



Mountain-Plains Consortium

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MOUNTAIN-PLAINS CONSORTIUM RECEIVES \$3.5 MILLION AWARD FROM U.S. DOT

The Mountain-Plains Consortium was one of 22 university transportation centers to receive grant awards from the U.S. Department of Transportation in January. North Dakota State University will lead the consortium of eight universities under the \$3.5 million grant.

NDSU's Upper Great Plains Transportation Institute and other members of the Mountain-Plains Consortium received the award for the coming year to study transportation issues in the Upper Great Plains and Intermountain West. The University Transportation Centers Program administered by the DOT's Research and Innovative Technology Administration.

The grant was one of 10 awarded to regional transportation centers. The other 12 grants were awarded to national centers. Partners with NDSU include Colorado State University, South Dakota State University, the University of Colorado Denver, the University of Denver, the University of Utah, the University of Wyoming and Utah State University. NDSU has been the lead university in the Mountain-Plains Consortium with various partner universities since 1988.

"The states in this region share a number of common characteristics such as vast rural road networks, few urban centers and harsh climate extremes," noted Denver Tolliver, Upper Great Plains Transportation Institute director and director of the consortium. "No single university can effectively address the complex transportation issues we face in this region, but the integrated efforts of eight universities along with support and partnerships in each state will have a significant impact."

Colorado State University
North Dakota State University
South Dakota State University
University of Colorado Denver
University of Denver
University of Utah
Utah State University
University of Wyoming



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New Universities Join MPC

The University of Colorado Denver



Wesley Marshall, Director. Marshall is an assistant professor of civil engineering and co-director of the ACT research group. He is also an affiliated faculty member

of the UCD Center for Sustainable Infrastructure Systems (CSIS) that houses the IGERT Program on Sustainable Urban Infrastructure. Marshall earned his doctoral and master's degrees from the University of Connecticut after receiving a B.S. in civil engineering from the University of Virginia. A professionally licensed civil engineer, Marshall specializes in transportation research dedicated to building a more sustainable infrastructure, particularly in terms of improving road safety, planning for better active transportation, and designing for transit-oriented communities.

The University of Colorado Denver combines a tradition of excellence with a bold vision for higher education in Colorado. By joining the strengths of a comprehensive campus in Denver with the health and medical programs at the Anschutz Medical Campus, the university serves more than 18,000 students in Denver and Aurora. It confers more than 4,200 degrees each year and more graduate degrees than any other Colorado institution. With its solid academic reputation, award-winning faculty and world renowned researchers, UCD offer more than 130 degree programs through 13 schools and colleges. Our students come from throughout Colorado and around the country and overseas for the university's high quality educational program and a vibrant urban environment. More than 14,700 traditional and nontraditional students attend the Denver Campus, choosing from more than 80 degree programs at the bachelors, masters and doctoral levels, serving recent high school graduates to seasoned professionals. UCD's transportation emphasis is multidisciplinary, spanning departments in engineering, planning, public affairs, liberal arts and sciences, and health related professions. The Transportation Research Center (TRC) addresses local, state, national, and international issues with funding from federal, state, local, and private sources. UCD is also home to the Active Communities Transportation (ACT) group that researches the integration of alternative transportation in healthier urban communities. Students and faculty investigate new methods and technologies for analyzing the performance and safety of transportation operations and designs, and also provide services to state and local agencies through seminars, committees, and special projects.

University of Denver

University of Denver, an independent university in the Rocky Mountain West, ranks among premier institutions of higher learning. At the end of Fall semester of 2010, 5,455 undergraduate and 6,387 graduate students were enrolled. The university has 11 colleges and schools and offers 12 baccalaureate degree programs, 19 master's degree programs, and 10 doctoral degree programs in natural sciences, engineering and computer science, law, education, international studies, social work, psychology, philosophy, social sciences, and arts and humanities. The Intermodal Transportation Institute offers a master's degree in intermodal transportation, one of the few of its kind in the world. Approximately 25 students enroll in the program each year. The programs are supported by the Daniels College of Business with faculty in finance, marketing and logistics. In addition, the Korbel School of International Studies faculty, with expertise in international transportation and transportation security policy are also involved in the program. Faculty and staff from urban planning and the GIS Laboratory contribute to courses and research efforts. Finally, the Center for Ethical Decision Making contributes to the training and education of leaders in the field of intermodal transportation management.



Patrick Sherry, Director. Sherry is an associate professor and training director for the Counseling Psychology Program. Since 2003 he has also served as director of the National

Center for Intermodal Transportation and a member of the board of directors of the Intermodal Transportation Institute at the University of Denver and was instrumental in obtaining over \$2.4 million dollars in funding for transportation-related research. He has consulted extensively with Fortune 500 transportation companies throughout the United States and Canada in the areas of safety, human resources, and leadership training. He has conducted extensive research in the area of human factors related to the hours of service for the transportation industry. He developed and validated an assessment battery for selecting and hiring managers in a large rail transportation company and is currently working on a documentary film and a book describing state-of-the-art intermodal transportation solutions in the western United States.

(Award)

Research conducted under the grant will focus on key areas including

- Assessing the impact of energy development and climatic extremes on transportation
- Advancing the state of repair and sustainability of transportation infrastructure
- Enhance economic competitiveness through transportation
- Improving safety and enforcement
- Advancing livable communities through transportation

Collaborators from the cooperating universities will submit project proposals for review and selection within the next month. The grant will also support transportation-related education programs at the participating universities as well as technology transfer and workforce development activities. Funding under the grant is for one year, but may be used over the next two years if necessary.

"Each of the participating universities has key strengths and programs. The consortium will combine them into a comprehensive and coordinated program that addresses key transportation issues in the region," Tolliver said. The consortium has on-going programs in several areas including transportation and sustainable energy development; bridge monitoring and performance; tribal transportation planning; transit oriented development and urban sustainability; workforce skill development; and development of online courses and training.

"These are areas where we've already identified needs and where our faculty and staff have developed excellent programs. This grant award gives us an opportunity to build on that foundation," Tolliver said.

Utah State University

Utah State University is a land-grant university located in Logan, UT, with an enrollment of 25,767. USU offers 168 undergraduate degree programs and 143 graduate degree programs. There are eight colleges in the university with the College of Engineering being the fourth largest. It is divided into six academic departments: biological, civil & environmental, electrical & computer, engineering & technology education, mechanical & aerospace, and the aviation program. The Department of Civil & Environmental Engineering houses the Utah Transportation Center, the Utah Water Research Laboratory, Structural Materials and Structural Health Laboratory and, the Transportation Infrastructure Management & Engineering Laboratory. Utah State University housed a Tier II University Transportation Center from 2006 to 2011 funded by SAFETEA-LU. The transportation program at Utah State University provides learning and research opportunities for students in public transportation, traffic, safety, and planning. The total research expenditures of the center were more than \$9 million during the five years of funding. In addition, USU has operated the Utah LTAP program since 1988.



