MOUNTAIN-PLAINS CONSORTIUM

# NEWS

## PROJECT HIGHLIGHTS

### SDSU and USGS Team Together to Study Bridge Hydraulics and Scour

Francis Ting, an SDSU professor in civil engineering, and Ryan Thompson, a hydrologist from the United States Geological Survey (USGS) in South Dakota, are working together to determine the most cost-effective ways to use computer models in bridge hydraulics calculations. Their objective is to develop procedures and guidelines that engineers can use to improve the hydraulic analysis of bridge waterways with complex channel and floodplain geometry. The need for improved calculations of bridge hydraulics becomes apparent when predicting bridge scour when the results can be very sensitive to the flow velocity distribution at the bridge crossing.

Topographical and bathymetric (underwater topographic) data were collected at the Big Sioux River Bridge near Flandreau in August 2009. The field survey data were used to construct a computer model of the bridge site. The complex floodplain geometry at the Flandreau site makes this an ideal site to test and evaluate different levels of computer modeling for bridge hydraulics calculations. Model predictions will be compared with flow velocity data collected using an acoustic Doppler current profiler (ADCP), and computer simulations will be conducted to identify the site characteristics that produce the complex flow interactions observed between the floodplain and the main channel during flooding events.



Graduate student Richard Liggett collected bathymetric data in the Big Sioux River near a bridge outside Flandreau, SD. Field survey data are entered into computer models to predict flow characteristics and the associated bridge scour depths produced by large floods.

(Bridge Hydraulics continued on page 2)

(Bridge Hydraulics continued)

The project is co-sponsored by the Mountain-Plains Consortium (MPC) and South Dakota Department of Transportation (SDDOT). Graduate students involved in the project are Ryan Larsen from Elk Point and Richard Liggett from Huron, SD.

### Flexible Barriers in Transportation Systems: The Use of Novel Materials



Paul Heyliger  
Colorado State University

Many transportation systems require barriers to permanently or temporarily cordon off different zones, divide medians, provide crash resistance, or serve as a means of absorbing

kinetic energy in emergency ramps. This can include systems ranging from orange traffic cones to massive concrete partitions. As part of an ongoing study to examine new designs for the latter class of structure, novel biological materials are being studied as inexpensive, renewable, and environmentally friendly elements to provide structural capacity. One of the candidates includes a class of structural systems composed of bamboo. This material, which is rapidly gaining traction in applications ranging from clothing to high-end wood flooring, has a well-deserved reputation for being 1) low cost, 2) very fast growing, and 3) relatively high strength.

Students at Colorado State University (CSU), including Jordan Jarrett, Karthik Rechan, Griffith D’Costa, and Thang Dao, have been completing experiments on both small-diameter bamboo elements and woven mats in collaboration with Dr. John van de Lindt of CSU. Woven bamboo mats, which are mass-produced in India and other countries in Southeast Asia, have been found to possess rather astonishing strength and toughness properties at extremely low cost. In the figure, a four-foot wide section of this woven composite under initial tension is being subjected

to a line load. This particular specimen took more than a ton of load before significant damage was induced, characterized by the fracture of individual strips. Yet even after this initial damage, the mat continued to possess enough resistance that the test had to be stopped because of physical limitations of the test procedure. Dynamic tests are in progress.

Among others, bamboo structures are being further considered in various applications where a soft structure with high ultimate strength is required. These materials possess numerous additional traits, including the ability to eventually degrade over time – something that could be beneficial for certain applications. They may provide an additional material choice to the usual selections of metal, concrete, and structural timber.

### Workshop Brings Asset Management Concepts to Local Officials

Local road managers across the Upper Great Plains and Mountain West will do a better job of tracking needs and directing investments, thanks to a two-day video workshop sponsored by the Mountain-Plains Consortium.

The “Roadway Surface Management Workshop for Local Officials,” held Nov. 2-3, was directed at local roads officials with little or no experience with asset management. Thanks to the use of video conferencing technology, the conference included participants at 19 sites in North Dakota, South Dakota, Montana, Wyoming, Utah, and Colorado. Ten formal presentations were made from seven of the sites, with ample time for discussion and questions.

“This was a major outreach to local and tribal road planners,” noted Denver Tolliver, director of the Mountain-Plains Consortium, a major sponsor and organizer of the event. “Asset management is well-practiced at the state and federal level, but there’s not as much experience and capacity at the local level.” He notes that most road miles in the Upper Great Plains and the intermountain West are rural roads under the authority of local

governments or tribal managers. “That’s a huge percentage of our infrastructure where this approach is greatly needed,” he said.

