

2010 Annual Report



**MID-AMERICA
TRANSPORTATION CENTER**

<http://matc.unl.edu>

**MATC: Improving Safety
and Minimizing Risk
Associated with
Increasing Multi-Modal
Freight Movements**



MID-AMERICA
TRANSPORTATION CENTER

(MATC)

Mid-America Transportation Center

University of Nebraska–Lincoln

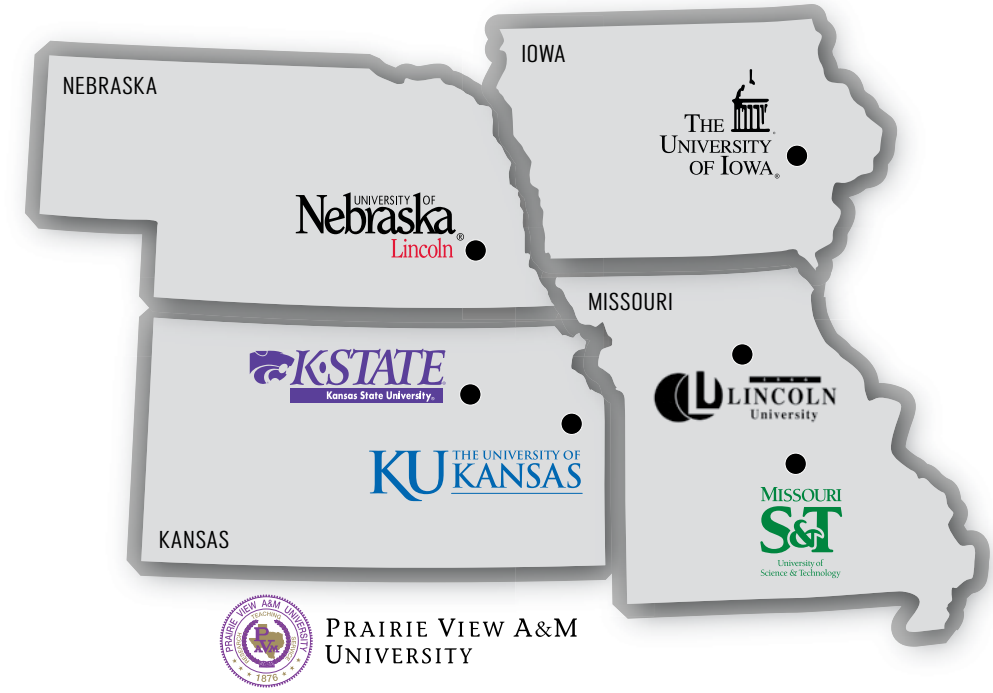
2200 Vine St.
262 F Whittier Research Center
Lincoln, NE 68583-0851

Phone: **402-472-1974**
Email: **matc@unl.edu**



**MID-AMERICA
TRANSPORTATION CENTER**

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Credits

Designer: Clint Chapman
Editorial Assistants: Lindsay Mayo Fincher, Charise Alexander
Marketing Coordinator: Bethany Carlson
Program Coordinator: Valerie Lefler

We at MATC would like to thank everyone for all of their hard work and cooperation throughout the process of making our third annual report. Without you it would not have been such a success.

Information Changes: lmayofincher@unlnotes.unl.edu, Phone (402) 472-1997

Letter from the Director: Reflections on the Past Year



MATC Director
Dr. Laurence R. Rilett

I am pleased to present our third MATC Annual Report since our designation by the U.S. Department of Transportation Research and Innovative Technology Administration as the Region VII University Transportation Center. We are proud to announce that we have met all of our research, technology transfer, and education initiatives that were laid out originally in our ambitious strategic plan. Of course, many of these initiatives involve continuing projects and activities--I assure you we have plenty to keep us busy in the coming year! For example, MATC recently hosted five faculty members and twenty-five students from historically under-represented universities and colleges at its first annual Scholars Program. The program, which was developed and run by Dr. Erick Jones of the University of Nebraska-Lincoln and Dr. Judy Perkins of Prairie View A&M University, provides specific, targeted seminars which are designed to improve the performance, recruitment and retention of under-represented students

in the science, technology, mathematics and engineering (STEM) fields at doctoral-granting institutions of higher learning. Drs. Jones and Perkins are working on making this workshop bigger and better in 2011. Watch for details of this successful initiative in our next newsletter.

As the stories in this annual report attest, our researchers, staff, and students have achieved an enviable record in research, education and technology transfer. The successful implementation of our strategic plan is directly attributable to two primary factors. The first is the overwhelming quality and dedication of the MATC personnel. Our faculty and staff have taken the leadership in making the MATC vision a reality. On the education front, as highlighted in this report, we are particularly proud of our K-12 programs and our regional transportation student internship programs that have been implemented across Region VII. The high level of success achieved by our research program, in terms of quantity and quality of projects, is clearly evident in this report. Of course, being a university institution, the greatest credit belongs to our students. As described in various articles throughout this annual report, our students have taken full advantage of the opportunities associated with our center. The best ambassadors for any program are its graduates; I am sure you will agree ours are among the best in the country.

The second reason behind our success is the overwhelmingly positive response of our partners in the public and private sectors. MATC was purposefully designed as a true partnership between the state transportation agencies in Region VII, the United States Department of Transportation (USDOT), private sector



transportation representatives, and the MATC consortium members. I am particularly pleased that the Region VII state transportation agency research heads—Sandra Larson from the Iowa DOT, Mara Campbell from the Missouri DOT, Rodney Montney from the Kansas DOT, and Moe Jamshidi from the Nebraska DOR—all actively participate as members of our executive committee. In addition, the MATC advisory board has significant federal, state and private sector participants from all surface transportation modes. These folks have been instrumental in broadening our research agenda and I am extremely grateful for the time and effort expended by our partners in helping us meet our goals.

The theme of our center is “improving safety and minimizing risk associated with increasing multi-modal freight movement on the U.S. surface transportation system.” This annual report will highlight our research, education, and technology programs over the past year.

As always I am very excited by the possibilities in the coming year as we continue to build one of the preeminent UTCs in the country. I welcome your feedback and suggestions and encourage you to check our website or contact us if you have any questions. Thank you for your interest and continued support.

Sincerely,
Larry



Vision

MATC's vision is to become a nationally recognized center of transportation excellence focused on developing new knowledge, innovative solutions, and the next generation of transportation professionals necessary to sustain the U.S. transportation system in a manner that is safer, more effective, more efficient, environmentally friendly, and sustainable.

Philosophy

MATC is designed as a true partnership between the Iowa Department of Transportation (IaDOT), the Kansas Department of Transportation (KDOT), Missouri Department of Transportation (MoDOT), the Nebraska Department of Roads (NDOR), the United States Department of Transportation (USDOT), private and public sector transportation representatives, and the member institutions of the Region VII UTC consortium. MATC is a cooperative effort among the major transportation sector partners in Region VII.

Overview of Consortium Members

Because each consortium member brings unique expertise and resources to MATC, the collective MATC program is greater than the sum of its individual programs. For example, the five state flagship universities—UNL, KSU, KU, MS&T and UI—have all established nationally recognized transportation programs and facilities. The laboratories, equipment, computer resources, faculty support, quality of students, and administrative support mechanisms are typically the highest quality available. MATC faculty are committed to increasing the diversity of the nation's transportation workforce and is proud to partner with LU, the leading minority-serving institution in Region VII. Faculty from each consortium member university are nationally and internationally known for their research related to the multi-modal transportation system.

This unique combination of resources and faculty allows MATC to succeed in meeting the programs and goals envisioned in the SAFETEA-LU UTC legislation. Because of MATC's underlying partnership agreement, faculty and students in Region VII have unprecedented access to state-of-the-art laboratories, computer resources, and administrative support; thereby, enabling MATC researchers to develop multi-institutional, interdisciplinary research teams to attack and solve the complex transportation problems faced by Region VII and the nation.

University of Nebraska-Lincoln (UNL)



The University of Nebraska-Lincoln (UNL) is the primary research and doctoral degree-granting institution in Nebraska. As Nebraska's land-grant university, it serves as the flagship institution of the University of Nebraska system. UNL has extensive experience in federal- and non-federal-sponsored research, as evidenced by its annual submission and receipt of grants in excess of \$150 million.

The primary conduit for transportation research at UNL is the Nebraska Transportation Center (NTC). The NTC, which is headquartered at UNL in the Whittier building, serves as the umbrella organization for surface transportation-related research, education, and technology transfer programs on all four University of Nebraska campuses (Omaha, Lincoln, Kearney, and the Medical Center). These programs include the Midwest Roadside Safety Facility, Mid-America Transportation Center, and the Nebraska Technology Transfer Center on the Lincoln Campus; the UNL Center for Infrastructure Research and the UNO School of Public Administration on the Omaha Campus; and the Nebraska Safety Center at University of Nebraska located in Kearney. The Health Education, Rural Health, and Traffic Injury Prevention and Acute Treatment Programs are located in the NU Medical Center.

University of Kansas (KU)



The University of Kansas (KU) fosters cross-disciplinary research in emerging transportation issues that have broad significance. Campus researchers and graduate students participate in research across related disciplines with colleagues from other universities and public transportation entities.

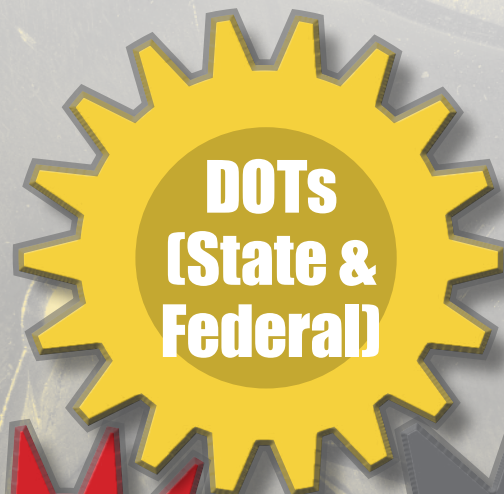
Faculty researchers at the University of Kansas conduct research on a variety of transportation topics, such as 1) new component and system technologies that advance vehicular and transportation systems; 2) the development of a new generation of vehicles, with improved energy efficiencies and lowered pollutant emissions, increased safety and durability; 3) the planning and development of new tools to design, model, and analyze components, transportation systems and environmental impacts; and 4) the provision of advanced-technology educational research experiences through undergraduate and graduate programs, interaction with industrial partners, and outreach activities to state and regional groups.

Missouri University of Science and Technology (MS&T)



The Department of Civil, Architectural, and Environmental Engineering at the Missouri University of Science and Technology (MS&T) (formerly University of Missouri-Rolla) has a broad-based program with seven emphasis areas, including structures, geotechnical engineering, construction, materials, transportation, environmental engineering, and hydraulics. The MS&T research activities related to infrastructural engineering and intelligent systems are coordinated by several research centers. The umbrella center, the Center for Infrastructure Engineering Studies (CIES), plays a significant role in the execution of initiatives within transportation infrastructural areas.

The primary research areas developed over the years include advanced materials and their application for existing structure rehabilitations, load test bridge assessment, nondestructive evaluation, and the monitoring of technologies of civil infrastructure. MS&T has developed research infrastructures for several of the proposed research theme topics, including a three-story tall structures testing laboratory that allows for the testing of full-scale structural members and systems, a structural health monitoring laboratory, a material testing laboratory, a nondestructive testing laboratory, and a network simulation laboratory.