Kevin Heaslip, Director. Heaslip is an assistant professor of Civil and Environmental Engineering specializing in transportation engineering. He received his Ph.D. from

University of Massachusetts Amherst and his master's and bachelor's degrees in civil engineering from Virginia Tech. His research interests include sustainable and resilient transportation infrastructures, traffic operations, transit operations, and intelligent transportation systems. In addition, his research involves design and operations of work zones on freeways and arterials in addition to the driver's response to those design elements. He is involved at the national level with the Institute of Transportation Engineers, the Intelligent Transportation Society of America's Research, Integration, Training, and Education Forum, and several committees of the Transportation Research Board.



Eunsu Lee



Nadim Wehbe



Kevin Thompson

Faculty Activities

Transportation analyst earns APICS CSCP designation

EunSu Lee, a transportation analyst with the Upper Great Plains Transportation Institute at NDSU, was recently recognized as an APICS Certified Supply Chain Professional (CSCP). APICS CSCP is a program offered by APICS the Association for Operations Management.

As a transportation analyst, Lee contributes to several current UGPTI projects that focus on state-wide transportation planning. His specialties in spatial analysis and supply chain management are especially useful while projecting oil traffic in North Dakota. In addition, Lee works on agricultural transportation projects that analyze grain movement by rail, truck and waterways. He also enjoys using humanitarian logistics to improve the lives of North Dakotans through analysis of ambulance service coverage and emergency services accessibility in rural areas. On a larger scale, Lee studies and analyzes international containerized freight movement, focusing on container imports and exports of the United States. Along with his analyst duties, Lee is currently teaching a graduate-level course, Spatial Analysis in Transportation.

Introduced in 2005, the APICS CSCP program takes a broad view of the supply chain field, extending beyond internal operations to encompass all the steps throughout the supply chain—from the supplier, through the company, to the end consumer—and provides the candidate with knowledge to effectively manage the integration of these activities to maximize a company's value chain. To qualify for the APICS CSCP designation, a candidate must complete a rigorous course of study and a comprehensive examination.

Wehbe elected ACI Fellow

Dr. Nadim Wehbe, professor of Civil and Environmental Engineering at South Dakota State University (SDSU), was elected in October 2011 as a fellow of the American Concrete Institute (ACI). According to ACI bylaws, "a Fellow shall have made outstanding contributions to the production or use of concrete materials, products, and structures in the areas of education, research, development, design, construction, or management. In addition, a Fellow shall have made significant contributions to ACI through committees and/or local chapters." Wehbe and 27 others will be formally recognized as new ACI Fellows during the ACI Spring Convention March 18 at the Hyatt Regency in Dallas, Texas.

Wehbe is invited speaker at Engineering Society Conference

Dr. Nadim Wehbe was an invited speaker at the 51st Annual South Dakota Engineering Society Conference. The conference was held on March 31-April 1, 2011 in Pierre, SD. Dr. Wehbe's presentation, entitled "Evaluation of Concrete Mixtures for Jointed Plain Concrete Pavement Applications," covered results from a portion of a study on performance of jointed plain concrete pavement. The study is co-sponsored by MPC and SDDOT.

Former California state bridge engineer presents Seminar at SDSU

On April 7, 2011 Kevin Thompson, a former State Bridge Engineer for the California Department of Transportation (CALTRANS), presented a one hour seminar at South Dakota State University (SDSU). The seminar, entitled "AASHTO— Maintenance of Bridge Design Specifications and Technical Publications" was sponsored by the MPC program at SDSU and covered a wide array of topics including the organization and functions of AASHTO committees, development of new standards for roadway tunnels, and the importance of research in advancing the state of practice. The seminar was attended by students, faculty, and local engineers.

Thompson has more than 27 years of experience with Caltrans, including bridge design, roadway tunnel and bridge seismic standards. He was State Bridge Engineer & Deputy Division Chief of Structure Design with Caltrans from February 2005 until his retirement from state service in July 2010. Thompson recently joined Arora and Associates, P.C. as Manager of West Coast Operations. He has participated on many national committees and research panels for industry organizations such as AASHTO, TRB, American Segmental Bridge Institute (ASBI) and Western Bridge Engineers, Inc.

MPC Staff Present Papers at Transportation Research Board Annual Meeting

MPC staff and students participated in the Transportation Research Board's national meeting in Washington, DC, Jan. 22-26.

The meeting attracted more than 11,000 transportation professionals from around the world and included more than 4,000 presentations in nearly 650 sessions and workshops covering all modes of transportation. The Transportation Research Board is one of the six major divisions of the National Research Council. The following research papers were presented by MPC staff.

Colorado State University

[A Quantitative Decision-making Framework to Evaluate Environmental Commitment Tracking Systems for Colorado Department of Transportation](#) by Mehmet Egemen, Caroline Murrie Clevenger and Andrew Fillion.

North Dakota State University

[Analyzing Investments Needed to Support Oil and Gas Production and Distribution](#) • Denver Tolliver, Alan Dybing and Subhro Mitra (University of North Texas).

[Application of Attitudinal Structural Equation Modeling to Intercity Transportation Market Segmentation](#) • Jeremy Mattson, David Ripplinger and Del Peterson.

[County Road Survey for Transportation Managers](#) • Kimberly Vachal, Mark Berwick and Jason Baker (Baker Consulting).

[Marginal Cos Pricing and Subsidy of Small Urban Transit](#) • Jeremy Mattson and David Ripplinger.

[Predicting Truck Crash Involvement: Commercial Driver Behavior-Based Model](#) • Brenda Lantz and Micah David Lueck (American Transportation Research Institute).

[Transportation and Health Care Use for Older Adults in Small Communities](#) • Jeremy Mattson.

[Using Laws, Enforcement, and Sanctions to Increase Seat Belt Use on Rural Roads](#) • Kimberly Vachal, Donald Malchose and Laurel Benson.

South Dakota State University

[Assessment of Labor-Based Construction Methods in Egyptian Rural Roads](#) • Hesham Mahgoub.

[Quantile Effects of Factors on Crash Distributions](#) • Xia Qin.

[Segment Length Impact on Highway Safety Analysis](#) • Xiao Qin and Adam Wellner.

University of Colorado Denver

[Arterial Intersections vs. Gridded Street Networks: Comparing Capacities & Pedestrian Accommodations](#) • Wesley Marshal and Brian Bern (Matrix Design Group, Inc.).

[Preliminary Analysis of Light-Rail Crashes in Denver, Colorado: Implications for Crash Prediction and Hazard Index Models Based on Heavy-Rail Systems](#) • Pamela Fischhaber and Bruce Janson.

University of Utah

[Calibrating Time-Dependent Car-Following Models Based on Vehicle Trajectory Data: Dynamic Time-Warping Approach](#) • Jeffrey Taylor, Xuesong Zhou and Nagui M. Roupail (North Carolina State University, Raleigh).

[Development and Evaluation of an Algorithm for Resolving Conflicting Transit Signal Priority Calls](#) • Milan Zlatkovic, Aleksandar Stevanovic (Florida Atlantic University) and Peter T. Martin.

[Drying Shrinkage Behavior of Mortars Made with Ternary Blends](#) • Xuhao Wang (Iowa State University), Fatih Bektas (Iowa State University), Peter C. Taylor (Iowa State University), Kejin Wang (Iowa State University) and Paul Tikalsky.