The conference had two primary goals: to learn how extensively asset management techniques are applied by road managers in the region; and to identify ways to help them implement principles of asset management that are appropriate to the limited budgets and personnel available to them.

Presentations during the conference included

- An overview of asset management concepts by Thomas Van, highway engineer with the FHWA’s Office of Infrastructure and Office of Asset Management
- First steps to an asset management program by Ron Hall, director of the Colorado State University Tribal Technical Assistance Program.
- Key steps to improving gravel and pavement management systems by George Huntington, of the Wyoming LTAP.
- Communicating infrastructure issues and priorities by Doyt Bolling, with the National Center for Pavement Preservation.

Steve Gaj, leader of the System Management and Monitoring Team in the FHWA’s Office of Asset Management, noted that the need for an asset management workshop was evident from participant comments during the 2008 Rural Roads Conference in Rapid City, SD. “Asset management could be used to help road managers answer the question, ‘If you received additional funding, how could it best be used?’”

Gaj noted that management systems should help agencies assess the quality of their roads and how much money would be required to maintain or improve them, and help track various performance measures. “Is your budget linked to what you’re doing?” he asked. “A good asset management system should help you plan, implement, and evaluate your investments.”

“It was a very good session,” noted Dennis Trusty, director of the Northern Plains Tribal Technical Assistance Program in Bismarck, ND. “Unfortunately, things are not as advanced as we had hoped.”

Trusty surveyed tribes across the country to find if any were implementing asset management systems. “We caught a few in the initial stages phases of implementation,” he noted. “In North and South Dakota, Wyoming, eastern Montana, and northern Nebraska, we’re just getting a good start.”

Non-tribal agencies are a little farther ahead. In a survey of South Dakota counties, Ken Skorseth, South Dakota LTAP program manager, found that about half have a formal management system for roads, bridges, and signs while less than half have any formal management of culverts.

Skorseth gave a presentation on moving from data collection to management, urging participants to set realistic goals. “Keep things simple or pretty soon you’ll be drowning in data and starved for information. Asset management approaches must be matched to the agency,” he said. Larger agencies with many assets have a greater need for higher levels of management with a comprehensive reporting capability. Conversely, smaller agencies with very limited staff and budgets need simple systems with limited data input and the capability to provide concise, condensed reports.

Other presenters included staff from county road departments and municipal public works departments who detailed their efforts to implement asset management programs. They discussed benefits from the systems and answered questions about the budget and staffing needs required to implement them.

Tolliver noted that the use of video conferencing technology was especially appropriate for this workshop. “Video allowed us to reach a very large part of our audience. Travel is difficult for them because of the cost and the fact that they are often a one-person show and it’s difficult for them to be away from the office for any significant amount of time.”

[\(Asset Management continued on page 4\)](#)

(Asset Management continued)

Trusty, who participated in the workshop from a site at the NDLTAP office in Bismarck, said the video conferencing worked well. “When you use technology to reach an audience this large and spread this widely, you’re bound to have a few issues. But a lot of people got a lot out of this workshop.”

FHWA’s Gaj also observed, “Look at how people sat in and participated in this event. We saw the interest and it’s an important issue. Let’s think about how we can move forward from here.”

“We have some momentum and a good group,” Tolliver noted. “The number of states and organizations involved gives us a head start in assembling some approaches and strategies that will be useful to many of the planners and managers in our region.”

A CD of resource materials has been prepared by Thomas Van of the FHWA and contains 44 asset management documents, case studies, and manuals. The CD also contains copies of each of the presentations made during the workshop. A copy was sent to each participant.

## PROJECTS COMPLETED

Several MPC projects were completed in 2009. Full reports on the efforts can be found by using the search function at <http://www.mountain-plains.org/pubs/>.

### Traffic Modeling to Support HOT Lanes

Researchers at the Utah Traffic Lab at the University of Utah modified a computer model of express lanes in the Salt Lake City area so that it can be used to evaluate various toll and traffic management scenarios.

Traffic Lab director Peter Martin notes that innovative lane management offers the opportunity to levy fees for the premium road space. Express lanes in Utah offer road users

reduced journey times for a fee. The Utah Department of Transportation (UDOT) has converted the high-occupancy-vehicle (HOV) lanes on Interstate 15 in the Salt Lake City metropolitan area to express lanes. Express lane subscribers and HOVs now share the same lane. UDOT is also planning to implement an electronic toll-collection system.