Kansas State University (KSU)



Kansas State University (KSU) has all the facilities necessary for the successful completion of a wide range of transportation research projects, offering some of the best facilities in the nation for research related to the transportation infrastructure. These facilities include a full-scale, indoor accelerated pavement testing facility, two state-of-the-art Superpave Asphalt Laboratories, a falling weight deflectometer (FWD) calibration laboratory, and various other structural testing capabilities.

University of Iowa (UI)



The University of Iowa (UI) brings a number of important research groups to the MATC consortium. UI's Public Policy Center (PPC) was formed in 1987 to facilitate interdisciplinary academic research on public policy issues. Research teams at PPC address a number of important policy areas including transportation, health care, human factors and vehicle safety, economic development, social equity, and environmental quality. UI is also home to the National Advanced Driving Simulator—the most advanced driving simulator in the world. Developed by the National Highway Traffic Safety Administration (NHTSA), it is used to conduct research that will ultimately reduce the loss of lives and property on the nation's roadways.

Lincoln University (LU)



Lincoln University (LU), located in Jefferson, Missouri, has strong programs in business, finance, and accounting and has requested that education be the focus of their participation in MATC. As the only historically black college and university (HBCU) in Region VII, LU's participation is critical to the success of the education and technology transfer components of the MATC program.

Prairie View A&M University (PVAMU)



Prairie View A&M University (PVAMU) was founded in 1876 and is the second-oldest public institution of higher education in Texas. PVAMU has an established reputation for producing engineers, nurses and educators, and offers baccalaureate degrees in 50 academic majors, 37 master's degrees, and 4 doctoral degree programs through 9 colleges and schools. A member of the Texas A&M University System, the university is dedicated to fulfilling its land-grant mission of achieving excellence in teaching, research, and service. PVAMU serves as the principal liaison between MATC consortium members and HBCUs with engineering programs that do not currently participate in a regional or national UTC.

Transportation-Related Research Programs

The five state flagship universities (UNL, KSU, KU, UI, and MS&T) all have significant existing transportation-related research programs that include centers dedicated to roadside safety (UNL), infrastructure testing (UNL, KSU, KU, and MS&T), advanced highway materials (KSU), technical assistance programs (MS&T, UNL, KU), driving simulation (UI, UNL), public policy (UI), and advanced vehicle and fuel technologies (MS&T, KU, UNL). Highlights of these are listed below.

UNL
Nebraska Transportation Center
Mid-America Transportation Center
Local Technical Assistance Program
KSU
University Transportation Center
Center for Transportation Training and Research
KU
Local Technical Assistance Program
Rural Transit Assistance Program
Transportation Research Institute
Infrastructure Research Institute
Information and Telecommunication Technology Center
MS&T
Center for Infrastructure Engineering Studies
University Transportation Center
Natural Hazards Mitigation Institute
Intelligent Systems Center
UI
National Advanced Driving Simulator
Public Policy Center
Iowa Institute of Hydraulic Research
Construction Materials Laboratory
Engineering Research Laboratory
Human Factors and Statistical Modeling Laboratory
Hank Driving Simulator
Operator Performance Laboratory

Institutional Resources

The member institutions that comprise the consortium, particularly, the five state flagship universities (UNL, KSU, KU, UI, and MS&T) have excellent facilities and significant resources that are used in MATC activities. Combined budgets of the research, service, and educational activities of the consortium members exceed tens of millions of dollars annually. More importantly, the synergy that exists among the consortium's transportation faculty and researchers is leading to greater national achievements in research, education, and service than could have been accomplished if the consortium members were to work as single entities.

The combined lab and equipment resources of the MATC consortium members are substantial. Major research libraries, state-of-the-art computer facilities, laboratories, and office space are available in adequate quantities at each university. The institutional members of MATC have a substantial array of classrooms, offices, and support services available for use by MATC personnel. All universities in the consortium have state-of-the-art training and video-conferencing facilities that are capable of meeting the needs of all research and training (both on-site and distance learning) initiatives.

MATC has access to a comprehensive set of multi-modal, state-of-the-art research and testing facilities. These include the Nebraska Transportation Center's (NTC) Intelligent Transportation Systems laboratory (UNL), the NTC Midwest Roadside Safety Facility (UNL), several structural testing facilities (UNL, MS&T, KU, KSU), an Accelerated Pavement Testing facility (KSU), the National Advanced Driving Simulator (UI), and an environmental testing facility (KU). A wide range of research already has been conducted at these facilities and the sponsors include various public (FHWA, FRA, NDOR, IaDOT, KDOT, MoDOT) and private agencies (NASCAR, Indy Racing League).

Highlights of the institutional resources of MATC's consortium members are shown in the following table:

UNL
NTC Intelligent Transportation Systems Lab
NTC At-Grade Railway Test Bed
NTC Midwest Roadside Testing Facility
Structural Laboratory - Lincoln
Peter Kiewit Institute's Structural Laboratory - Omaha
KSU
Accelerated Pavement Testing Facility
Falling Weight Deflectometer Calibration Lab
Superpave Laboratory and Advanced Asphalt Laboratory
Structural Engineering Laboratory
KU
Structural Engineering and Materials Lab
Geotechnical Testing Lab
Traffic Safety Lab
Intelligent Systems and Automation Lab
Energy Research Center
MS&T
Highbay Structures Laboratory
Applied Microwave Nondestructive Testing Laboratory
Trustworthy Systems Laboratory
Structural Health Monitoring Laboratory
UI
National Advanced Driving Simulator

CENTER PERSONNEL

ASSOCIATE DIRECTORS
ADVISORY BOARD
RESEARCH DIRECTORS
ORGANIZATIONAL STRUCTURE
EDUCATION ADMINISTRATORS
MATC STAFF

MATC Associate Directors



Dr. Elizabeth "Libby" Jones
Associate Professor, Civil Engineering
Associate Director, Mid-America
Transportation Center
University of Nebraska-Lincoln
203E Peter Kiewit Institute Building
6001 Dodge Street
Omaha, NE 68182-0178
Phone: (402) 554-3869
ejones1@unl.edu

Dr. Libby Jones is an associate professor in the Department of Civil Engineering at the University of Nebraska-Lincoln (Omaha campus). She directs and oversees the MATC Intelligent Transportation Systems Lab at the University of Nebraska's Peter Kiewit Institute. Dr. Jones has been a principal investigator or co-principal investigator on more than 15 research projects. She has authored or co-authored over 20 journal papers and served as committee chair for over 20 masters' and doctoral students. Currently she is supervising five masters' students and two doctoral students. Dr. Jones serves as the MATC associate director for UNL.



Dr. Paul Hanley
Assistant Professor, Civil &
Environmental Engineering and
Public Policy Center
Associate Director, Mid-America
Transportation Center
University of Iowa
218 South Quad
Iowa City, IA 52242
Phone: (319) 335-8137
paul-hanley@uiowa.edu

Dr. Paul Hanley is an associate professor of transportation in civil and environmental engineering as well as in urban and regional planning at the University of Iowa. He also has an appointment at the University's Public Policy Center, where he is the director of transportation policy research. His principal research interests are transportation engineering, planning, and economic policy analysis. In general, his work focuses on assessing the impacts of policy changes on transportation behavior and on infrastructure provision as a means of enhancing safety, ensuring economic welfare, and promoting sustainable urban patterns. He serves as a MATC associate director for the University of Iowa.



Dr. Genda Chen
Professor, Civil Engineering,
Architectural & Environmental
Engineering
Associate Director, Mid-America
Transportation Center
Missouri University of Science & Technology
224 Engineering Research Laboratory
500 West 16th Street
Rolla, Missouri 65409-0030
Phone: (573) 341-4462
gchen@mst.edu

Dr. Genda Chen is a professor in the Department of Civil, Architectural, and Environmental Engineering at the Missouri University of Science & Technology (formerly, University of Missouri-Rolla) and the interim director of the Center for Infrastructure Engineering Studies (CIES). He is a registered professional engineer in the state of California. Dr. Chen has been principal investigator and co-principal investigator on over 55 research projects, totaling more than \$8 million for his teams and approximately \$3 million for his share. He has supervised 11 doctoral students and 13 masters' students, and has published over 40 peer-reviewed journal papers and an additional 125 conference papers. Dr. Chen serves as the MATC associate director for the Missouri University of Science & Technology.



Dr. Tom Mulinazzi
Professor, Civil, Environmental &
Architectural Engineering
Associate Director, Mid-America
Transportation Center
University of Kansas
2150 Learned Hall
Lawrence, Kansas 66045
Phone: (785) 864-2928
tomm@ku.edu

Dr. Tom Mulinazzi is a professor and former department chair of civil engineering and associate dean of engineering at the University of Kansas (KU). He has been a member of the Kansas State Board of Technical Profession since 2000. He is very active with the Local Technical Assistance Program at KU. Dr. Mulinazzi serves as the MATC associate director for the University of Kansas.



Dr. Mustaque Hossain
Professor, Civil Engineering
Associate Director, Mid-America
Transportation Center
Kansas State University
2124 Fiedler Hall
Manhattan, Kansas 66506-5000
Phone: (785) 532-1576
mustak@k-state.edu

Dr. Mustaque Hossain is a professor in the Department of Civil Engineering at Kansas State University. His main areas of interest include the application of new technologies in construction, quality control/quality assurance, mechanistic analysis and design of pavements, non-destructive testing of pavements, and pavement and maintenance management systems. Dr. Hossain has conducted over 50 research projects, published over 44 peer-reviewed journal articles and has four patents related to his research. He is a fellow of the American Society of Civil Engineers (ASCE) and is also very active in the Transportation Research Board (TRB). He serves as the MATC associate director for Kansas State University.

MATC Advisory Board: Private Sector



Mr. E. Dean Carlson
Former Executive Director, FHWA
Former Secretary of
Transportation, Kansas

Mr. Carlson is the former executive director of FHWA, former secretary of transportation for the



State of Kansas, and a member of the National Academy of Engineering. In 2003 Dean Carlson retired from his position as Kansas secretary of transportation and began his consulting practice. He has nearly five decades of experience in the field of transportation; in addition to 8 years as Kansas Secretary, he served for 36 years with the Federal Highway Administration, retiring as executive director in 1994. His career with Federal Highway Administration included many positions in various regional and division offices as well as the headquarters in Washington, D.C. He has served as a member of the Executive Committee of the Transportation Research Board, and was its chairman in 2002. He is also former president of the Board of Directors of the American Association of State Highway and Transportation Officials. In 2001, Secretary Carlson was elected to the prestigious National Academy of Engineers for "outstanding leadership and dedication in developing national highway policy, systems management initiatives and research programs." During his distinguished career, Secretary Carlson has received numerous awards from Presidents G.H.W. Bush and Clinton, the Federal Highway Administration, The American Association of State Highway and Transportation Officials, the National Research Council, the International Road Federation and the Road Gang.



Mr. David Connell
Vice President, Engineering
Union Pacific Railroad

Mr. Connell is the vice president of engineering for Union Pacific Railroad.



David has worked for Union Pacific and predecessor companies

for 27 years having held a variety of field and staff positions including AVP- Construction, Chief Engineer - Maintenance of Way and various track research positions. In his current position, David directs the design, construction and maintenance of all track, signal and bridge infrastructure in the nation's largest railway. David holds a BS degree in civil engineering from NC State University and attended the Harvard Business School. He currently chairs the American Association of Railroad's Heavy Axle Load Committee and is a member of the Railway Technology Working Committee at the Transportation Technology Center, Inc.