[Dynamic Origin-Destination Demand Flow Estimation Under Congested Traffic Conditions: General Framework](#) • Xuesong Zhou, Chung-Cheng Lu (National Taipei University of Technology, Taiwan) and Kuilin Zhang (Argonne National Laboratory).

[Estimating Fuel Consumption and Emissions Based on Reconstructed Vehicle Trajectories](#) • Zhong Chen (Tongji University, China), Chao Yang (Tongji University, China) and Anthony Chen.

[Evaluation of Asphalt Mixture Performance Tester: Utah Experience](#) • Levi Roberts, Pedro Romero and Kevin VanFrank (Utah Department of Transportation).

[Evaluation of Transit Signal Priority Options for Future 5600 W Bus Rapid Transit Line in West Valley City, Utah](#) • Milan Zlatkovic, Aleksandar Stevanovic (Florida Atlantic University), Peter T. Martin and Ivana Milorad Tasic.

[Freeway Traffic State Estimation and Uncertainty Quantification Based on Heterogeneous Data Sources: Stochastic Three-Detector Approach](#) • Wei Deng (Southeast University, China) and Xuesong Zhou.

[Geometric Design, Speed, and Safety](#) • Richard Jon Porter, Eric T. Donnell (Pennsylvania State University) and John M. Mason (Auburn University).

[Investigating Traffic Mobility Impact of Mileage-Based User Fees on Traveler Route Choice Behavior and Network Performance: Planning-Level Traffic Equilibrium-Based Approach](#) • Anxi Jia (North Carolina State University, Raleigh), Xuesong Zhou and Nagui M. Roupail (North Carolina State University, Raleigh).

[Korozeeneck: New Service Life Modeling Software for Bridge Decks](#) • Petr Konečný (VSB-Technical University of Ostrava, Czech Republic), Pratnu Ghosh (California State University – Fullerton), Jiří Brožovský (VSB-Technical University of Ostrava Czech Republic) and Paul Tikalsky.

[Monitoring Travel Time Reliability from the Cloud: Cloud Computing-Based Architecture for Advanced Traffic Information Dissemination](#) • Hao Lei, Tao Xing, Jeffrey Taylor and Xuesong Zhou.

[Path-Based Algorithms for Solving C-logit Stochastic User Equilibrium Assignment Problem](#) • Xiangdong Xu, Anthony Chen, Zhong Zhou (Citilabs) and Shlomo Bekhor (Technion - Israel Institute of Technology).

[Repair of Shear-Critical Reinforced Concrete Beams with External FRP Posttensioned Rods](#) • Chris Pantelides.

[Safety Evaluation of Geometric Design Criteria for Entrance-Exit Ramp Spacing and Auxiliary Lane Use](#) • Thanh Q. Le and Richard Jon Porter.

[Simulating Crashes for Evaluating Network-level Impact of Safety Enhancement Strategies: A Fast Dynamic Traffic Assignment Approach](#) • Xuesong Zhou.

[Sometimes It Pays to Be Lazy When Responding to Freeway Incidents](#) • Ivana Milorad Tasic, Peter T. Martin, Milan Zlatkovic and Piyali Chaudhuri.

[Using Asphalt Mixture Beams in Bending Beam Rheometer for Quality Control: Utah Experience](#) • Chun-Hsing Ho (Lake Washington Institute of Technology) and Pedro Romero.

Utah State University

[Alternative Planning Tool for Small Metropolitan Planning Organizations in Utah](#) • Sarawut Jansuwan, Anthony Chen and Seungkyu Ryu.

[Assessment of Sign Retroreflectivity Compliance for Development of a Management Plan](#) • Travis Evans, Kevin Heaslip, Wesley Bill Boggs, David S. Hurwitz and Kevin Gardiner.

[Development of Demand Uncertainty-Based Model to Estimate Network Reliability](#) • Ali Soltani Sobh, James Fishelson, Kevin Heaslip and John El Khoury (CH2M Hill).

[Development of a Sign Asset Management Plan for Retroreflectivity Compliance](#) • Wesley Bill Boggs, Travis Evans, Kevin Heaslip, William Louisell and Kevin Gardiner.

[Development of a Work Zone Safety Audit Risk Assessment Tool](#) • Tomas Lindheimer, Kevin Heaslip, William Louisell and Kevin Gardiner.

[Enhancement of Double Projection Method Designed for Traffic Assignment](#) • Donghyung Yook (University of Virginia), Kevin Heaslip and Anthony Chen.

[Evaluation of Transportation Network Resiliency with Consideration for Disaster Magnitude](#) • Derek Frckleton, Kevin Heaslip, William Louisell and John Collura.

[Modeling Side Constraints in Combined Distribution and Assignment Problem](#) • Seungkyu Ryu, Anthony Chen and Xiangdong Xu.

[Road Network Redundancy Measures: Route Diversity and Network Spare Capacity](#) • Xiangdong Xu, Anthony Chen, Sarawut Jansuwan and Kevin Heaslip.

[Path-Based Algorithms for Solving C-logit Stochastic User Equilibrium Assignment Problem](#) • Xiangdong Xu, Anthony Chen, Zhong Zhou of Citilabs and Schlomo Bekhor (Technion - Israel Institute of Technology).

University of Wyoming

[Developing Standards and Guidelines for Establishing Speed Limits on Unpaved Roads](#) • Josh Jones (Wyoming Local Technical Assistance Program), Joel Meena (Wyoming Department of Transportation) and Khaled Ksaibati.

[Highway Patrol Enforcement Impacts on Crash Prevention in Wyoming and North Dakota](#) • Burt Andreen, Matt Carlson (Wyoming Department of Transportation), and Khaled Ksaibati.

[Impacts of Economic Activities on Four Crash Rates in North Dakota and Wyoming](#) • Burt Andreen, Matt Carlson (Wyoming Department of Transportation) and Khaled Ksaibati.

[Implementation of Wyoming Rural Roads Program](#) • Bart Evans and Josh Jones (Wyoming Local Technical Assistance Program).

[Methodology for Cost-Benefit Analysis of Recycled Asphalt Pavement in Various Highway Applications](#) • Burt Andreen, Harry Rocheville and Khaled Ksaibati.

[Traffic Characteristics on Unpaved Roads](#) • Josh Jones (Wyoming Local Technical Assistance Program) and Khaled Ksaibati.



Student Activities

MOUNTAIN-PLAINS CONSORTIUM HONORS STUDENT OF THE YEAR

Doug Allen was named the Mountain-Plains Consortium (MPC) Student of the Year in January at the Transportation Research Board's 91st Annual Meeting in Washington, DC. The U.S. Department of Transportation honors an outstanding student each year for achievement and the potential future contributions to the transportation field. Students are selected based on their accomplishments, academic merit, research and leadership.

After a 12-year career as a carpenter, Allen chose to further his education by seeking a B.S. in civil engineering at Colorado State University, graduating in May 2010. He continued at CSU to earn a master's degree in civil engineering in December 2011.