Martin notes that improper pricing policy for the high-occupancy-toll (HOT) lanes could cause a large debate among travelers and potentially jeopardize success of the strategy. Consequently, UDOT needed an informative decision about further HOT pricing. The I-15 VISSIM model developed by the Traffic Lab can serve as a decision support tool for those decisions. Researchers modified and calibrated the I-15 VISSIM model that integrates HOT pricing. They also propose an algorithm for HOT pricing that would enable real-time variable congestion pricing. More detail is available in the final report, MPC Report No. 09-210, “Express Lane Genetic Algorithm Microsimulation Evaluation (Part 2) ELGAME 2.” The research was conducted by Martin, and research assistants Ivana Vladisavljevic, James Ries, and Bhagavan Raju Nadimpalli.

### Research to Improve Rural Use of Dynamic Message Signs

University of Wyoming researchers studied the use of dynamic message signs on Interstate 80 between Laramie and Cheyenne to develop a decision support system that will use real-time weather and speed variables to improve the consistency, quality, and timeliness of rural travel information. Their research could help improve the use of the signs in other rural areas.

In their study, the researchers evaluated of the consistency of past DMS messages, surveyed both frequent and random travelers, and conducted statistical analyses of the correlation between speed, weather, and DMS data. They also evaluated the current message decision system utilized by the Wyoming Department of Transportation (WYDOT).

“Traveler information systems were originally utilized in urban areas to reduce congestion. Traveler information has become increasingly important in rural areas, especially in areas with adverse weather conditions, such as Wyoming,” noted Rhonda Young, a University of Wyoming associate professor of civil engineering. “Dynamic message signs are often used to provide information during a traveler’s trip. Current research literature does not contain much guidance for the rural use of the signs.”

Young notes that dynamic message signs are becoming more common in rural areas that experience severe weather conditions because they allow agencies to inform drivers of road and weather conditions. “By utilizing various types of collected data from speed sensors, weather stations, pavement sensors, and weather forecasts, traveler information can be accurately and efficiently supplied to drivers both before and during their trip through technologies such as dynamic message signs.”

Based on the ongoing research, decision guides will be developed to assist the dispatch operators in message selection. The expert system takes real-time weather and speed data into account and suggests a recommended message for each DMS to the operator. Speed data, weather, and snowplow operator observations are included in this determination because of the lack of weather data coverage along the entire route.

In the short-term, before the complete decision support system is developed, the researchers recommended practices that can be implemented by WYDOT to improve the effectiveness of the DMSs. Because the most drivers see and read the signs, it is important that the information given on the signs be accurate, credible, timely, and consistent. Operators should:

- Utilize predetermined message sets as much as possible to improve consistency.
- Update the information more frequently, in accordance with the changing roadway and weather conditions, to improve its accuracy.
- Provide more detailed information when applicable (e.g. wind gusts, accident locations, lane closures).

For more information, see the final report for the first phase of this project, MPC Report No. 09-211A, “Developing System for Consistent Messaging on Interstate 80s Dynamic Message Signs Phase 1.” The research was conducted by Young and graduate student Michelle Edwards.

### **Additional Project Final Reports**

“Developing Public Transit Support for Transportation and Mobility: A Guidebook,” MPC Report No. 09-212, by Kathryn Harrington-Hughes at the Upper Great Plains Transportation Institute at North Dakota State University.

“An Evaluation of Passenger Values and Comparison of the MZX Versus Other Regular Buses,” MPC Report No. 09-213, by Aleksander Stevanovic, Milan Zlatkovik, and Bhagavan Nadimpalli at the Utah Traffic Lab at the University of Utah.

“Evaluation of Optimal Traffic Monitoring Station Spacing on Freeways,” MPC Report No. 09-214, by Peter T. Martin, Piyali Chaduri, and Aleksander Stevanovic at the Utah Traffic Lab at the University of Utah.

“Wyoming rural Road Safety Program,” MPC Report No. 09-215, by Khaled Ksaibati, Cheng Zhong and Bart Evans at the University of Wyoming.

“Use of Salvaged Utility Poles in Roadway Bridges: Time-Dependent Behavior of Composite Wood-Concrete Beams,” MPC Report No. 09-216, by Nathan J. Miller, Richard M. Gutkowski, and Jenő Balogh at Colorado State University.