Mr. John L. Craig
Vice President
HDR Engineering, Inc.

John L. Craig is vice president of HDR Engineering, Inc. and is leading a Joint HDR-Fluor venture to repair or replace 365 bridges throughout Oregon.

Prior to this, he served over 10 years as the



Director of the Nebraska Department of Roads (Department of Transportation), and as a member of the Governor's Cabinet. He retired as a commissioned officer, U.S. Army Corps of Engineers, with assignments and responsibilities in the United States and around the world.

John is a past member of the Board of Directors of the American Association of State Highway and Transportation Officials (AASHTO); Board of Directors of the Intelligent Transportation Society of America; and the Executive Committee of the Transportation Research Board, U.S. National Academies. He currently serves on the Board of Directors of the Nebraska Transportation Center, University of Nebraska. John has also participated in and received awards from myriad international, national, regional, state and local organizations in engineering, transportation, and defense.



Mr. Abbas Mohaddes
President and Chief Executive
Officer
Iteris, Inc.

Mr. Mohaddes is president and chief executive officer of Iteris (www.iteris.com), a leading traffic management company focused on



Intelligent Transportation Systems (ITS). Prior to his appointment as CEO, he was the executive vice president and general manager from 2003 - 2007. Mr. Mohaddes has also served as president and chief executive officer of Meyer Mohaddes Associates, Inc. (MMA), an ITS and Traffic Engineering firm that he co-founded in 1991. MMA was acquired by Iteris in 1998 to further augment the company's transportation systems consulting and design services.

Mr. Mohaddes is a founding member of ITS America and a nationally recognized expert in ITS and Traffic Management. He is a published author and has presented over 50 articles at ITS/Transportation engineering professional organizations. Mr. Mohaddes is a fellow of the Institute of Transportation Engineers (ITE), member of Transportation Research Board (TRB), board member of ITS America, and member of Design/Build Institute of America. Mr. Mohaddes is a UNL Alumni and received his bachelor's degree in civil engineering from the University of Nebraska. He also received his master of science in transportation engineering from UNL.



Mr. Dan Murray
Vice President, American
Transportation Research Institute

Mr. Murray is vice president of research for the American Transportation Research Institute (ATRI), an award-winning, not-for-



profit research arm of the trucking industry that conducts objective research, analysis and evaluation on a range of transportation issues, such as safety, technology, productivity and security. Mr. Murray has overall responsibility for directing ATRI's portfolio of research and has served as project manager on research initiatives sponsored by FHWA, FAA, FMCSA, USDA, CBP, TRB and TSA. In addition, he has served on various transportation research committees for organizations such as the National Academy of Sciences, General Accounting Office, and Council on Competitiveness. Prior to joining ATRI, Mr. Murray worked for the Regional Transit Board (Minneapolis/St. Paul) as project administrator. He also spent several years working in economic development for a Chicago-based Fortune 500 business consortium. Mr. Murray received his BA from Gustavus Adolphus College, and his MS from Northwestern University.



Mr. Richard Reiser
Executive Vice President and
General Counsel
Werner Enterprises, Inc.

Mr. Reiser is vice president of government affairs at Werner Enterprises, Inc., an Omaha-based motor carrier and logistics company that provides trucking



and logistics services in 48 states and several foreign countries. Dick is responsible for managing all of the governmental, regulatory, and legislative affairs of Werner Enterprises.

As a transportation expert, Reiser serves as chairman of the Transportation Council of the Greater Omaha Chamber of Commerce, vice-chairman of the Litigation Center Board of Directors for the American Trucking Associations, and member of the ATA's Board of Directors. Reiser serves on the Board of Trustees of the Greater Omaha Alliance for Business Ethics and is chairman of the Board of Directors of the Nebraska Chamber of Commerce and Industry.

Reiser's educational background includes a bachelor of science in business administration from the University of Nebraska—Lincoln (1968) and a juris doctorate degree from the University of Nebraska (1972). Prior to joining Werner Enterprises, he was in private practice in Omaha, Nebraska from 1972 through 1993. He is admitted to practice law in Iowa, Nebraska, the U.S. District Court for the District of Nebraska, and the U.S. Circuit Court of Appeals for the 8th Circuit.



Mr. David Sehrt
Senior Vice President
Ingram Barge Lines

Mr. Sehrt is senior vice president of Ingram Barge Lines. Mr. Sehrt graduated with a BS in civil engineering from Tulane University



in 1976. In 1990, Mr. Sehrt received an MBA from the Owen School at Vanderbilt University. Since 1989, he has been with Ingram Barge Company, working primarily in the motor vessel engineering and barge maintenance areas.



Mr. Robert VanderClute
Senior Vice President of Safety and
Operations
Association of American Railroads

Mr. VanderClute is a senior vice president of safety and operations at the Association of American Railroads.



Association
of American
Railroads

His department's responsibilities include the oversight of the industry's homeland security plan, equipment interchange standards, car service rules, quality assurance programs, and safety initiatives in addition to environmental issues, hazardous materials, communication signals, and tank car safety standards and design. Mr. VanderClute is the industry's liaison with the FRA, NTSB, EPA, DHS, FCC, and other regulatory bodies. After graduating from the University of Tennessee, where he majored in transportation, Mr. VanderClute completed graduate school programs at both the Darden Graduate School of Business at the University of Virginia and the Harvard Business School. He is a fellow with CILT and is active in several public and professional organizations. Mr. VanderClute subsequently served as vice president of operations and later chief operations officer at Amtrak. Reporting directly to Amtrak's president and chairman, Mr. VanderClute was responsible for the day-to-day operations of the company, including customer service, transportation, procurement and material management, safety, environmental, engineering, and mechanical service centers as well as other key corporate responsibilities. During his career, the corporation implemented a high-speed rail program, embarked on a six billion-dollar infrastructure improvement program, replaced virtually its entire motive power and car fleet, and became the largest contract carrier of commuter services in North America.

MATC Advisory Board: Public Sector



Mr. Michael Flanigon
Director, Office of Safety and Security,
Office of Program Management
Federal Transit Administration

Mr. Flanigon has been involved in the rail transportation industry for over 35 years. He



began his career as a brakeman on the Southern Pacific Lines (SP). During his tenure with SP, he worked as a switchman, conductor, locomotive engineer, and operating rules instructor. He has also worked with the California Public Utilities Commission, where he had responsibilities in that state's rail safety oversight program, and the Valley Transportation Authority, where he served as environmental health and safety manager and subsequently as light rail superintendent. Later, at San Francisco Bay Area Rapid Transit (BART), he served as the chief safety officer. He was an NTSB railroad accident investigator and served as the investigator-in-charge on a number of high profile railroad and transit accidents before joining the FTA in 2007 as the director of the Office of Technology. He earned his bachelor's degree in anthropology from California State University in Los Angeles, and his master's degree in public administration from Golden Gate University in San Francisco.



Mr. Joseph Werning
Division Administrator
Federal Highway Administration
Nebraska Division

Mr. Werning was appointed division administrator for the Federal Highway Administration's



(FHWA) Nebraska Division on August 18, 2008. In this capacity, Mr. Werning serves as the principal representative of the FHWA and is responsible for administering the entire federal aid highway program in Nebraska. He is responsible for providing leadership and guidance to state, local, industry, and academic officials in the identification of transportation needs and priorities that, when implemented, carry out national transportation and safety program goals. He is also responsible for establishing division office goals and objectives that will meet the agency's strategic vision while maximizing available resources. Mr. Werning earned a bachelor's degree from the University of Maryland, College Park, in 1989. For the past 19 years, he has held numerous professional positions with FHWA throughout the country and with a private engineering firm. He has extensive experience in the transportation field including, statewide and urban planning and programming, project development, environmental management, transportation finance, policy analysis, and legislative development. He has also received numerous performance awards, including the FHWA Administrator's Award for Superior Achievement.



Mr. Monty Fredrickson
Director, State Engineer
Nebraska Department of Roads



Mr. Fredrickson was born and raised in Stromsburg, Nebraska. After graduating with a bachelor's degree in civil engineering in 1969 from the University of Nebraska—Lincoln, he worked for Shell Oil Company as a mechanical engineer in New Orleans, Louisiana for eighteen months. In 1970, he began working for the Nebraska Department of Roads and spent one year as survey party chief and inspector in the Omaha, Nebraska construction district. Mr. Fredrickson also spent seventeen years working in the Roadway Design Division in Lincoln, Nebraska, rising to the position of assistant design engineer in the following areas: Rural, Urban, Expressway and Interstate. After four years as district engineer in charge of construction and maintenance back in Omaha, he spent 17 years as deputy director for engineering services in Lincoln, Nebraska. He is currently serving his second year as director-state engineer.



Dr. Ray Krammes
Technical Director, Research and
Development
Turner-Fairbank Highway Research
Center

Dr. Ray Krammes has spent the last three decades establishing himself as one



of the nation's preeminent road geometric design scholars. Dr. Krammes, who holds a PhD in civil engineering from Pennsylvania State University and is a registered professional engineer, has more than three dozen publication credits to his name and was recognized as the Federal Highway Administration's Engineer of the Year in 2004. He is a member of the Institute of Transportation Engineers' Transportation Safety Council.



Dr. Judy Perkins
Professor and Department Head
Department of Civil and Environmental
Engineering
Prairie View A&M University

Dr. Perkins holds a BS, MS, and PhD in civil engineering from Southern University,



University of Illinois (Urbana-Champaign), and Georgia Institute of Technology, respectively. At the master's level, her area of specialty was in reinforced concrete structures; at the doctoral level, it was in transportation engineering. Since 1992, Dr. Perkins' research has focused on statewide intermodal transportation planning, transportation logistics, hurricane evacuation analyses, and the impact of economic development as it relates to transportation. Moreover, Dr. Perkins has accumulated extensive experience in the development of survey design, data collection, state-level transportation planning, and the refinement of economic development methodologies used to evaluate transportation-related activities. Dr. Perkins' extensive record of publication extends into both the national and international transportation and engineering education arenas.

Region VII State Agency Research Directors



Mara Campbell
Organizational Results Director
Missouri Department of
Transportation

Mara Campbell is the organizational results director for the Missouri Department



of Transportation (MoDOT), a position she assumed June 2005. This unit is responsible for coordinating organizational performance efforts such as the development and monitoring of organizational performance measures and essential process and quality efforts coupled with innovative and applicable transportation research. The focus of the organizational results division is to close organizational performance gaps by implementing innovative transportation solutions.

Mrs. Campbell previously directed the department's strategic planning and policy efforts. She has also served as a senior examiner with the Missouri Quality Award Program for the past four years and currently represents MoDOT on the Missouri Interagency Planning Council, AASHTO's Standing Committee on Performance Management and Research Advisory Committee.

Mrs. Campbell joined MoDOT in 1997 as public affairs manager at MoDOT's Central District office in Jefferson City. In the past, she has also served as MoDOT's government affairs manager. Prior to joining MoDOT, Mrs. Campbell was the public relations and marketing director for Memorial Community Hospital/Capital Region Medical Center in Jefferson City.