As an undergraduate and graduate student, Allen worked on numerous MPC research projects including "Sustainable Concretes for Transportation Infrastructure," "Low-Impact, High-Toughness Transportation Barriers," "Rapid Load rating of Short Rural Bridges," and "Long-Term Performance of FRP Repair Materials." He co-authored reports for three of these projects. His extensive participation in MPC related research and his outstanding academic ability were important considerations in selecting Allen for this award.

Allen has also pursued research opportunities outside the MPC. In the summer of 2009, he traveled to Japan to participate in seismic testing of a seven-story structure through the Research Experience for Undergraduates with the National Science Foundation.



Denver Tolliver and Doug Allen

NEW STUDENTS

NDSU

Matthew Alvarez is a student in the MML program. He graduated with a B.A. in general education from Columbia College of Missouri in 2004. Alvarez plans to continue in the military for a few more years before beginning a civilian logistics career.

Raj Bridgelall is a Ph.D. student in transportation and logistics. He holds B.S. and M.S. degrees in electrical engineering from Stony Brook University. Bridgelall's research interests include real-time pavement condition monitoring. He is the director of UGPTI's Advanced Traffic Analysis Center.

Natassia Fay is enrolled in the MML program and plans to use her logistics knowledge and skills to further her career. She holds a B.A. in philosophy from Kent State University.

Kevin Hoffman is a student in the MML program. He earned a B.S. in health care administration from Oregon State University. Through the MML program, Hoffman hopes to earn a promotion to major in the U.S. Army and be assigned as a support operations officer or battalion executive officer.

Ciaran Kelly is enrolled in the MML program. He earned a B.A. from Northumbrian University in the United Kingdom. His interest in logistics stems from an interest in business and the movement of people and goods.

William Lyons is studying to earn the certificate in Transportation and Urban Systems. Lyons is the president and CEO of Fort Hill Infrastructure Services in Boston, MA. He holds a B.S. in electrical engineering from Norwich University and a J.D. from Suffolk University Law School.

Brett Korporaal is a master's student in the Urban and Transportation Systems Program. He also holds a B.A. in organizational management from Patten University. Korporaal is interested in the planning and development of high speed rail in the United States.

David Massey is enrolled to earn the certificate in Transportations and Urban Systems. He holds a B.S. from the Rose Hulman Institute of Technology and a master of urban planning from the University of Illinois-Urbana Champaign. Work experience with an MPO and as a transportation planner and engineer have led Massey to pursue the certificate.

Ryan McDonald is pursuing an MML degree and plans to continue in the military upon completion of the program. He is interested in the logistical challenges surrounding earthquakes and is focusing his research on earthquakes in Chile.

Nicholas Miller is a student in the MML program. He believes earning the MML will make him a valuable logistical asset to the U.S. Army, tying together education and his military field experience.

Nam Nguyen is enrolled in the MML program. A native of Vietnam, he attended the University of Transport in Ho Chi Minh City, majoring in marine navigation engineering. Nguyen has work experience with the Hanjin Shipping Line.

Preston Rutherford is studying to earn the MML. He holds a B.S. in crime and justice studies from the University of Idaho and an A.A.S. in law enforcement from North Idaho College. Upon completing the MML, he plans to continue his career in the U.S. Army.

Peter Simonson is a doctoral candidate. He holds a B.S. in business administration from the University of Arizona, earned an MBA from North Dakota State University and holds a J.D. from the University of North Dakota Law School. An adjunct professor of business at NDSU, Simonson is interested in how logistics affect businesses.

Robert Swearingen is a student in the MML program. He holds a B.S. in Liberal Studies from Excelsior College and a Lean Six Sigma Master Certificate from Villanova University. After finishing the MML, Swearingen plans to return to the service in the U.S. Army.

Emmanuel Velez is enrolled in the MML program. He previously attended the Interamerican University of Puerto Rico. Velez plans to finish the MML program and return to serve in the U.S. Army to be promoted to major with an assignment to use his logistical knowledge.

Joseph Zabaldano is studying to earn the MML. He holds a B.S. in industrial technology from Mississippi State University. Zabaldano plans to apply his logistical knowledge to his career in the U.S. Army.

SDSU

Brittney Ahrenstorff is an undergraduate research assistant. After completing her B.S. degree in May, she will join the graduate program in civil engineering. A native of Lake Park, IA, Brittney began her education at the University of Iowa and transferred to SDSU. Her research on the evaluation of ice loads on bridge piers in South Dakota, co-funded by MPC and the South Dakota Department of Transportation, includes development of an efficient and accurate ice load monitoring system, measurement of ice loads exerted on bridge piers, and evaluation of the applicability of AASHTO ice load equations to bridge piers on South Dakota's rivers. Brittney anticipates gaining her M.S. in May 2014.

Thomas A. Druyvestein earned his B.S. degree in civil and environmental engineering from SDSU in 2010. He is pursuing an M.S. degree in civil engineering and is a graduate research assistant working on the optimization of pavement marking performance. The project is co-sponsored by MPC and the South Dakota Department of Transportation. While he was an undergraduate student, Druyvestein assisted with another research project, titled "Jointed Plain Concrete (JPC) Design and Construction Review," that was also co-funded by MPC and SDDOT.

Shawn Maassen, a native of Rock Valley, IA, earned his B.S. degree in civil and environmental engineering in 2011 and anticipates earning his M.S. in civil engineering in December. Maassen is continuing research on the mitigation of corrosion in CRC pavement. The study is co-funded by MPC and the South Dakota Department of Transportation. The project was started in 2010 by former graduate student Stephanie (Peters) Klay. Maassen's research will focus on field and laboratory testing of corrosion inhibitors using half-cell potential. He will then analyze the data from his tests and from tests that have previously been completed for this project.

University of Colorado Denver

Ed Gaviria is earning his Ph.D. in civil engineering systems with a focus on transportation and sustainability. He holds a B.S. in electrical engineering from the University of Texas at Austin, an MBA in finance and marketing from the McCombs School of Business at the University of Texas at Austin, and an M.S. in quantitative analysis and city planning from Cornell University. He has more than 15 years of experience in engineering, finance, engineering management, consulting and market research. In the past, he has worked as an advanced engineer for Boeing, as senior financial analyst at American Airlines and as a senior manager at Deloitte Consulting, IBM Global Services and Hewlett Packard. His research interests include sustainable transportation, the economics and design of inter-city rail transit, the costs of congestion and related rail and light rail approaches to solve the problem.

Alejandro Henao is working on an M.S. and Ph.D. in civil and environmental engineering with an emphasis on transportation. He is in his first year as an NSF-funded IGERT fellow in the Sustainable Urban Infrastructure program. Originally from Colombia, he started his studies at the Universidad del Valle in Cali, and earned a B.S. – Magna Cum Laude - in civil engineering from the University of Colorado at Boulder. Prior to joining the IGERT program, Alejandro worked professionally as a structural engineer at Contech Bridge and as a project intern for Opus Northwest. His research interests include sustainable urban infrastructure systems, transportation and planning and management for mega events, and bus rapid transit.