# RESEARCH PROJECTS (2009-10)

## Colorado State University

- MPC-275 Z-Spike Rejuvenation to Salvage Timber Railroad Bridge Members (3rd Year)
- MPC-278 Bus-Stop Shelters-Improved Safety
- MPC-301 Sustainable Concretes for Transportation Infrastructure
- MPC-303 Seed Project–Beneficial Use of Off-Specification Coal Combustion Products to Increase the Stiffness of Expansive Soil-Rubber Mixtures
- MPC-323 Risk-Based Advisory Prevention System for Commercial Trucks under Hazardous Conditions
- MPC-324 Reliability-Based Safety Risk and Cost production of Large Trucks on Rural Highways
- MPC-325 Fatigue Testing of Wood-Concrete Composite Beams
- MPC-326 Rapid Load Rating of Short Rural Bridges
- MPC-327 Seismic Risk Assessment for the I-25/I-70 Corridor in the Mountain Plains Region of the U.S.
- MPC-328 Low-Impact, High-Toughness Transportation Barriers

## North Dakota State University

- MPC-329 Traffic Safety: Pilot Study to Assess Sustained and Multifaceted Activity on North Dakota’s Rural Roads
- MPC-330 Integrate Supply Chain Model in Urban Freight Planning
- MPC-331 Using ND Traffic Records to Identify Higher Risk Teen Drivers
- MPC-332 Estimation of the Generalized Truck Freight Elasticity of Demand: Case Study of the Seattle-Tacoma to Chicago Corridor
- MPC-333 Implementing Traffic Safety Evaluations to Enhance Roadway Safety
- MPC-334 Proper Seat Placement of Children Aged 4 to 12 within Vehicles
- MPC-335 Misinformation Contributing to Safety Issues in Vehicle Restraints for Children
- MPC-336 ND Wheat Transportation Knowledge for Market Enhancement
- MPC-337 Analysis of Freight Fuel Efficiency with Comparisons to Waterways and Truck Transportation

## South Dakota State University

- MPC-305 Jointed Plain Concrete (JPC) Design and Construction Review
- MPC-306 Optimization of Pavement Marking Performance
- MPC-315 Analysis of Compound Channel Flow with Two-Dimensional Models
- MPC-316 Mitigation of Corrosion in CRC Pavement
- MPC-317 Development of Safety Screening Tool for High Risk Rural Roads

## University of Utah

- MPC-288 Utah Department of Transportation Traffic Operations Center Operator Training (TOC)
- MPC-313 Evaluation of LRT and BRT Impact on Traffic Operations
- MPC-314 Assessing the User Impacts of Fast-Track Highway Construction
- MPC-322 Driver Simulation

## University of Wyoming

- Implementation of the Mechanistic-Empirical Pavement Design Guide
- MPC-318 Investigating Crashes and Geometric Conditions in the State of Wyoming
- MPC-319 Gravel Roads Management: Developing a Methodology
- MPC-320 Pricing Strategies for Rural Freeways
- MPC-338 Use of Wind Power Maps to Establish Fatigue Design Criteria for Traffic Signal and Variable Message Structures

## FACULTY ACTIVITIES

### Sigl Retires After More Than 40 Years of Service



Arden Sigl

Arden Sigl, professor emeritus of civil and environmental engineering, retired from SDSU in May 2009. Sigl had a distinguished career that lasted more than 40 years in the Department of Civil and Environmental Engineering at SDSU. He taught courses in mechanics, materials, and structural engineering analysis and design. During his tenure at SDSU, he led many research studies in the field of bridge engineering. In the last three years, Dr. Sigl was a co-principal investigator on two MPC co-sponsored research studies.

### CSU Professor and Students Appear on History Channel



Richard Gutkowski

Richard Gutkowski, CSU professor of civil and environmental engineering, participated as an expert commentator in two episodes of the Life after People series on the History Channel. On June 9, he appeared in the episode, "Armed and Defenseless," which focused on Denver, CO, and Honolulu, HI, and covered the mechanisms of how exposed tall buildings eventually collapse without human intervention and illustrated the phenomena by the simulated collapse of the Wells Fargo Center (aka "the cash register building") in downtown Denver. CSU students Chris Turnbull-Grimes, Nathan Miller, and Kris Bruun constructed a model multi-story building framework and used it to physically simulate how tall buildings such as the World Trade Center twin towers experience a rapidly cascading collapse of floors and columns

once one level gives way. On June 2, 2009, Dr. Gutkowski provided comments covering the eventual collapse of the Stratosphere Tower in Las Vegas as part of the episode, "Sin City Meltdown," focused on Las Vegas and Atlantic City.

### Gutkowski Presents Work in Portugal

Richard Gutkowski, CSU professor of civil and environmental engineering, was a speaker in a public forum, a seminar, and meetings with officials held during the festival of the pine organized by the municipality of Oleiros, Portugal. The seminar, "Structural Applications of Roundwood Timber," was held in August and was sponsored by the local development agency, "Pinhal Maior," and the University of Coimbra. Gutkowski spoke on the Scott Lancaster Memorial Bridge project in Colorado, an example of work he did in round pole construction. The project was constructed by the local community of Idaho Springs and named for a local high school student killed by a mountain lion. Other speakers were from the municipality of Oleiros, the National Laboratory for Science and Technology in Lisbon, Portugal, the University of Coimbra, and the Portuguese Department of Agriculture. Gutkowski is working with Rui Batista from the Portuguese Department of Agriculture to foster a wood-concrete bridge demonstration project in the Olieros region as an application of ongoing MPC-sponsored research on that topic.