Moe Jamshidi
Materials and Research Division
Engineer
Nebraska Department of Roads



Mostafa Jamshidi is the materials and research engineer for the



State of Nebraska Department of Roads (NDOR). Mr. Jamshidi is currently responsible for directing the activities related to pavement design, pavement management and materials testing for the 10,000 Mile State Highway System of Nebraska. He is also in charge of coordinating all the research activities related to pavements and materials for the Nebraska Department of Roads. Mr. Jamshidi has been involved in the design and construction of transportation related projects for over 25 years. He has served on numerous local, and national Technical Advisory Committees for transportation related research projects. Mr. Jamshidi is a graduate of the University of Nebraska with a degree in civil engineering, and is a registered professional engineer in the state of Nebraska. He is a member of the AASHTO Subcommittee on Materials, a member of AASHTO Research Advisory Committee, and the Transportation Research Board's (TRB) representative for the NDOR.



Sandra Larson
Research and Technology Bureau
Director
Iowa Department of Transportation
Highway Division

Sandra Larson is currently director of the Research and Technology Bureau in the Highway Division of the Iowa Department

of Transportation, a position she has held since 2002. During her 21 years with the Iowa Department of



Transportation, she has held various positions, including Engineering Bureau director, state bridge engineer, Ames resident construction engineer, and bridge design engineer. Sandra has two BS degrees from Iowa State University in civil engineering (1988) and general science/ biology (1975) and is a registered professional engineer in the state of Iowa in civil and structural engineering. She serves on numerous TRB, FHWA, and AASHTO committees in the areas of research, structures, winter maintenance, and pavements.



Rodney "Rod" Montney
Engineer of Research
Kansas Department of
Transportation

Rodney Montney is the engineer of research for the Kansas Department of Transportation (KDOT). In this position, he directs the agency's research activities and 25 staff members. He serves as chairman of KDOT's Research Technical Committee and secretary

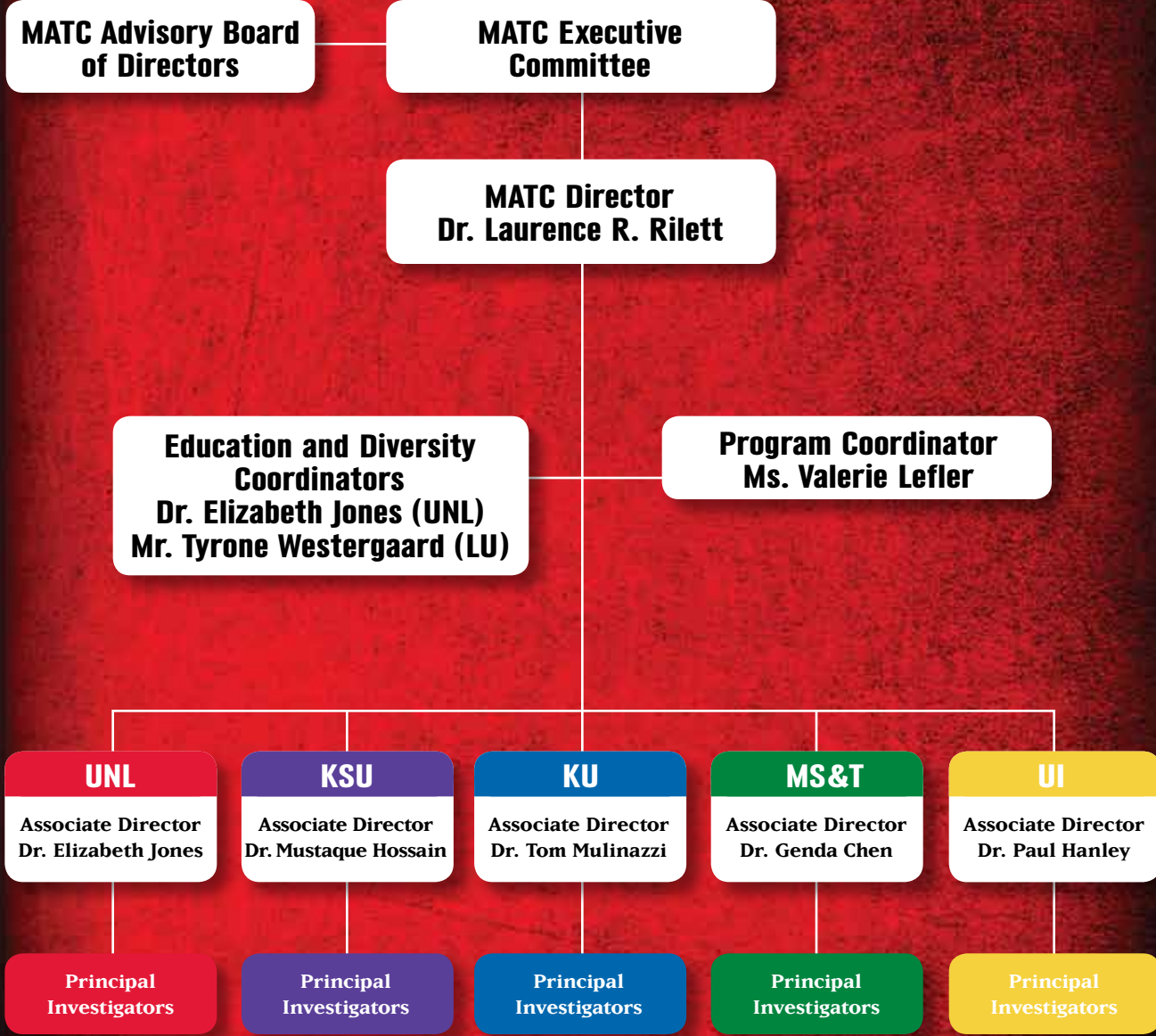


of its Research Program Council. Mr. Montney is a member of the AASHTO Standing Committee on Research (SCOR) and the AASHTO Research Advisory Committee (RAC). He is also the Kansas DOT Transportation Research Board (TRB) representative. Mr. Montney serves on advisory committees for the University of Nebraska Mid-America Transportation Center and the Kansas State University Transportation Center.

Mr. Montney has a BS in mining engineering from the Colorado School of Mines and is a licensed professional engineer in the State of Kansas. He has worked for KDOT for 25 years. Prior to being appointed engineer of research, his experience has primarily been in construction, materials tests, pavement design, and concrete.



MID-AMERICA
TRANSPORTATION CENTER



Education Administrators



Dr. Elizabeth "Libby" Jones
Associate Professor, Civil Engineering
Associate Director, Mid-America
Transportation Center
University of Nebraska-Lincoln

Dr. Jones serves as the MATC coordinator for education and equity and will be responsible for coordinating the MATC educational and diversity programs.



Dr. Erick Jones
Director, RFID Supply Chain Lab
Director, Transportation Logistics Lab
Associate Professor
Industrial and Management Systems
Engineering

Dr. Jones serves as the lead principle investigator for the MATC Scholars Program and, as part of this position, coordinates the curriculum for the annual MATC Scholars Program Graduate Conference.



Mr. Tyrone Westergaard
Assistant Professor, Business
Administration
Lincoln University

Mr. Westergaard serves as the MATC education coordinator at Lincoln University and will help coordinate, along with Dr. Jones, the MATC diversity programs.

MATC Staff

Dr. Laurence Rilett
MATC Director
Keith W. Klaasmeyer Chair in Engineering and Technology
lrilett2@unl.edu
Phone: (402) 472-1992

Ms. Valerie Lefler
MATC Program Coordinator
vlefler2@unl.edu
Phone: (402) 472-1974

The Mid-America Transportation Center employs staff and students from the Nebraska Transportation Center on an as-needed hourly basis to ensure the most efficient use of MATC funds. The staff and students draw on a wide range of qualifications and areas of expertise and contribute greatly to the success of the center's programs and to the quality of its publications. Through their work on MATC projects, students engaged in such diverse majors as computer engineering, business, psychology, marketing, and English learn about transportation engineering and how it shapes the world while providing MATC with a talented, well-educated, and high energy staff to complete the activities necessary for the center to thrive.



PARTNERSHIPS

CONSORTIUM PARTNER HIGHLIGHTS

UNIVERSITY OF NEBRASKA-LINCOLN
KANSAS STATE UNIVERSITY
UNIVERSITY OF IOWA
UNIVERSITY OF KANSAS
MISSOURI S&T



University of Nebraska-Lincoln

Lead Institution

Highlights at a Glance

University of Nebraska-Lincoln Educational Programming and Outreach

For Letter from UNL
Director see pages 6-7

This past year, MATC has continued to support educational initiatives benefitting a broad spectrum of students, from middle to graduate school. The focus remains on a multi-disciplinary approach in recruiting students to transportation careers, with an increased recognition of the need for supporting diversity in the field.

• **Summer Intern Program:** This year, fifteen undergraduate students participated in the fifteenth successful year of the MATC summer intern program at UNL. About half of the interns worked at public and private entities, while the other half worked with MATC research faculty. For information on all the internship activities, please see page 59.

• **Math and Science Professional Development Summer Institute and Engineering Experience Days:** Led by MATC Director Dr. Larry Rilett, Dr. Gina Kunz and Dr. Gwen Nugent, both from UNL's Center for Youth and Family Services, this year's Summer Institute included a record twenty-nine middle and high school teachers from four locations throughout

eastern Nebraska. Linked by a teleconferencing system, CYFS and Engineering faculty offered teachers a variety of presentations, tours, and activities to provide an introduction to areas within transportation engineering. After learning about these concepts, teachers developed hands-on lesson plans that were then piloted with students at Engineering Experience Day the following month. See the full story on pages 64-65.

• **MATC Scholars Program:** Visiting faculty members from HBCUs assembled at UNL with MATC's Dr. Judy Perkins and Dr. Erick Jones to plan the MATC Scholars Program Graduate Conference, which took place in late September. The Scholars Program prepares students from groups that are under-represented in engineering to enter and succeed in graduate school. About fifteen students came together for educational seminars from these faculty members. This important endeavor allows experienced, accomplished faculty to use their own experiences and knowledge to guide future graduate students. For more information, see page 68.

Tech Transfer and Career Development

This year showed a marked increase in the number and scope of tech transfer activities at every MATC institution, including UNL. Both undergraduate and graduate students had numerous opportunities to present their own research and learn about research and other developments in transportation engineering at several regional and national conferences. Other tech transfer happenings over the past year have included the following.

- **MATC Transportation Engineering Graduate Seminar:** This past fall, Dr. Rilett offered a transportation engineering graduate seminar, which explored everyday issues in transportation-related professions. Guest speakers in various public, private, and academic positions in the transportation field gave a wide range of perspectives on possible career paths. In addition, the lecture series was open for anyone interested to attend. For more information on all the lecturers, see page 70.
- **Indo-US Workshop:** A workshop on "Emerging Trends in Intelligent Transportation Systems" brought together over one hundred participants from India and the United States at the Indian Institute of Technology in Chennai, India. Numerous ITS

experts from academic, public, and private sectors in both countries discussed the future of ITS through panels and specialized sessions. The subsequent recommendations emphasized an interdisciplinary and multi-institutional approach that joins together academia, the public and private sector in addressing transportation concerns. For more information on the event, see page 74.

- **ITS Heartland Annual Meeting and Training:** The 11th Annual ITS Heartland meeting in Omaha served as a venue for dialogue across state lines to support ITSH's mission of improving transportation through technology and communication. A number of eminent speakers were featured to speak on local, regional, and national ITS issues. ITS Heartland also offered an FHWA workshop last spring on "Managing Travel Demand: A Contemporary Approach to Mitigating Congestion" in both St. Louis and Kansas City. More than forty participants gathered for training and discussion on how to improve existing transportation systems in order to decrease congestion in urban corridors. For all the information, please see page 76.