Kara Luckey is a Ph.D. student in planning and design in the College of Architecture and Planning, where her work is focused on the relationship between urban infrastructure, economic and community development, and social equity. Her research focuses on neighborhood change processes, transportation and housing equity, and public transit's role as a community and economic development tool. Kara is the recipient of a fellowship in Sustainable Urban Infrastructure through the National Science Foundation's Integrative Graduate Education and Research Traineeship (IGERT) program. She holds a B.S.E. in civil engineering from The Cooper Union for the Advancement of Science and Art, in New York City, and has more than seven years of experience in planning practice. She has worked as a planner and project manager

predominantly in transit and transportation planning, but also in contexts related to urban revitalization, waterfront redevelopment, and planning for public and federal lands. Her research interests include transportation and housing equity, economic and community development around urban infrastructure investment, urban and regional governance structures, and residential location decision-making.

University of Denver

The Executive Masters Program at the Intermodal Transportation Institute (ITI) at the University of Denver is designed for experienced managers and allows participants to work full-time from anywhere while earning a degree. Graduates receive a Master of Science in intermodal transportation management. The following students are the 10th cohort in the program and will graduate in 2012

Aurthur Adams is the director of domestic sales for CSX Transportation in Jacksonville, FL. He is responsible for the profitable growth of CSX's Rail Controlled Asset Program. Prior to joining CSX, he was a district Team Leader for Target Corporation.

Ronald Bethmann is a terminal superintendent for CSX Transportation in Jacksonville, FL. He has management responsibilities for five CSX Intermodal Terminals throughout the South including Jacksonville, Orlando, Tampa, New Orleans and Mobile.

Teresa Brewer is the freight mobility coordinator/associate transportation planner for the Municipality of Anchorage, AK. She also leads planning projects that include all modes of transportation and provides land-use analysis for public and private development.

William Corcoran is manager of automotive at TTX corp., a railcar owner and pool operator. He is based in Chicago and is responsible for the handling of shipper accounts and implements strategies and procedures necessary to manage about 57,000 railcars.

John Cusato is the supply chain department manager for JCPenney Company in Haslet, TX. He manages the receiving department at the JCPenney Alliance Retail Logistics Center and is responsible for operational and administrative receiving processes and associate development.

Matthew Davies is the managing director of Sales for FedEx Express – South America in Sao Paulo, Brazil. He is responsible for all revenue-creative activities

in South America. He was previously based in Singapore as the FedEx sales managing director with responsibility for the South Pacific region.

Drew Franklin is the operations manager for the retail division of Linfox Logistics in Melbourne, Australia. He has operational responsibility for Linfox's largest retail customer in the state of Victoria with more than 400 employees and servicing more than 200 retail outlets.

Keith Haskel is the general manager for trade performance and analysis for Wallenius Wilhelmsen Logistics in Woodcliff Lake, NJ. Haskel's division provides intelligence and decision-making support to the company's ocean transportation service.

Michael Haugh is the national operations manager for Linfox Logistics in Melbourne, Australia. He manages the national operations for the wood business within Linfox's Industrial Division. He manages warehousing and distribution of finished wood products from 18 sites across Australia.

Sean Kelly is the senior account manager/chemicals for CSX Transportation in the Chicago Sales Office. He is responsible for contract negotiations, account growth and expansion, and service enhancements for several large chemical shippers.

James Kramer is the vice president for national accounts for ContainerPort Group Inc. in Chicago. He manages and develops the strategic relationships with the company's national accounts for both the transportation and terminal business units and manages the sales and marketing within specific regions.

D'Andrae Larry is the director of marketing – industrial products for BNSF Railway Company in Fort Worth, TX. He supports the sales and marketing teams by assessing, making recommendations, and improving upon any structural impediments to service with customers.

Chris Luebbers is the group manager for international marketing for Norfolk Southern Corp. in Norfolk, VA. His team provides the support that marketing staff need to maintain and grow current customer relationships and develop new business opportunities.

Ed Mykyten is the senior vice president for enterprise business development with Hub Group Inc. in Duluth Georgia. Within Hub he has also served as a national account executive, regional vice president for the Southeast and the Southwest, and as the president of the Atlanta operating office.

Chris Novosad is the terminal operations manager for Horizon Lines in Tacoma, WA. He oversees operations, regulator, finance and vessel schedule integrity for the shipping company which has terminals throughout North America.

Lynn Ramsey is national supply chain analyst for Domino's Pizza LLC in Denver. He evaluates supply chain, logistics, warehousing, quality control and compliance oversight. He also manages commodity storage, processing and warehousing plus DOT and EPA reporting for 20 U.S. distribution centers.

Steve Rhode is the vice president for rail commercial at Schneider National Inc. in Green Bay, WI. He oversees the team that works closely with railroads on new service design, contract negotiations, issue resolution and other topics.

Ian Strachan is the national manager for linehaul for Linfox Logistics in Brisbane, Australia. He is involved in all aspects of the business including business, financial, operational and customer account management. He is also responsible for developing the company's steel business across the country.

Scott Swetkovick is the director of operations for Sounds True Inc. in Louisville, CO. He oversees all operational activities including the manufacturing process, supply chain management, purchasing warehousing, customer service and IT infrastructure of this audio, video and book publishing company.

Sarthak Verma is the director of intermodal operations for JB Hunt Transport Services Inc. of Lowell, AR. He is working on improving the efficiency and productivity of the JB Hunt dray fleets with a focus on reducing costs. He also heads up the IT and engineering undertakings involving intermodal operations.

Brian Ward is the director of sales and marketing for processed materials with CSX Transportation in Jacksonville, FL. He leads a team of four sales managers and two market managers and is responsible for developing and executing short- and long-term strategies for the processed materials business unit.

Kimberly Yox is senior manager of North America intermodal operations for APL Ltd. of Scottsdale, AZ. She oversees a team that coordinates, manages and improves intermodal service schedules in concert with rail carriers to meet service needs for customers.

Utah State University

Wesley Boggs is a master's degree student developing a sign management plan for the Utah Department of Transportation to meet new MUTCD standards. He is working on retroreflectivity deterioration forecasting. Before beginning his master's program, Boggs was an engineering intern at UDOT. He received his B.S. in civil and environmental engineering from Utah State in 2010.

James Fishelson is a master's student conducting research on capacity modeling for Automated Electric Transportation: a system of self-driving, automated vehicles electrically powered via in-motion energy transfer by the roadway itself. He did his undergraduate work at Yale University, where he was a double major in chemistry and international studies. Fishelson has had a lifelong interest in transportation and the way that its infrastructure influences societies. This interest was nurtured by his work and studies in Kazakhstan, Vietnam, Russia, and Israel.

Derek Freckleton is a master's student conducting research on Automated Electric Transportation (AET). A native of Bountiful, Utah, Freckleton completed his B.S. in civil and environmental engineering from Utah State University in 2010. While at Utah State University, he received the Institute of Transportation Engineers Intermountain Section Student Paper Competition Award.

Luis Hidalgo did his undergraduate work at PUCMM University in the Dominican Republic, where he was a double major in civil engineering and international business. He earned his MBA at INTEC / INCAE University in 2010. He has more than five years of experience, working as project manager and construction supervisor for multinational mining companies. He was also involved in high-level investment projects focused on the search for cleaner energies at lower cost. He is currently the president of the USU chapter of the Institute of Transportation Engineers. His master's research focuses on integrated corridor management, an initiative toward a coordination of transportation operations to improve travel management.