### Wehbe to Serve on TRB Committee



Nadim Wehbe

Nadim Wehbe, SDSU professor of civil and environmental engineering, was appointed to TRB Committee AFF50: Seismic Design and Performance of Bridges. Wehbe will serve on the committee for a three-year term starting April 15, 2009.

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### CSU Researcher Wins Prize from ASCE



Suren Chen

Suren Chen, CSU assistant professor of civil and environmental engineering, was the recipient of the 2009 Collingwood Prize from the American Society of Civil Engineers for the paper, "Equivalent Wheel Load Approach for Slender Cable-Stayed Bridge Assessment Under

Traffic and Wind: Feasibility Study," published in the Journal of Bridge Engineering, November-December 2007. Currently, fatigue design only considers one truck per bridge, which may not be rational for long-span bridges. Chen's paper develops a new "equivalent dynamic wheel load approach" for considering the complicated interactions between vehicle, bridge, and wind when more than one vehicle may be present by creating equations which are independent of the number of vehicles. The simplification resulting from the new method lays a foundation for advancing bridge design codes to more accurately analyze fatigue for long-span bridges under wind and actual traffic conditions.

The Collingwood Prize is awarded to the author or authors, under 35 years of age, of a paper describing an engineering project with which the author is directly connected, or recording investigations contributing to engineering knowledge to which the author has contributed some essential contributions and which contains a rational digest of results.

## STUDENT ACTIVITIES

### NDSU Graduate School Announces New Degree Programs

NDSU's Graduate School added new graduate programs for the 2009-10 academic year. The Transportation and Logistics Program in the College of Graduate and Interdisciplinary Studies now offers two new graduate degrees and two new certificate programs. The programs will focus on urban transportation systems; linkages between transportation, land use, the environment, emergency response, and logistical delivery systems; coordinated planning, operations and security; and the spatial dimensions of urban systems.

- The Master of Science in Transportation and Urban Systems degree is targeted at students with strong research interests and capabilities who want to work in the fields of research or education. Two courses for this program will be available in fall 2009.
- The Master of Transportation and Urban Systems degree is targeted at mid-career professionals and other candidates who want to gain skills appropriate to their career without participating in advanced research. Two courses for this program will be available in fall 2009.
- The Transportation and Urban Systems Certificate is a program designed to enhance working professionals' credentials in the transportation and logistics field.
- The Transportation Leadership Graduate Certificate is an online program designed to prepare future leaders of the transportation industry. This prestigious program is an initiative of the Regional University Transportation Centers. This program will be available fully online starting in spring semester 2010. However, students are encouraged to begin the admission process in the 2009 fall semester.



## Lee Inducted into Tapestry of Diverse Talents at NDSU

NDSU transportation and logistics student Eunsu Lee was inducted into the Tapestry of Diverse Talents Dec. 11 in NDSU Memorial Union.

The Tapestry of Diverse Talents, a program of the NDSU Memorial Union, recognizes students, faculty, staff, and alumni for the diversity and contributions they bring to North Dakota State University. Each semester, individuals are added to the Tapestry, reflecting the ages, classes, ability, ethnicity, gender, races, regional differences, sexual orientations, beliefs, and values of the university community. The Tapestry kindles the spirit to diversify diversity. Lee was one of two individuals inducted into the tapestry for the fall semester.

Lee, of South Korea, received his B.S. in computer engineering from Kwandong University

in South Korea in 1996. Then, Lee received his MBA from Hanyang University, also in South Korea, in 1999. Currently, Lee is working on his M.S. degree. He currently researches at the Upper Great Plains Transportation Institute in the areas of multimodal routing, logistics network simulation, and aviation planning.

The award recognizes Lee's efforts to provide information and news to people who want to share Korean language and culture for diversity and support communication among students, faculty, and Fargo-Moorhead people who are interested in Korean culture. Lee was one of the founders of the "Bison Herald," an organization, online forum and newspaper directed at those goals.

(Student Activities continued on page 10)



Richard A. Hanson, NDSU president, and Eunsu Lee.