Cody Stolle Awarded Eisenhower Graduate Fellowship

University of Nebraska-Lincoln Ph.D. student Cody Stolle received a prestigious and highly selective 2010 Eisenhower Graduate Fellowship from the Federal Highway Transportation Administration. This award, in the amount of \$5000, is given to students pursuing a graduate degree in transportation-related fields. The purpose of the Eisenhower Transportation Fellowship Program is to encourage talented students to pursue transportation jobs, in order to foster innovation and enhance the scope of transportation knowledge in the United States.



Mr. Stolle is studying civil engineering with a focus on structural engineering, under the direction of Dr. Dean Sicking, director of MwRSF. His research goals include improving transportation safety by recommending new designs and uses of simulation. For the award, he submitted a proposal to reduce or eliminate cable barrier penetrations.

MwRSF faculty members have been a key part of the education and experience that helped qualify Mr. Stolle for this fellowship. He expressed gratitude to Dr. Sicking for his leadership and friendship, as well as to Dr. John Reid of MwRSF, whom he calls a tremendous resource and advisor.



AREMA Scholarship

John Coburn is winner of the Union Pacific William E. Wimmer Scholarship of \$1000, provided through the AREMA Foundation. Mr. Coburn was awarded this prize for his MATC intern project, advised by Dr. Anuj Sharma.

University of Nebraska-Lincoln Research Projects

- Effect of Freeway Level of Service and Driver Education on Truck Driver's Stress - Phase 1
- Heavy Vehicle Adjustment Factors for High Percentages of Trucks
- Impact of Truck Loading on Design and Analysis of Asphaltic Pavement Structures - Phase II
- Reducing Impact of Heavy Truck Traffics on Service Life of Bridge Structures
- Simulation and Evaluation of a Cable-to-Post Attachment for High-Tension, Cable Barriers Placed in Medians along Freight Transportation Systems
- Investigating RFID for Linear Asset Management

Matching Funds Provided by:

Nebraska Department of Roads

Felsburg, Holt & Ullevig

Lamp, Rynearson & Assc, Inc.

University of Nebraska-Lincoln

For project details see pages 52-54

University of Nebraska MATC Affiliated Faculty, Research Staff & Partners



Dr. Laurence Rilett
Keith W. Klaasmeyer Chair in Engineering and Technology
Director, Nebraska Transportation Center
University of Nebraska-Lincoln
262D Whittier Research Center
Lincoln, NE 68583-0152
Phone: (402) 472-1992
lrilett2@unl.edu



Dr. Aemal Khattak
Associate Professor, Civil Engineering
University of Nebraska-Lincoln
330E Whittier Research Center
Lincoln, NE 68583-0851
Phone: (402) 472-8126
akhattak2@unl.edu

Dr. Elizabeth "Libby" Jones
Associate Professor, Civil Engineering
Associate Director, Mid-America Transportation Center
University of Nebraska-Lincoln
203E Peter Kiewit Institute Building
6001 Dodge Street
Omaha, NE 68182-0178
Phone: (402) 554-3869
ejones1@unl.edu



Dr. Anuj Sharma
Assistant Professor, Civil Engineering
University of Nebraska-Lincoln
330F Whittier Research Center
Lincoln, NE 68588
Phone: (402) 472-6391
asharma3@unl.edu



University of Nebraska MATC Affiliated Faculty, Research Staff, & Partners



Dr. Junke (Drinker) Guo
 Assistant Professor of Hydraulics and Fluid Mechanics, Civil Engineering
 University of Nebraska-Lincoln
 1110 S. 67th St, PK1 204D
 Omaha, NE 68182-0178
 Work (402) 554-3873
 jguo2@unl.edu



Dr. Hamid Sharif
 Henson Professor, Computer & Electronics Engineering
 University of Nebraska
 200C PKI
 Omaha, NE 68182-0572
 Phone: (402) 554-3628
 hsharif@unl.edu



Dr. Ronald Faller
 Research Assistant Professor, Midwest Roadside Safety Facility
 University of Nebraska-Lincoln
 130 Whittier Research Center
 Lincoln, NE 68583-0853
 Phone: (402) 472-6864
 rfaller1@unl.edu



Dean Sicking
 Leonard A. Lovell Professor, Civil Engineering
 Director, Midwest Roadside Safety Facility
 University of Nebraska-Lincoln
 130 Whittier Research Center
 Lincoln, NE 68583-0853
 Phone: (402) 472-9332
 dsicking1@unl.edu

Dr. John Rohde
 Associate Professor, Civil Engineering
 University of Nebraska-Lincoln
 362G Whittier Research Center
 PO Box 830856
 Lincoln, NE 68583-0856
 Phone: (402) 472-8807
 jrohde1@unl.edu



Dr. David Admiraal
 Associate Professor, Civil Engineering
 W355 NH
 Lincoln, NE 68588-0531
 Phone: (402) 472-8568
 dadmiraal2@unl.edu



Dr. Erick Jones
 Director, RFID Supply Chain Lab
 Director, Transportation Logistics Lab, Industrial and Management Systems Engineering
 University of Nebraska-Lincoln
 162 C Whittier Research Center
 Lincoln, NE 68583-0854
 Phone: (402) 472-3695
 ejones2@unl.edu



Dr. Senem Velipasalar
 Assistant Professor, Electrical Engineering
 University of Nebraska-Lincoln
 219N SEC
 Lincoln, NE 68588
 Phone: (402) 472-1976
 velipasa@engr.unl.edu



Dr. John Reid
 Professor, Mechanical Engineering
 University of Nebraska-Lincoln
 N104 Walter Scott Engineering Center
 Lincoln NE 68588-0656
 Phone: (402) 472-3084
 jreid@unl.edu



Dr. Tian Zhang
 Professor, Civil Engineering
 205D PKI
 Omaha NE 68182-0178
 Phone: (402) 554-3784
 tzhang1@unl.edu



Dr. Judy A. Perkins
 Professor and Department Head
 Civil & Environmental Engineering
 Prairie View A&M University
 P. O. Box 519, MS #2510
 Prairie View, TX 77446
 Phone: (936) 261-1665
 juperkins@pvamu.edu



Dr. Atorode Azizinamini
 Endowed University Professor, Civil Engineering
 University of Nebraska-Lincoln
 W150 Nebraska Hall
 Lincoln, NE 68588-0531
 Phone: (402) 472-5106
 aazizi@unl.edu

Dr. Yong-Rak Kim
 Associate Professor, McNeel Professor of Engineering, Civil Engineering
 University of Nebraska - Lincoln
 362M Whittier Research Center
 Lincoln, NE 68583-0856
 Work: (402) 472-1727
 ykim3@unl.edu



Mr. Bob Bielenberg
 Research Associate Engineer
 Midwest Roadside Safety Facility
 University of Nebraska-Lincoln
 130 Whittier Research Center
 Lincoln NE, 68583-0853
 Phone: (402) 472-9064
 rbielenberg2@unl.edu



Jim Holloway
 Research Manager
 Midwest Roadside Safety Facility
 University of Nebraska-Lincoln
 1901 Y St Bldg C
 Lincoln, NE 68588-0601
 Phone: (402) 472-9464
 jholloway1@unl.edu



Dr. Sanjay Singh
 Associate Professor, Neurological Sciences
 University of Nebraska Medical Center
 982045 Nebraska Medical Center
 Omaha, NE 68198-2045
 Phone: (402) 559-4496
 spsingh@unmc.edu



Dr. Andrzej Nowak
 Interim Chair, Robert W. Brightfelt Professor of Engineering
 Professor, Civil Engineering
 University of Nebraska
 W348 Nebraska Hall
 Lincoln, NE 68588-0531
 Phone: (402) 472-1376
 anowak2@unl.edu



Dr. Michael Hempel
 Research Assistant Professor, Computer & Electronics Engineering
 University of Nebraska-Lincoln
 200/313 PKI
 Omaha, NE 68182-0572
 Phone: (402) 554-2288
 mhempel2@unl.edu



Karla A. Lechtenberg
 Research Associate Engineer
 Midwest Roadside Safety Facility
 University of Nebraska-Lincoln
 130 Whittier Research Center
 Lincoln, Nebraska 68583-0853
 Phone: (402) 472-9070
 kpolivka2@unl.edu

Mr. Michael Hall
 Interim Program Supervisor
 Truck Driver Trainer
 Central Community College
 P.O. Box 1024
 Hastings, NE 68901
 Phone: (402) 461-2550
 mhall@cccneb.edu

Kansas State University Consortium Partner Highlights at a Glance



Letter from the Associate Director - Dr. Mustaque Hossain

Last year was a big milestone in the progress of MATC-related activities at Kansas State University (KSU). Most of KSU's research projects are directed toward the preservation and safety of our regional transportation infrastructure

due to increased truck loads resulting from freight movements. Thus our efforts are concentrated on lengthening the lives of our transportation infrastructure elements. We are also looking at the safety aspects of increased truck traffic on our highways due to increased freight movements, and the effects of motorcycles in these instances. During the past year, results from the MATC projects were presented at various forums. I presented results from a FY 2008 MATC project on thin surface treatments at the 1st International Conference on Pavement Preservation held in Newport Beach, California in April 2010. A paper based on some of the findings of the MATC project on characteristics and contributory causes related to large truck crashes was presented by Dr. Sunanda Dissanayake, PI of the project, at the 89th Annual Transportation Research Board Meeting held in Washington D.C. in January 2010. Another paper based on the same project was presented at the Mid-Continent Transportation Symposium at Iowa State University in August 2009. Dr. Dissanayake has also been working on the motorcycle safety project funded by MATC that is progressing well with a survey of motorcycle riders combined with crash data analysis. Two papers have been prepared and submitted for the upcoming TRB Annual Meeting. Dr. Bob Peterman has been working on assessing the damage potential in pre-tensioned bridges caused by increased truck loads by accurately determining the stresses carried by in situ bridge elements.

In May 2010, he made two presentations at the PCI National Convention in Washington, DC.

Our MATC students continue to excel too. Brandon Bortz graduated with a master's degree in civil engineering. Joey Holste, Dr. Peterman's graduate student, has won the Outstanding Student Award from the K-State University Transportation Center, a Tier II UTC.

On the educational side, a transportation engineering certificate program has been developed and approved by KSU (<http://www.dce.k-state.edu/engineering/certificates/transportation/>). MATC researcher, Dr. Sunanda Dissanayake, won the Myers-Alford Memorial Teaching Award at the College of Engineering at Kansas State University in recognition of outstanding teaching.

Last year, KSU also implemented a "Transportation Workforce Development Initiative." As a part of this initiative, continuous support is being provided for the transportation engineering certificate program and a new, joint KDOT-KSU summer internship program. Several technology transfer projects are also being supported by MATC. In April 2010, four hundred and fifty representatives from the local, state and federal agencies and from the private sector attended the 92nd Annual Kansas Transportation Engineering Conference held at KSU. KSU also organized three training sessions on Superpave asphalt mixture that was attended by fifty-two participants.

Overall, this past year has been a very productive one for MATC at KSU, and we look forward to continuing our collaboration with the other consortium partners in the future.

KSU Educational Programming, Tech Transfer and Career Development

KSU continues to use the partnership with MATC to engage in tech transfer and education activities that address current and pressing issues in transportation engineering.