Sarawut Jansuwan is a Ph.D. student in civil and environmental engineering. He received his bachelor's in civil engineering from Chiang Mai University, Thailand in 1999, and master's in civil engineering (transportation engineering) from Chulalongkorn University, in Thailand in 2002.

Jansuwan served as a regional project engineer and construction supervisor for an intelligent transportation system company from Japan. He worked on ITS projects with government agencies and local municipalities focused on procurement, design, and installation of intelligent traffic control and traffic detector systems. He is currently a research assistant working for various transportation research projects at USU. His research interests include transportation network vulnerability and resiliency, freight planning and modeling, transportation-disadvantaged populations, and traffic simulation modeling.

Majid Khalilikhah is a Ph.D. student studying gender-based choice behavior in central zone pricing policy conditions. He earned his B.S. in civil and environmental engineering at K.N.T University in Iran and his M.S. at Sharif University of Technology in 2011. While there, he undertook a variety of research in travel behavior modeling, travel demand management policies, and traffic safety. Also, he managed a comprehensive parking study project

Songyot Kitthamkesorn is a Ph.D. student in transportation system engineering. He earned his bachelor's in civil engineering at Kasetsart University in Thailand and his master's in structural engineering at the Asian Institute of Technology in 2000. Before attending USU, he worked as an assistant to the director general of the Office of Transportation and Traffic Policy and Planning in Thailand. His research focuses on network equilibrium under uncertainty

Sunil Pant is a master's student conducting research on a resiliency measurement framework for road networks subjected to different magnitudes disasters. Pant earned his bachelors' degree in civil engineering from Tribhuvan University in Nepal and worked for the Department of Roads in Nepal before joining Utah State University.

Seungkyu Ryu is a Ph.D. student studying network modeling, traffic assignment algorithms and origin-destination estimation algorithms. Ryu received his bachelor's and master's degrees from the transportation engineering department at the University of Seoul, South Korea. His research experiences include developing shortest path algorithm, trip generation model and traffic impact studies. He is currently working on various transportation research projects including Path Flow Estimator model and Automated Electric Transportation model at USU. From that research, he has published 10 journal papers.

Sadra Sharifi is a Ph.D. student and graduate research assistant studying transportation system analysis, application of operation research in transportation engineering and travel behavior modeling. Sharifi earned his bachelor's in civil engineering from Ferdowsi University of Mashhad, in Mashhad, Iran. He earned his master's from Sharif University of Technology, Tehran, Iran, where his thesis provided an introduction to network modeling, uncertainty in demand and travel time for real transportation networks.

Ali Soltani Sobh completed his master's in transportation engineering at Sharif University of Technology in Iran. His thesis focused on transportation network pricing. He has experience as a consultant engineering in Iran where he worked on traffic organization projects. He is a Ph.D. student and a research assistant focusing on transportation network resiliency, reliability of transportation network and network pricing.

Devin Squire is a master's student who transferred from Weber State University. He plans to graduate this fall. His research involves the simplification of data collection and asset management through the use of mobile technology.

Jia Yoa is a visiting Ph.D. research scholar being advised by Dr. Anthony Chen of transportation division in the Department of Civil and Environmental Engineering. He is a Ph.D. candidate in the School of Traffic and Transportation Engineering at Central South University in China. He earned his B.S. in applied mathematics at Central South University and was honored as the Excellent Graduate of Central South University and Excellent Graduate of Hunan Province. He also earned his master's in transportation engineering at the Central South University. His research focuses on multimodal transportation network equilibrium analysis, transportation network optimization, and transportation system reliability.

Donghyung Yook is a Ph.D. student studying the improvement of transit assignment algorithms. He was from Suwon, South Korea and earned bachelor's and master's degrees in transportation engineering at the University of Seoul. He worked for Korea Transport Institute and Gyeonggi Research Institute for two years.

University of Wyoming

Nathan Stroud of Pinedale, WY, completed his B.S. in civil engineering 2011. He will become a licensed surveyor in the spring of 2012 and is currently pursuing his M.S. in the same field. Stroud is researching the impact of oil and gas traffic on county roads and standardizing permits for the oil and gas traffic in Wyoming. He plans to work in the State of Washington or Montana as a professional engineer and land surveyor.

Vijay Sabawat of Hyderabad, India, is seeking a Ph.D. in civil engineering under the direction of Dr. Rhonda Young in the Department of Civil and Architectural Engineering (transportation). His research is on a variable speed limit decision system for the Elk Mountain Corridor. The objective is to develop a control strategy for implementing variable speed limits on I-80 corridor between Laramie and Rawlins. Sabawat is active in ITE and WYOCC (Wyoming Cricket Club). Sabawat plans to work in the United States for a few years to gain work experience and then return to India and assist in development there.

Lindsay Schumaker earned her B.S. in civil engineering from California State University, Sacramento. While there, she was active in the student chapter of Engineers without Borders, Tau Beta Pi, and served as president in ASCE. She worked several years as a transportation design engineer with HDR Engineering Inc., and obtained a professional engineering license from the state of California. She is an M.S. student in civil engineering and is a graduate research assistant studying the potential use of the MEPDG for local paved roads in Wyoming.

Yanfei Sui is from China and holds a bachelor's in computer science and business administration and a master's degree in vehicle engineering. As a master student he studied driving behavior analysis and emergency evacuation. As a Ph.D. student in civil engineering, his research interests include traffic safety, intelligent transportation system and solving traffic problems with GIS tools.

Promotes Saha earned a B.S. in civil engineering with an emphasis in transportation engineering from Bangladesh University of Engineering and Technology and an M.S. in civil engineering from the University of Wyoming. Saha worked for Sami Engineering, a structural design and detailing firm. As an undergraduate, he conducted research on road safety trends, applying quantitative risk assessment

techniques and statistical analysis, and working on several design projects. His current research interests include transportation safety and accident prevention analysis, intelligent transportation systems, statistical modeling and application on transportation safety.

Debbie Shinstine of Cheyenne, WY, earned her B.S. in civil engineering at the University of Wyoming and her M.S. in civil engineering at the University of Arizona. She is a Ph.D. student in civil engineering and is a graduate research assistant in transportation. She has 25 years of professional experience in civil engineering both in private practice and public service and is licensed as a PE in three states. Most recently, she worked for the Virginia Department of Transportation managing maintenance, construction and land use. She is developing a methodology for identifying high-risk crash locations on the Indian reservation roads in order to implement a safety improvement program. After earning her Ph.D., Shinstine plans to secure a position as a professor.

Abram Pearce of Pinedale, WY, will complete a B.S. in civil engineering in May. He is pursuing a master's degree in transportation and plans to graduate in May 2013. Pearce is researching the effects of heavy oil and gas traffic on Wyoming's paved county roads. In the future, Abram plans to work in Wyoming as a professional engineer.

Dick Apronti is from Accra, Ghana, and worked as an assistant highway engineer for a Ghanaian consultant. He is pursuing a master's degree in transportation and is a graduate assistant. He is researching base widening methods and plans to work as a professional engineer in developing countries upon graduation.