(Student Activities continued)

## Student Presents Research at World of Coal Ash



Carolyne Namagga

CSU student Carolyne Namagga presented her paper titled "Optimization of Fly Ash in Concrete: High Lime Fly Ash as a Replacement for Cement and Filler Material" at the 2009 World of Coal Ash Conference in Lexington, KY, in May. Namagga is an M.S. student working with assistant professor of civil and environmental engineering Rebecca Atadero. Her research is funded by the MPC project Sustainable Concretes for Transportation Infrastructure. She is investigating the effect of a local fly ash on the strength, freeze-thaw durability, and bond strength of concrete.

## NDSU Hosts Senate Armed Services Committee Staffer

NDSU's Transportation and Logistics Program hosted Creighton Green, professional staff member with the U.S. Senate Armed Services Committee, on Sept. 3. Greene spoke about the policies and procedures of the committee.

Greene also gave background information on his position as the committee's staff member for transportation and logistics. He discussed the role of logistics management for the best logistic systems and suppliers in order to keep the leadership in warfare and support the needs of the warfighter and ended his presentation by taking questions from students.

Greene is a professional staff member supporting the subcommittees on Seapower, Airland Forces and Strategic Forces. His responsibilities include reviewing the Air Force, Navy, and Marine Corps aviation program; Navy shipbuilding programs; Navy and Air Force conventional investment programs; and defense-wide intelligence programs.

"Mr. Green provided some good insights on how civilian leaders focused on military logistics systems and how important these systems are for accomplishing the country's strategic objectives," said Jeremiah O'Connor, a graduate student in transportation and logistics. Other students who attended the presentation were Khalid Bachkar, Charles Briggs, Lei Fan, Xing Lu, Annie Thomison, Kartik Sundhar and transportation and logistics academic program director Jody Bohn.

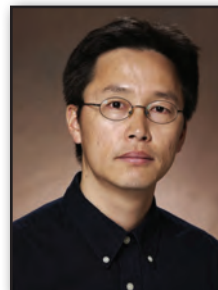
## Students Attend North American Freight Flows Conference

Transportation and logistics graduate students attended the North American Freight Flows Conference in Irvine, CA. Doctoral student Christopher DeHaan presented "Analyzing Freight Data Between the Borders in North America" for the conference's Innovative Uses of Data session. His

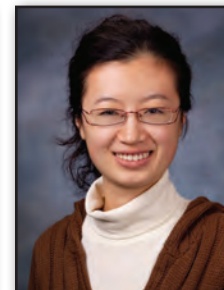


Chris DeHaan

presentation discussed an analysis of the rail gateways on the U.S.-Canada and U.S.-Mexico border for 2008. Doctoral students Qing Liu and Eunsu Lee also attended the conference. The Association of Transportation and Logistics sponsored the students' attendance at the event. The North American Freight Flows Conference was hosted and organized by the Transportation Research Board and brought together government and industry managers, analysts, and data specialists concerned with North American freight flows. A main objective of the conference was to identify improvements in the availability and use of freight transportation data in North America and to identify areas that require future research.



Eunsu Lee



Qing Liu

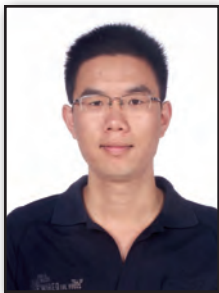
## Student attends NSF conference



Jun Wu

CSU Ph.D. candidate Jun Wu received student grants to attend the National Science Foundation Civil, Mechanical and Manufacturing Innovation Conference held in Hawaii. She gave a poster presentation about her research on lifetime analysis and damage detection of long-span bridges. The conference had an international attendance of 1,500 people from academics, industry, and government, and address issues related to globalization, specifically in the context of research and education. Conference activities included more than 700 poster presentations, and plenary and breakout sessions on funding opportunities and proposal writing, research needs, opportunities, and best practices.

## Student Makes Presentation to NIOSH Center



Feng Chen

CSU Ph.D. candidate Feng Chen gave a presentation about I-70 traffic safety study at the Mountains and Plains Education and Research Center's (MAP ERC) second annual research symposium in November. The study is part of a project funded by MAP ERC, which is the education and research center of the National Institute for Occupational Safety and Health

Transportation and logistics students tour BNSF facilities

Students in NDSU's Association of Transportation and Logistics toured Dilworth's Burlington Northern Santa Fe (BNSF) Railway facilities last spring. The tour, which allowed students to interact with yardmasters, gave students a better

understanding of railroad terminal operation.

The students study intermodal transportation and rail technology to identify shippers' and carriers' advantages. The visit to Dilworth's BNSF railroad terminal allowed the students to gain a better understanding of the concepts presented in class through first-hand observation. Students also gained a better understanding of the importance of safety and technical assistance.