• **KSU Internship Program:** KSU offered an internship program this summer in conjunction with the intern program offered by the Kansas Department of Transportation (KDOT). With eleven students participating in this program, it was a successful year. This program offers students the opportunity to work in a transportation-related position in order to attract more students to transportation careers. Learn more about the program and the students involved in KSU summer internships in the full article on page 60.

• **Transportation Workforce Development Initiative:** Dr. Hossain and Dr. Robert Stokes have established a Transportation Workforce Development Initiative to benefit both undergraduate and graduate students and recruit them into transportation careers. This expansive program includes academic year and summer internships for undergraduate students to provide experience in the transportation field. For more information, please see page 78.



• **Superpave Field Certification:** In the spring of 2011, KSU will offer Superpave Field Laboratory Technician Certification Training with cooperation from KDOT and sponsorship from MATC. Superpave hot-mix asphalt can extend the life of asphalt pavements, thereby reducing congestion resulting from construction and enhancing public safety. These courses are designed to certify personnel who will be involved in the construction of Superpave pavements using the specifications of the state of Kansas. KSU faculty also have past experience in offering training related to Superpave. For more information, please see page 78.

• **Pavement Construction and Materials Technology Transfer:** KSU is offering courses both in Kansas and via webinar on pavement construction and materials in fall 2010. These courses will help ensure that the state and nation's workforces will be properly qualified while preparing future professionals for the workforce as many current transportation professionals prepare to retire. The courses will utilize a variety of media forms as educational

tools for familiarizing participants with the latest developments and most up-to-date technology. For more information, please turn to page 78.

Kansas State University Research Projects

- Characteristics and Contributory Causes Related to Large Truck Crashes-Phase II
- Determining the Stresses in Steel Railroad-Track Rails Due to Freight Movements using Non-Contact Laser-Speckle

For project details see page 54

Matching Funds Provided by:

Kansas Transportation Research and New Developments

Civil Infrastructure System Laboratory - PRS Mediterranean Ltd. (Israel)

Kansas State University

Kansas State MATC Affiliated Faculty



Dr. Mustaque Hossain
Professor, Civil Engineering
Associate Director, Mid-America
Transportation Center
Kansas State University
2124 Fiedler Hall
Manhattan, Kansas 66506-5000
Phone: (785) 532-1576
mustak@k-state.edu



Dr. Robert Peterman
Professor, Civil Engineering
Kansas State University
Manhattan, KS 66506-5000
2113 Fiedler Hall
Phone: (785) 532-7612
bob@ksu.edu

Dr. Sunanda Dissanayake
Associate Professor, Transportation
Engineering, Civil Engineering
Kansas State University
2128 Fiedler Hall
Manhattan, KS 66506-5000
Phone: (785) 532-1540
sunanda@ksu.edu



Dr. Robert Stokes
Professor and Director,
K-State University Transportation
Center, Civil Engineering
Kansas State University
2118 Fiedler Hall
Manhattan, KS 66506-5000
Phone: (785) 532-1595
drbob@ksu.edu



University of Iowa Consortium Partner Highlights at a Glance

Letter from the Associate Director - Dr. Paul Hanley



We are pleased to announce once again that we have had a very productive and successful year as a partner in Mid-America Transportation Center (MATC). As a direct result of our participation in MATC, University of Iowa transportation-related faculty and students have been involved in an array of research projects and we have been able to extend our transportation engineering course offerings.

The FY 2010 year has seen the completion of several MATC sponsored research projects including those related to commercial vehicle operations, freight safety, and materials. Dr. Linda Ng Boyle, formerly of University of Iowa, completed her study of management's attitudes towards safety in commercial vehicle operations. Dr. Hosin "David" Lee has completed his project on performance measures of warm mix asphalt and the results are intended to create a safer, more reliable highway for freight transportation. Dr. Thanos Papanicolaou's research on automated erosion systems using PEEP technology is also geared at creating safer highways by protecting bridge crossings. Other completed research includes two projects by Dr. Albert Ratner relative to mist mitigation in improving freight fire safety. Since UI joined MATC, eighteen students have been funded to work on research projects and have gained priceless experience from this opportunity.

For FY 2010 MATC has funded projects by Dr. Hosin "David" Lee and Dr. Ratner that extend their respective research beyond the reports they have just completed.

As part of MATC's commitment to education, the University of Iowa was again able to offer the two transportation courses initiated last year. "Public Transit Operations and Planning," taught by Dr. James Stoner and Dr. Paul Hanley in the spring semester, and "Freight Transportation Planning," taught by Dr. John Fuller in the fall semester, are courses geared towards expanding knowledge and interest in the transportation field. The enrollment for both classes was equally split between the Departments of Civil and Environmental Engineering and Urban and Regional Planning. Additionally, the University of Iowa continues to work alongside the Tier I UTCP, thereby allowing us to connect researchers across campus from Urban Planning, and the Colleges of Business, Public Health and Engineering.

I am sure that you will agree that this has been a very successful year and we are looking forward to extending our research and teaching efforts over the coming months.

University of Iowa Educational Programming, Tech Transfer and Career Development

Thanks to the continuing efforts of faculty to develop new and relevant coursework that will prepare students for the demands of future careers, transportation engineering students at UI are benefitting from courses that provide the most up-to-date information in this ever-evolving field.

• **Industry-Oriented Freight and Public Transit Planning Courses:** First debuted in spring 2009, the Public Transit Operations and Planning course has become integrated into UI's curriculum. This course offering focuses on a variety of public transportation modes from traditional buses to light rail. It provides a useful background for undergraduate and graduate engineering students, as well as graduate urban and regional planning students.

Dr. John Fuller and Dr. Barton Cramer of UI also developed a course on "Freight Transportation Planning," offered for the first time in fall 2009. The course focused on the growing need to expand and restructure the U.S. freight transportation system due to the globalization of production practices and

steep increases in commodity prices. For more information, see page 71.

• **UI Transportation Symposium:** The Public Policy Center of the University of Iowa, with support from MATC, assembled nationally recognized experts for a two-day symposium on transportation policy. One goal of this event was to encourage undergraduate and graduate students to seek careers in the transportation sector, while also providing an opportunity for local, regional and state transportation professionals to obtain current information on transportation finance policy. For the full story, please see page 71.

• **UI Student's "Road Scholars" Video Wins Award:** "How are our nation's roadways funded?" This was the question Allison Reiter asked a variety of respondents in the video she submitted to TRB's Surface Transportation Finance Conference. The wide variety of surprising answers offers insight into the complexities of transportation finance. To watch the video, visit the MATC website.

University of Iowa Research Projects

- Improving Freight Fire Safety: Experimental Testing and Computer Modeling to Further Development of Mist-controlling Additives for Fire Mitigation
- Performance Measures of Warm Asphalt Mixtures for Safe and Reliable Freight Transportation (Phase 2: Evaluation of Friction and Raveling Characteristics of Warm Mix Asphalt Mixtures with Anti-stripping Agents)

For project details see page 57

Matching Funds Provided by:

Korea Institute of Construction Technology (KICT)

University of Iowa

University of Iowa MATC Affiliated Faculty



Dr. Paul Hanley
Assistant Professor, Civil & Environmental Engineering and Public Policy Center
Associate Director, Mid-America Transportation Center
University of Iowa
218 South Quad
Iowa City, IA 52242
Phone: (319) 335-8137
paul-hanley@uiowa.edu



Dr. Wilfrid Nixon
Professor, Civil & Environmental Engineering
Faculty Research Engineer, IIHR - Hydroscience & Engineering
Researcher, Center for Global & Regional Environmental Research
University of Iowa
4121 Seamans Center
Iowa City, IA 52242-1527
Phone: (319) 335-5166
wilfrid-nixon@uiowa.edu

Dr. Albert Ratner

Assistant Professor, Mechanical & Industrial Engineering
University of Iowa
3131 Seamans Center
Iowa City, IA 52242
Phone: (319) 384-0883
aratner@engineering.uiowa.edu



Dr. Barton Cramer

Adjunct Assistant Professor, Urban & Regional Planning
347 Jessup Hall
University of Iowa
Iowa City, IA 52242
Phone: (319) 335-0033
barton-cramer@uiowa.edu



Dr. James Stoner
Associate Professor, Civil & Environmental Engineering
Researcher, Injury Prevention Research Center
University of Iowa
4123 Seamans Center
Iowa City, IA 52242-1527
Phone: (319) 335-5664
james-stoner@uiowa.edu



Dr. Hosin "David" Lee
Associate Professor, Civil & Environmental Engineering
Transportation Research, Public Policy Center
University of Iowa
210 South Quadrangle
Iowa City, IA 52242-1192
Phone: (319) 335-6818
hlee@engineering.uiowa.edu

Dr. John Fuller

Professor, Associate Chair, and Director of Graduate Studies
University of Iowa
344 Jessup Hall
Iowa City, IA 52242-1316
Phone: (319) 335-0038
john-w-fuller@uiowa.edu



Dr. Thanos Papanicolaou

Professor, Civil & Environmental Engineering,
IIHR - Hydroscience & Engineering
University of Iowa
323B C. Maxwell Stanley Hydraulics Laboratory
Iowa City, IA 52242-1585



Dr. Yongjoo Kim
Research Associate
Public Policy Center
University of Iowa
209 SQ, Public Policy Center
Iowa City, IA 52242
Phone: (319) 335-6800
yongjook@gmail.com

Dr. Mohamed Elhakeem

Assistant Research Engineer, IIHR-Hydroscience & Engineering
University of Iowa
323 E SHL
Iowa City, IA 52242
mohamed-elhakeem@uiowa.edu



Dr. Miwa Matsuo
Assistant Professor, Urban and Regional Planning
University of Iowa
349 Jessup Hall
Iowa City, IA 52242
Phone: (319) 335-0501
miwa-matsuo@uiowa.edu

University of Kansas Consortium Partner Highlights at a Glance

Letter from the Associate Director - Dr. Tom Mulinazzi



This past year has been a productive one for the partnership between KU and MATC on all fronts. Students and faculty have been active in attending professional meetings and conferences to stay updated on the latest developments in the transportation field. In January, eleven students and two faculty members attended the annual Transportation Research Board meeting in Washington, D.C. Included were two undergraduate students, who received undergraduate transportation

scholarships to attend this meeting. As a testament to the continuation of our excellent placement record, one of the undergraduate scholars is now in graduate school at Texas A & M University, and the other is a graduate student at KU.

In April, seven students, one post doctoral researcher and one faculty member attended the ITE Section meeting in Kansas City. In June, six students and one faculty member attended the District ITE meeting in Minneapolis. The students enjoyed competing in the Traffic Bowl competition though they did not win this year.

The ITE Student Chapter continues to support professional development for transportation students. Regular monthly meetings boasted an average attendance of between twenty and twenty-five students. Transportation engineers from Kansas City and Topeka were featured as guest speakers.

KU continues to strengthen transportation course offerings through the CEAE department and explore new educational opportunities. This fall a new required transportation course was offered at the junior level. Previous to the fall semester, some civil engineering students would graduate without any coursework in transportation. However, increased recognition of the need for and utility of transportation engineering courses as a result of the MATC program has led us to establish a required course that will be taught every semester. The course will be 50% highways, 25% railroads and 25% airports. This course offering is expected to develop more interest in transportation studies at the University of Kansas.