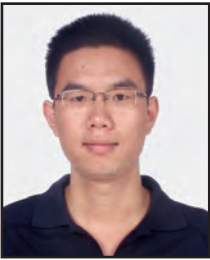
Edward Offei is a Ph.D. student in civil engineering from Accra, Ghana. He obtained his B.S. in civil engineering from the Kwame Nkrumah University of Science and Technology in Ghana. He also earned an M.S. degree in civil engineering from the University of Wyoming in 2011. For his doctoral degree, he is working on the research project to "Evaluate the Base Widening Methods used in Wyoming." His teaching responsibilities involved teaching the engineering computing course for the engineering undergraduate class. He plans to work for any research institution or engineering consulting firm after graduation.

Eric Milliken, of Casper, WY, completed his B.S. in civil engineering in 2011. He is pursuing a master's degree in transportation engineering and is a graduate research assistant in transportation engineering. He is working on developing an algorithm to determine travel time and travel time reliability for rural highways during winter weather conditions. Milliken is the secretary of the University of Wyoming ITE and is a board member on the Albany County Transportation Authority.

MPC 2011 UNIVERSITY GRADUATES

CSU

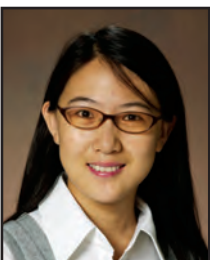
Doug Allen completed his M.S. degree. His thesis was titled, "Evaluating the Long-Term Durability of Fiber Reinforced Polymers Via Field Assessments of Reinforced Structures."



Chen

Feng Chen completed his Ph.D. in April. His dissertation was "Reliability-Based Safety Evaluation of Traffic on Rural Highways." Chen is currently a post-doctoral researcher at CSU.

NDSU



Lu

Pan Lu earned her Ph.D. Her dissertation was "Modeling Pavement Performance and Preservation." She is now a research analyst with the UGPTI at NDSU.



Chen

Ieelong "Peter" Chen earned his Ph.D. His dissertation was "The Dynamic Effects of Collaborative Transportation Management and RFID Implementation in the Railroad



Smith

Supply Chain."

Joshua Smith completed the MML program and returned to active duty in the U.S. Army. He is stationed in Ft. Leavenworth, TX.

SDSU



Klay

Stephanie (Peters) Klay earned her M.S. in civil engineering. Her thesis was "Mitigation of Corrosion in Continuously Reinforced Concrete Pavement." She is a structural specialist with Barr Engineering Co. in Hibbing, MN.

University of Utah

James Mulandi earned his Ph.D. His dissertation was "Assessing Traffic Control Evaluation Strategies and Delay Estimation Procedures." He is working for a transportation consultant.

Piyali Chaudhuri earned his Ph.D. His dissertation was "ITS Loop Data Based Optimization Methods for Optimal Traffic Operations on Freeways." He is working for the University of California Los Angeles as a transportation manager.

Muhammad Farhan earned his Ph.D. His dissertation was "A Practical Perspective on the Benefits of Combined Traffic Assignment and Control Models." He is working for Wasatch Front Metropolitan Planning Organization.

Utah State University | the University of Denver

Travis Evans earned his M.S. in the Summer of 2011. His thesis was "Development of Assessment & Evaluation Strategies for Sign Retroreflectivity." Evans is pursuing employment opportunities in Utah's transportation industry.

Brandon Brady earned his M.S. in the Summer of 2011. His thesis was "Effects Of Cordon Pricing On Pm2.5 Production." Brady is employed at Johansen and Tuttle Engineering in Castle Dale, UT.



Project Highlights

CSU researchers test highly flexible emergency barriers

If you've tried to mow an especially lush lawn, you've experienced a basic principle of mechanics: individual blades of grass are easy to tear and cut, but enough of them together can stop a sharpened steel blade.

Colorado State University researchers Michael Lebsack, Thomas Wilson, and Paul Heyliger used that principle in a recently completed study on flexible emergency barriers and escape ramps that relied not on arrestor beds or heavy barriers, but on an array of flexible, small diameter rods that deform elastically to absorb kinetic energy of moving vehicles. These arrays can be placed on paths regardless of slope and have the advantage of being durable, inexpensive, reusable, and can be recycled after the materials have seen enough use.

Both numerical predictions and experimental measurements showed the potential for these sorts of systems, with prototypical tests being completed at CSU's ramp facility. As an example of what can be accomplished, a 400 pound test cart moving at about 15 miles per hour can be stopped within 14 feet with less than \$100 of materials with little or no post-maintenance required. Extensions to larger vehicles are possible.

Evaluation of Ice Loads on Bridge Structures in South Dakota

A research study to measure ice loads on bridge piers in South Dakota was initiated in the fall of 2011. The research focuses on directly monitoring ice loads at critical bridge sites in South Dakota and comparing measured load statistical values with codified load values.

The study involves the development of an efficient and accurate ice load monitoring system that will be used to measure and record ice loads at two bridge sites on South Dakota's rivers. The researchers have already inspected and evaluated several potential bridge sites for instrumentation. Once the final selection of two sites is made, the design and construction of the proposed conceptual monitoring system will be completed and tested at the Lohr Structures Laboratory. The monitoring system and instrumentation will be installed in the summer of 2012 and data will be collected over two consecutive winters. Each instrumented site will be fitted with a data logger and a wireless communication system that will allow for periodic remote downloading of the recorded data.

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

Research shows misinformation contributing to safety issues in vehicular restraints for children

Despite laws requiring the use of child safety seats in all 50 states, many children still do not travel safely in vehicles. A study at the Upper Great Plains Transportation Institute at NDSU shows that health care providers in rural areas are less likely to ask and provide information about child safety seats than their counterparts in rural areas.

Recent studies show that lack of parental knowledge of proper child restraints and misinformation are two main reasons that children were not properly restrained in vehicles. This lack of information and dissemination of misinformation could be the result of a general lack of child passenger protection knowledge among groups who should be well-informed (i.e. pediatricians, family practitioners).

If used properly, child safety seats can reduce the risk of death by up to 54 percent for children aged 1 to 4 and by as much as 71 percent for infants. Fatality risks for children aged 12 or younger properly restrained in the rear seat of a vehicle are 38 percent lower than for children restrained in the front seat. Also, although child restraint use in rural and urban areas is fairly comparable, children aged 14 or younger who are involved in motor vehicle crashes in rural areas are two to five times more likely to be seriously or fatally injured than children involved in crashes in urban areas. Health care providers are ideally placed in society to be on the front-lines of prevention education regarding these issues.

UGPTI researcher Andrea Huseth-Zosel surveyed health care providers in several Midwest states to determine:

- The extent to which health care providers (specifically pediatricians and family practitioners) are providing anticipatory guidance regarding child safety seats and proper child occupant restraint within a vehicle.
- Whether health care providers are providing accurate anticipatory guidance regarding child safety seats and proper child occupant restraint within a vehicle.
- Barriers to discussing child passenger safety during well-child checkups.
- If there are differences in anticipatory counseling practices regarding child vehicle occupant safety between rural and urban health care providers.