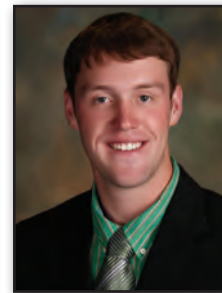
"The tour was very beneficial because it gave us real experience with the rail industry," said student Lei Fan. Others who participated in the tour were EunSu Lee, Ieelong Chen, and Subhro Mitra.

## MPC Funds Scholarships

The Upper Great Plains Transportation Institute awarded two, \$1,500 scholarships to civil engineering students at its annual awards banquet in October. Garrett Brunell, a senior from Elk River, MN, and Thomas Kading, a senior from Park Rapids, MN, received Transportation Engineering Scholarships. The scholarships recognize academic achievement and promote the education of transportation students at NDSU and are funded by the Mountain-Plains Consortium.



Garrett Brunell



Thomas Kading

(Student Activities continued on page 12)

(Student Activities continued)

## Students Attend International Transport Economics Conference

NDSU transportation and logistics graduate students attended the International Transport Economics Conference June 15-16 at the University of Minnesota. The MPC sponsored their trip.

The International Transport Economics Conference brings together researchers, practitioners, and policy makers interested in questions of transport economics. Key topics of the conference included revenue and finance; congestion, pricing, and investment; production function and cost estimation; transport demand; energy and environment; safety; institutions and industrial organization; and transport and land use.

NDSU's transportation and logistics graduate student Lei Fan presented his paper, "Global Supply Chain in Container Shipments: Impacts of Congestion on Imports to United States," at the conference. Other students who attended the conference were Qing Liu, Eunsu Lee, Elvis Ndembe, Khaled Bachkar, Eileen Campbell, Steven Leon, Ieelong Chen, and Chris DeHaan.



Lei Fan

## MPC Expertise Now at Use in Peace Corps

A former MPC student and graduate of CSU is putting his expertise to use in Kenya with the Peace Corps where he will be teaching math and will be involved in water engineering projects.

The 27-month assignment is a dream come true for Chris Turnbull-Grimes. "I love to travel," he said. "I've always wanted to go places. My long-term goal has always been to do this (join the Peace Corps)."



Turnbull-Grimes

This is not the first time Turnbull-Grimes has gotten his hands dirty through involvement in projects outside of the United States. He travelled four times to El Salvador with the CSU chapter of Engineers Without Borders where the group drove a well, installed a pump, and developed a distribution center where area residents could get fresh water. The goal was to provide a sustainable source of clean water for a village of 500 that relied on hand-dug wells that often dried up during the area's dry season.

Turnbull-Grimes specialized in structural engineering in his degree programs. While at CSU, he was involved in MPC research to test crash barriers and to study alternative materials, such as wood, for those barriers. "The research projects at CSU, particularly the MPC projects, were a crucial part of my education," he says. "The biggest thing for me was the experience of learning how to take a project from start to finish and how to write reports to communicate your research."

While at CSU, Turnbull-Grimes was president of the ASCE student chapter and co-captain of its steel bridge team.

# NEW STUDENTS

## North Dakota State University

**Maher Itani**, of Beirut, Lebanon, recently started his Ph.D. program in transportation and logistics. His research is on identifying the logistical challenges faced by humanitarian organizations. Itani received his bachelor's degree in mathematics from American University of Beirut in 1992.



Maher Itani

In 1994 he received a maitrise degree in statistics from Lebanese University. In 1996 Itani received a master's degree in business administration. In 2008 he received his Member of the Chartered Institute of Purchasing and Supply (MCIPS) from the Chartered Institute of Purchasing & Supply in Stamford, United Kingdom. Before attending NDSU, Itani received a meritorious award from the United Nations for his performance in the year 2006. Upon completion of the program, Itani plans to continue his work at the United Nations.

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



Mridula Sarker

**Sumadhur Shakya**, of Ludhiana, India, recently started his Ph.D. program in transportation and logistics. His research is in risk management of transportation and logistics. Shakya received his bachelor's degree in crop science from Punjab Agriculture University in Ludhiana, India, in 2005. In 2009 he received his masters in international agribusiness from NDSU. Upon completion of the Ph.D., Shakya plans to conduct research and teach in land-grant universities and do consulting work in the private sector.



Sumadhur Shakya

## South Dakota State University



Tom Larsen

**Tom Larsen** is a graduate student in civil and environmental engineering program at SDSU. He is a native of Morgan, MN. Tom entered the civil engineering program at SDSU in September 2004 and earned his B.S. degree in civil and environmental engineering in May 2009.