We are experiencing increased interest in transportation at the undergraduate level as well. The senior level highway engineering course, taught each fall by Dr. Steven Schrock, has increased its enrollment from ten to twenty-eight students over a four year period.

This summer a number of undergraduates participated in an intern program to gain professional experience. Dr. Steven Schrock and I have made a concerted effort to get summer internships for our undergraduate students. During this past summer, ten undergraduate students worked for KDOT. In addition, five interns worked on transportation research at KU; three students worked for consultants and two students interned at Johnson County Public Works.

KU Educational Programming, Tech Transfer and Career Development

• **Jayhawk Transportation Scholars Program:** This year marked another successful one for the Jayhawk Scholars Program, which helps send undergraduate students to the annual TRB conference in Washington D.C. Attendance at this conference benefits undergraduate students by providing the opportunity for them to meet professionals and learn about career opportunities in the transportation engineering field. See page 69 for more information.

• **KU Intern Program:** KU's MATC intern program sponsored thirteen students this year, who worked at a diverse number of locations. These included KDOT, research facilities at KU, local consultants, and Johnson County Public Works. Interns reflect on the valuable skills they learned, which helped bring context to their classroom work and helped them consider options for their future after graduation. For more information, please see page 61.

• **Undergraduate Transportation Engineering Course:** A new, required course for undergraduates, taught by Dr. Mulinazzi, has recently been added to the civil engineering curriculum. The course offers an introductory study of the various modes of transportation, emphasizing highways, railroads, and air transport, including the planning, design and operations of these modes. This added emphasis will likely result in more students showing interest in working in transportation fields.

University of Kansas Research Projects

- Enhanced Sustainability of Railroad Ballast
- Improving the Long-Range Tracking Algorithm for use in Tracking Long-Haul Trucks using Cellular Data
- Modeling Truck Speed in the Upstream of Two-lane Highway Work Zones: Implications on Reducing Truck-Related Crashes in Work Zones

Matching Funds Provided by:

Kansas Department of Transportation

University of Kansas

For project details see page 56

University of Kansas MATC Affiliated Faculty

Dr. Tom Mulinazzi

Professor, Civil, Environmental & Architectural Engineering
Associate Director, Mid-America Transportation Center
University of Kansas
2150 Learned Hall
Lawrence, Kansas 66045
Phone: (785) 864-3766
tomm@ku.edu



Dr. Yong Bai

Associate Professor, Civil, Environmental & Architectural Engineering
University of Kansas
2135 B Learned Hall
1530 W. 15th Street
Lawrence, KS 66045
Phone: (785) 864-2991
ybai@ku.edu



Dr. Steven Schrock

Assistant Professor, Civil, Environmental & Architectural Engineering
University of Kansas
2159B Learned Hall
1530 W. 15th Street
Lawrence, KS 66045
Phone: (785) 864-3418
schrock@ku.edu



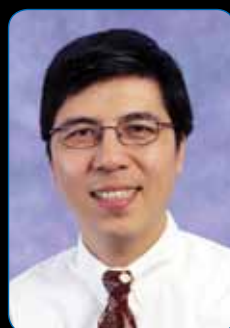
Dr. Robert Parsons

Associate Professor, Civil, Environmental & Architectural Engineering
University of Kansas
2150 Learned Hall
1530 W. 15th Street
Lawrence, KS 66045
Phone: (785) 864-2946
rparsons@ku.edu



Dr. Jie Han

Professor, Civil, Environmental & Architectural Engineering
University of Kansas
2150 Learned Hall
1530 W. 15th Street
Lawrence, Kansas 66045-7609
Phone: (785) 864-3714
jiehan@ku.edu



Missouri University of Science & Technology Consortium Partner Highlights at a Glance

Letter from the Associate Director - Dr. Genda Chen



Greetings again from Rolla, Missouri! The third-year projects at Missouri University of Science and Technology (Missouri S&T) address MATC theme topics such as corrosion monitoring, crash analysis due to the closure of I-64 for rehabilitation, evaluation of variable speed limits in the St. Louis Metropolitan area, and the increase of next-generation workforce in the transportation industry.

Corrosion is responsible for the nearly \$10 billion spent on bridge maintenance per year with indirect costs increasing up to ten times the amount per year. New bridges in the U.S. are now proposed for a design life of seventy-five to one hundred years and will require substantially more long-term attention and service support. To respond to this ever-increasing demand on the long-term performance of bridges, a novel concept of corrosion sensors was proposed and proof-of-concept tests are underway. The design strategy was to coat nano-scale iron particles on optical fibers and deploy the sensors along steel reinforcing bars. As the iron particles, together with the steel rebar, are corroded over time, the surface condition (refraction index) of the optical fibers changed, which can be related to steel rebar corrosion through careful calibrations. The test results will allow this concept to be further exploited with other future opportunities.

To improve the capacity of existing highway infrastructure, interstate I-64 in the St. Louis area was closed last year and upgraded to accommodate increased vehicles. Heavy traffic was temporarily detoured to I-270 and I-70. The crash analysis related to the closure of I-64 gives Missouri Department of Transportation (MoDOT) the firsthand data for their decision making on short-term I-64 closure versus long-term reduced traffic. Similarly, variable speed limits were enforced in the St. Louis metropolitan area. Their impact on traffic flow and highway accident was evaluated. The data collected from this project can support a decision on whether this pilot program should be expanded to other major cities.

To meet transportation workforce needs, an undergraduate internship program initiated with Missouri Department of Transportation will continue into its third year. The main objective of this program was to motivate undergraduate students to experience the design, maintenance, and operation process of the transportation system in Missouri. Thus far, fifteen intern students who participated in that program in summer 2010 have been selected for MATC scholarships. In addition, Laura Rather, a MATC graduate fellow, prepared a set of presentation slides on transportation engineering, geotechnical engineering, and structural monitoring based on MATC projects. She will present these topics to high school students in Rolla this coming fall with the intent of increasing the participation of U.S. students in transportation research.

MS&T Educational Programming, Tech Transfer and Career Development



MS&T spent the past year engaged in creative tech transfer and education activities to introduce students and the community to the world of transportation engineering.

- MS&T Introduces Intern Program with MoDOT:** After several years of planning, MS&T launched a summer internship program in conjunction with MATC and the Missouri Department of Transportation. Along with hourly pay and a chance to experience a career in the transportation field, students also received a scholarship for participating. Please see page 61 for all the information.
- MS&T Students Attend Legislative Day:** At the Capitol in Jefferson City, civil engineering students and Dr. Chen presented current transportation research and its uses to state legislators. They discussed highway construction and safety, and bridge strengthening, among other projects that affect transportation policy in Missouri. For more information, please see page 63.
- MS&T and Fox 4 Day at the K:** MS&T students participated in the annual "School Day at the K" event, hosted by the meteorologists of Fox 4 News in Kansas City, at Kauffman Stadium. MS&T invited local students to take part in hands-on experiments that demonstrated how structures are affected by earthquakes and what engineers have to consider in the design stages to minimize damage. For the full story, see page 69.

Missouri University of Science & Technology Research Projects

- Crash Analysis in MoDOT I-64 Closure Project
- I270/I-255 Variable Speed Limit Study
- Initial Study and Verification of a Distributed Fiber Optic Corrosion Monitoring System for Transportation Structures

For project details see page 55

Matching Funds Provided by:

Missouri Department of Transportation

Missouri University of Science & Technology

HDR Engineering, Inc.

Missouri S&T MATC Affiliated Faculty & Partners



Dr. Genda Chen
 Professor, Civil Engineering
 Associate Director, Mid-America Transportation Center
 Missouri University of Science & Technology
 224 Engineering Research Laboratory
 500 W. 16th Street
 Rolla, MO 65409-0710
 Phone: (573) 341-4462
 gchen@mst.edu

Dr. Hojong Baik
 100 Hwajeon-dong, Deokyang-gu, Goyang
 School of Air Transportation and Logistics
 Korea Aerospace University
 Gyeonggi, 412-791
 S. Korea
 Phone: 82-2-300-0373 (o)
 baikh@kau.ac.kr

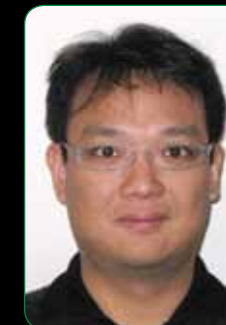


Dr. Ghulam Bham
 Assistant Professor,
 Department of Civil, Architectural & Environmental Engineering
 Missouri University of Science & Technology
 135 Butler-Carlton Hall
 1401 N. Pine St.
 Rolla, MO 65409-0030
 Phone: (573) 341-6286
 ghbham@mst.edu



Dr. Hai Xiao
 Associate Professor, Electrical & Computer Engineering
 Missouri University of Science & Technology
 219 Emerson Electric Co. Hall
 301 W. 16th St.
 Rolla, MO 65409-0040
 Phone: (573) 341-6887
 xiaoha@mst.edu

Preveen Edara
 Assistant Professor, Civil Engineering
 University of Missouri
 E3502 Lafferre Hall
 Columbia, MO 65211
 Phone: (573) 882-1900
 edarap@missouri.edu



Dr. Yu-Ning Ge
 Professor, Civil, Architectural, & Environmental Engineering
 Missouri University of Science & Technology
 1401 North Pine Street
 Rolla, MO 65409
 Phone: (573) 341-7193
 geyun@mst.edu

RESEARCH

COMPLETED RESEARCH PROJECT REPORTS
2010 FUNDED RESEARCH PROJECTS

Completed MATC Research Projects



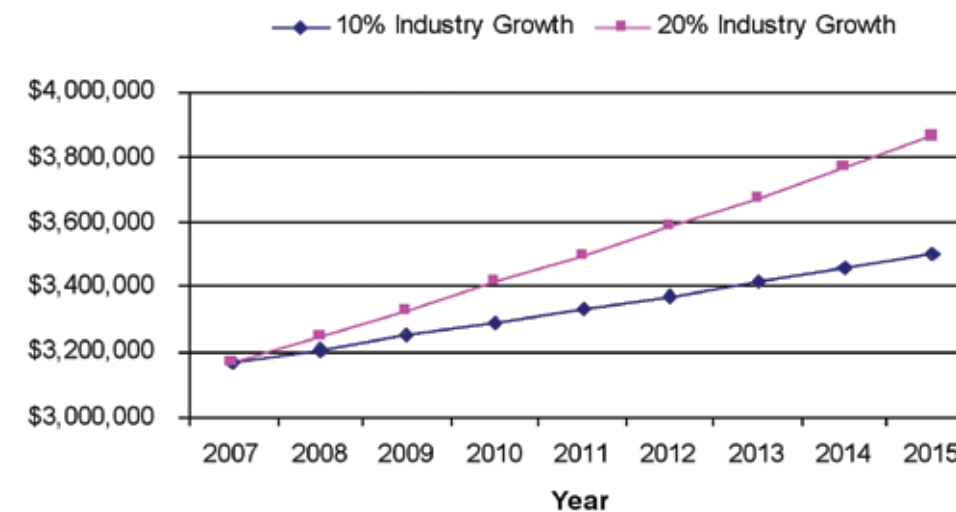
University of Kansas Projects

Project Title: Estimating Highway Pavement Damage Costs Attributed to Truck Traffic

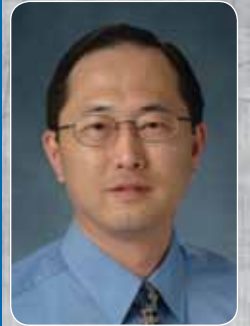
Kansas is one of the leaders in meat production in the United States. In the southwest Kansas region, there are more than three hundred feed yards and several of the biggest meat processing plants in the nation. Heavy trucks (e.g., tractor-trailers) have been used primarily for transporting processed meat, meat byproducts, grain, and other related products. With the continuous growth of these industries, there will be more trucks on highways transporting meat and meat-related products in southwest Kansas. These trucks cause noteworthy damage to Kansas highway pavements, which in turn leads to more frequent maintenance actions and ultimately more traffic delays and congestion. The primary objective of this research was to estimate the highway damage costs attributed to the truck traffic associated with the processed meat (beef) and related industries in southwest Kansas. The researchers developed a systematic pavement damage estimation procedure that synthesized several existing methodologies including Highway Economic Requirements System (HERS) and American Association of State Highway and Transportation Officials (AASHTO) methods. In this research project, the highway section of US 50/400 between Dodge City and Garden City in Kansas was selected and its pavement data were collected for analysis. Outcomes of this research will be

“It has been proven that utilizing the diversified transportation modes is the key to reduce highway pavement damage costs.”

beneficial for the selection of cost-effective transportation modes for the meat processing and related industries in southwest Kansas. It will also help government agents to assess highway maintenance needs and to set up maintenance priorities. Meanwhile, the analysis results will be valuable for the determination of reasonable user costs. The results of this study suggest that industries and government agencies need to study the possibility of increasing the utilization of railroads as an alternative to truck transportation for the processed meat and related industries.