Also, parents in the same Midwest states were surveyed to determine if there is a difference in the knowledge of child occupant protection between parents whose health care provider discussed this topic with them versus parents whose health care providers did not discuss the topic. Huseth-Zosel also wanted to learn if there is a difference in the knowledge of child occupant safety between parents whose health care providers are located in a rural area versus those located in an urban area.



Huseth-Zosel

According to Huseth-Zosel, preliminary results indicate health care providers of rural parents are less likely than urban parents' health care providers to ask about the type of restraint used by their child when riding in a vehicle. In addition, the health care providers of rural parents are less likely than the health care providers of urban parents to provide information about the type of restraint their child should be using when riding in a vehicle. Also, rural parents are less likely than urban parents to keep their children rear facing between the ages of 1 and 2. Recently, the American Academy of Pediatrics raised the suggested age to keep children rear-facing from age 1 to 2 years of age.

Preliminary results of the health care provider survey show that rural health care providers are less likely than urban health care providers to state they "Frequently" or "Always" provide child passenger safety advice to parents of children aged 17 or younger. Also, urban health care providers were more confident than rural health care providers of their ability to adequately address parents' questions/concerns regarding selecting a car seat/booster seat appropriate for the age and weight of a child and in determining the appropriate age/weight for the use of a car seat or booster seat.

University of Utah research examines safety impacts of design exceptions in Utah

Meeting established design standards for highways is not always practical or cost effective, but little is known about the safety consequences when exceptions are made to those standards. University of Utah researcher Richard J. Porter and graduate student researchers Jonathan Wood, Thanh Le, Yunqi Zhang will compare safety, measured by expected

crash frequency and severity, on road segments where design exceptions were approved to similar road segments where no design exceptions were approved.

Construction and reconstruction projects on state facilities are usually designed to conform to state agency-adopted geometric design criteria. The Utah Department of Transportation (UDOT) has adopted the AASHTO "Green Book" as its standard for roadway design with some differences noted in the UDOT Roadway Design Manual of Instruction.

Deviating from design criteria requires documentation and approval. This generally occurs at two levels in Utah: design exceptions and design waivers. Design exceptions are prepared when a road design deviates from one or more of the Federal Highway



Porter

Administration (FHWA) 13 controlling design criteria for a construction or reconstruction project on the National Highway System (NHS) or the Strategic Highway Network (STRAHNET). The FHWA Federal-Aid Policy Guide states that an "exception should not be approved if the exception would result in degrading the relative safety of the roadway." Predicting the safety consequences of design exceptions is difficult, and attempts to track safety of road segments where design exceptions have been approved are rare.

University of Utah researchers collected data in Utah for this study using design exception documentation, project databases, online mapping software and images (e.g., Google Maps and Google Earth), traffic counts, and electronically coded crash data. Negative binomial regression was used to model the relationships between expected crash frequencies and various traffic and roadway characteristics, including the presence of one or more design exceptions. The research team is currently estimating multinomial logit models to explore relationships between design exceptions and crash severity. Research results will provide insights into the effectiveness of the current design exception preparation and approval process as well as whether deviations from some controlling criteria have different safety impacts than others. A final report will be available in 2012.

MPC students, researchers, and faculty members present at Transportation Research Forum

MPC students, researchers and faculty members presented research at the annual forum of the Transportation Research Forum March 15-17 in Tampa, FL. The Transportation Research Forum is an independent organization of transportation professionals, academics and practitioners. Its annual forum each spring brings together transportation professionals to participate in research presentations, plenary panels, and discussions.

North Dakota State University

[Modeling Pavement Performance and Preservation](#)

• Pan Lu and Denver Tolliver.

[Pulsating Market Boundaries and Spatial Arbitrage in the U.S. Gulf](#) • Sumadhur Shakya, William Wilson and Bruce Dahl.

[Impetus to Short Sea Shipping Lines through Marine Highways](#) • EunSu Lee.

[Transporting Water for Hydraulic Fracturing](#) • Christopher DeHaan and Denver Tolliver.

[Toxic Air Pollutants and Trucking Productivity](#) • Yan Heng (Kansas State University) Siew Hoon Lim and Junwook Chi (Marshall University).

University of Denver

[The Reshaping of Land Use and Urban Form in Denver Through Transit-Oriented Development](#) • Keith Ratner (Salem State University) and Andrew Goetz.

[Developing a Measure of Organizational Inclusiveness in a Public Transportation Company](#) • Briana Hedman and Patrick Sherry.

[Women and Health: A Study of Female Shift Workers in the Transportation Industry](#) • Patrick Sherry and Allison Bondanza.

Wyoming researchers study performance of reclaimed asphalt pavement on unpaved roads

Researchers at the University of Wyoming examined the performance of reclaimed, recycled asphalt pavement (RAP) on unpaved roads at three sites, one each in Wyoming's Laramie, Johnson and Sweetwater Counties. They found that RAP could be an effective surfacing material for unpaved roads when blended with other aggregates, however its most economical use is as an additive to hot plant mix asphalt.

Health and equipment durability are both compromised by dust emissions. In addition, maintenance and regravelling costs increase as binder in the form of dust is lost from unpaved roads. The ability of RAP to reduce fugitive dust emissions is of considerable interest as both environmental and economic factors encourage local agencies to minimize the loss of dust from their unpaved roads and streets.

In this study, 15 material and dust suppression treatment combinations were examined. Materials included three RAP sources from Wyoming interstate millings and one milled cement-treated base (CTB) from Interstate 80. These were blended with other aggregate sources to provide an unpaved road surface. Dust suppressants included calcium chloride flakes, magnesium chloride brine, and brines made from blends of magnesium chloride with either lignin sulfonate or a proprietary polymer.

Three different construction methods were used: RAP was placed with haul trucks and shaped and blended with a motor grader; RAP was placed with haul trucks and blended with a reclaimer and shaped with a motor grader; and RAP was blended with virgin aggregate at the stockpile, then the blend was hauled to the roadway, shaped with a motor grader, and compacted with a single steel drum roller. The most critical element of placing, blending and shaping the RAP blends was the method's ability to provide complete blending, thereby avoiding segregation that led to several distresses including loose aggregate, dust and rutting.



Dustometer setup (l. to r.), dustometer, generator and vacuum.

Performance was assessed using Colorado State University's dustometer, the unsurfaced road condition index (URCI), and a variety of other materials tests and performance evaluations.

The following conclusions can be drawn based on the analyses performed

- CTB is not recommended as a surfacing material on unpaved roads.
- RAP was an effective surfacing material for unpaved roads when blended with other aggregates. Dust was reduced. Further reductions were, in most cases, achieved by adding a dust suppressant to the RAP and aggregate blends. However, dust suppressants increased the RAP-blend surfaces' vulnerability to rutting and other surface distortions when compared to the RAP blends alone.
- Economic analyses indicate that RAP should not be used when the alternative use is as an additive to hot plant mix asphalt. However, if the alternative use is as road base material, it is likely that using the RAP as an additive to an unpaved road's surface is the most economically advantageous use of the RAP.

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