He worked as a summer intern for Bolton and Menk, Inc. and performed surveying and construction observation during the summers of 2006-2008. Tom is now a graduate student at SDSU and is working on a project co-funded by MPC and the South Dakota Department of Transportation. The project investigates the durability and retroreflectivity of different pavement markings on roads throughout the different regions of South Dakota.



Brooke Postma

**Brooke Postma**, a native of Madison, SD, is currently a senior undergraduate student. She began at SDSU in the fall of 2005 and earned her B.S. degree in civil and environmental engineering in December 2009. Brooke will attend graduate school at SDSU beginning in January 2010

and expects to complete her M.S. degree in civil engineering in May 2011. She is currently working on a research project co-funded by MPC and SDDOT. Her work involves performance evaluation of jointed plain concrete pavements incorporating different construction details. Following graduation, Brooke plans to work in transportation engineering in the Midwest.



Adam Wellner

**Adam Wellner** is a graduate student in civil and environmental engineering, with an emphasis in transportation. He earned his B.S. in civil and environmental engineering in May 2009 from SDSU. He anticipates graduating with his M.S. degree in May 2011. He is working on the

MPC project "Development of a Safety Screening Tool for High Risk Rural Roads" under the supervision of Dr. Xiao Qin.

## NEW FACULTY

**Stephen Boyles** joined the University of Wyoming as an assistant professor in the Department of Civil and Architectural Engineering in August. He is originally from the Seattle area and completed his undergraduate work at the University of Washington, earning degrees in civil engineering and mathematics in 2004. During his time in Seattle, he was an intern with the Washington State Department of Transportation, working at a traffic management center where he gained experience in ITS operations, working with ramp meters, variable message signs, and recording highway advisory radio messages and traffic reports on WSDOT's hotline.

In 2004, he began graduate studies at the University of Texas where his master's and Ph.D. work focused on network analysis and transportation planning under uncertainty -- for instance, studying how travelers choose routes when travel times may be affected by incidents or weather, or how an agency can evaluate dynamic congestion pricing which responds to real-time conditions. This allowed information-providing ITS strategies to be placed directly in planning models, streamlining evaluation of the benefits of such strategies. During this time, he was also involved in several projects with the Texas Department of Transportation on incident management, traffic data archiving, and large-scale simulation of the Austin metropolitan area.

Boyles says the most exciting part of transportation research is its multidisciplinary nature, bringing together economics, mathematics, electrical engineering, structural and geotechnical engineering, psychology, public policy, statistics -- and a host of other fields -- in order to solve highly practical and urgent problems in society. Within all of these fields, his primary interests are in planning and optimization. He is interested in the possibility of developing a very large-scale simulation model, perhaps encompassing an entire state or multistate region, combining aspects of dynamic assignment planning models and operational

microsimulators. Recent advances in mesoscopic traffic modeling and in computing make such a large-scale model feasible in rural areas such as those comprising most of the MPC states, and can allow the statewide impacts of different alternatives to be measured, as well as making planning and operations models more consistent with each other.

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



Xiao Qin

**Xiao Qin** has joined SDSU faculty working on MPC co-sponsored research studies. With extensive experience in traffic safety and operations, Qin is leading a MPC project to develop a safety screening tool for the identification of high-risk rural roads with the aid of computer

techniques, GIS, and statistical modeling.

Qin is an assistant professor of civil and environmental engineering. He holds B.S. and M.S. degrees in civil engineering from Southeast University, Nanjing, China, and a Ph.D. degree in civil engineering (Transportation and Urban Engineering) from the University of Connecticut. Prior to joining the SDSU faculty, Qin was an assistant scientist at the University of Wisconsin-Madison where he managed the traffic safety program at the UW Traffic Operations and Safety Laboratory and advised graduate students at the Department of Civil and Environmental Engineering. Qin also spent two years working as an ITS/safety engineer for Maricopa Associations of Governments (MAG) in Phoenix, AZ, where he provided technical support to the development of regional transportation plan with a special focus on traffic safety and Intelligent

Transportation Systems (ITS) planning and deployment. Qin's main research interests are traffic operations and safety, statistical modeling and application in transportation, GIS and GPS application and spatial data analysis, and sustainable transportation planning. His recent research projects, "Road Weather Safety Audits" and "Roundabout Implementation Program," were conducted in collaboration with and funded by the Wisconsin Department of Transportation. Those projects won biennial National Roadway Safety Awards Honorable Mention in 2007 and 2009, respectively. Qin also won 2008 Transportation Research Board Best Paper awarded by the Committee on Statistical Methods and Applications. He is a member of the Institute of Transportation Engineers, the American Society of Civil Engineers, Intelligent Transportation Systems America and is a licensed professional engineer in Arizona.

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