Projected Future Annual Pavement Damage Costs Associated with Meat Processed and Related Industries on the Major Highways in Southwest Kansas



Dr. Yong Bai
Associate Professor
University of Kansas
(785) 864-2991
ybai@ku.edu

Co-PI:
Steven D. Schrock,
Assistant Professor,
KU; **Thomas E. Mulinazzi,**
Professor, KU

Students:
Wenhua Hou,
Graduate Research
Assistant, KU;
Chunxiao Liu,
Graduate Research
Assistant, KU;
Umar Firman,
Undergraduate
Research Assistant,
KU

Completed Research Projects



Linda Ng Boyle
Associate Professor,
UW (formerly of UI)
linda@u.washing-
ton.edu

Co-PI:
Jeffrey Short,
Senior Research
Associate, ATRI

Students:
Yiyun Peng,
Graduate Research
Assistant, UW;
David M. Neyens,
Graduate Research
Assistant, UI

THE UNIVERSITY OF IOWA
University of Iowa Projects

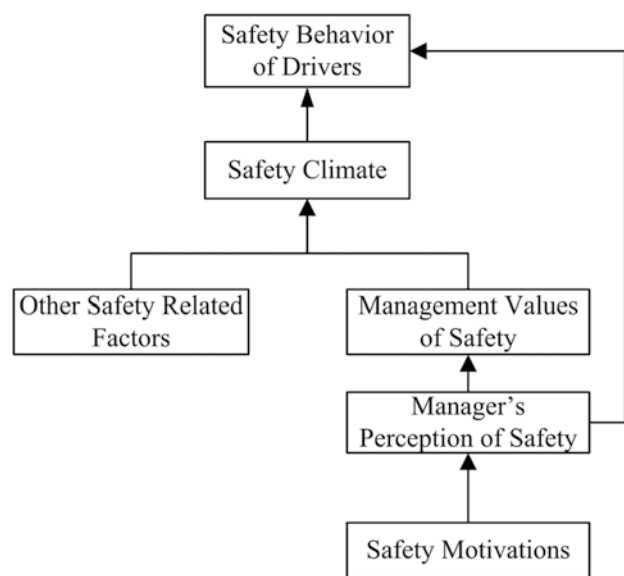
Project Title: Safety Climate of Commercial Vehicle Operation

Enhancing the safety culture within trucking and motor coach industries has become a key area of concern given the potential impact it has on crashes and overall safety. Many organizations recognize that safety is compromised if the culture within their organization does not promote safety. Unfortunately, the specifics of a good safety culture and the methods by which safety culture is fostered are relatively ambiguous. A key reason for this is the general lack of standardization of the highly qualitative term "safety climate" within the trucking and motor coach industries.

A survey was completed by 31 organizations within these industries as part of a Commercial Truck and Bus Safety Synthesis Program (CTBSSP) Synthesis #14. The results provide some insights into the safety beliefs and attitudes of safety managers and the organizational needs to maintain a stable workforce and positive safety climate. This previous report provides descriptions of the data collected but was limited in insights on how to shape the safety culture.

"This study underscores the importance of management's attitudes toward safety in commercial vehicle operations and the impact on drivers."

In this research project, key constructs that can shape the safety culture and influence a safety manager's perception of safety, are developed using factor analytic techniques. These constructs are based on an existing survey data from the original CTBSSP project. The result reveals a four-factor model that is grouped based on the overall safety culture in the industry, the financial impact, internal awareness, and demand for safety. This outcome suggests that there are both internal and external factors that may affect a safety manager's motivation and perception of safety, and provides insights for the trucking industry to communicate a positive safety climate and safety culture to their employees. An established safety culture can have substantial impact on the safety climate and that can translate into a stable workforce with safer drivers.



Associations among safety manager's perception of safety, safety climate and safety behavior

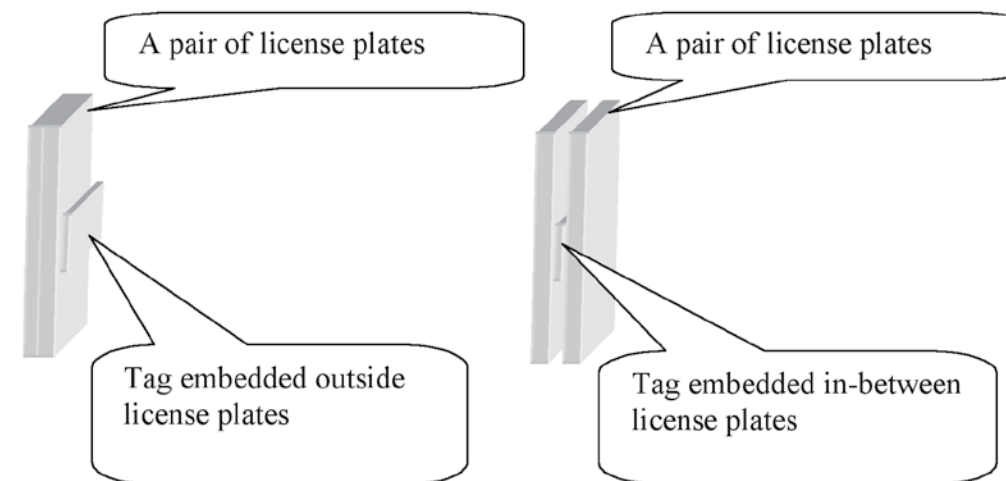
UNIVERSITY OF NEBRASKA LINCOLN
University of Nebraska Projects

Project Title: Investigating RFID for Roadside Identification Involving Freight Commercial Vehicle Operators (CVO)

Radio Frequency Identification (RFID) is an emerging technology to track commercial vehicles. This transcript describes research that investigates the ability for RFID technologies to work in license plates. Mile markers are common fixtures on the roadside and may provide infrastructure to support identifying RFID to enabled Commercial Vehicle Operators (CVO). This research considers variables that affect the performance of a RFID License Plate System that uses a scanner located at the mile marker. Mile marker characteristics, such as horizontal distance and vertical height, were evaluated along with RFID tag characteristics, such tag type and license plate location.

"Impacts of this technology could include optimizing traffic patterns, the identification of roads most used by CVO, and a reduced cost in capturing information for accurate road and transportation planning."

Enforcement operations have a critical need to provide a more efficient means of capturing data for inspection purposes in comparison to manual "screening" approaches for enforcement of safety and registration guidelines. In order to utilize automated technologies for more effective roadside data collection—for traffic counts, enforcement data collection, and toll usage—information must be accessible and collected in a reliable way. We tested RFID technology's ability to work in license plates in order to make information collection for CVO more efficient.



Dr. Erick C. Jones
Associate Professor
University of
Nebraska-Lincoln
(402) 472-3695
ejones2@unl.edu

Co-PI:
Dwight Mosby,
National
Aeronautics
and Space
Administration
(NASA) engineer;
Judy Perkins, Full
Professor, PVAMU

Students:
Dejing Kong, Ph.D.
student, UNL;
Angela Garza, Ph.D.
student, UNL



Dr. Yong-Rak Kim
Associate Professor
University of
Nebraska-Lincoln
(402) 472-1727
ykim3@unl.edu

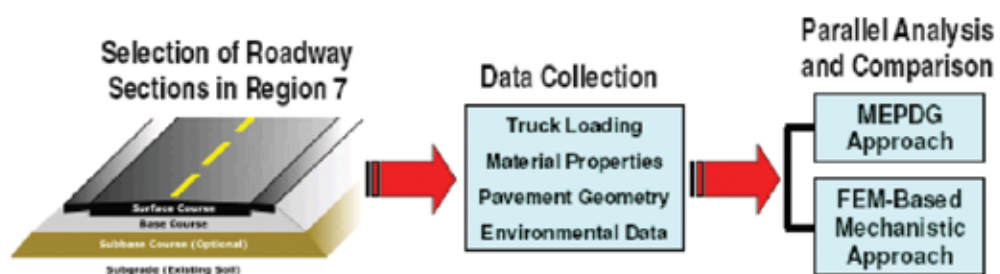
Co-PI:
Hoki Ban, Post-
Doctoral Research
Associate

Students:
Soohyok Im,
Graduate Student,
UNL

UNIVERSITY OF
Nebraska
Lincoln **University of Nebraska
Projects**

Project Title: Impact of Truck Loading on Design and Analysis of Asphaltic Pavement Structures

Mechanistic-Empirical Pavement Design Guide (MEPDG) is an improved methodology for pavement design and the evaluation of paving materials. However, in spite of significant advancements to pre-existing traditional design methods, the MEPDG is known to be limited in its accurate prediction of mechanical responses and damage in asphaltic pavements. This restriction is both due to the use of simplified structural analysis methods, and a general lack of understanding of the fundamental constitutive behavior and damage mechanisms in paving materials. Performance prediction and pavement life are determined based on the simple layered elastic theory and the empirically-developed failure criteria. To model pavement performance in a more appropriate manner, this study attempts mechanistic modeling aided by finite element simulations incorporated with viscoelastic paving materials. Mechanical responses between the finite element simulations and the MEPDG analyses are compared to monitor any significant differences that are relevant to better pavement analysis and design. Pavement performance and the corresponding design life between the two approaches were further compared and discussed. As a first step of this research, we investigated the effects of only one design parameter, the property of asphaltic surface layer, and one type of failure mode, rutting, on pavement performance and life.



“This research provides a better understanding as to the effects of heavy load trucks on pavement performance and safety so as to enhance future pavement structural designs.”

This research is to improve safety and to minimize risk associated with increasing heavy truck movement on the U.S. surface transportation system. This study aims to investigate the truck load impact on pavement damage and performance life of highways by employing the MEPDG method, which is currently the best model, and the next-generation mechanistic design-analysis approach. Success in this study will promote a better understanding of pavement infrastructure and its performance behavior. This study can eventually contribute to improving public safety by mitigating risk associated with pavement deterioration.

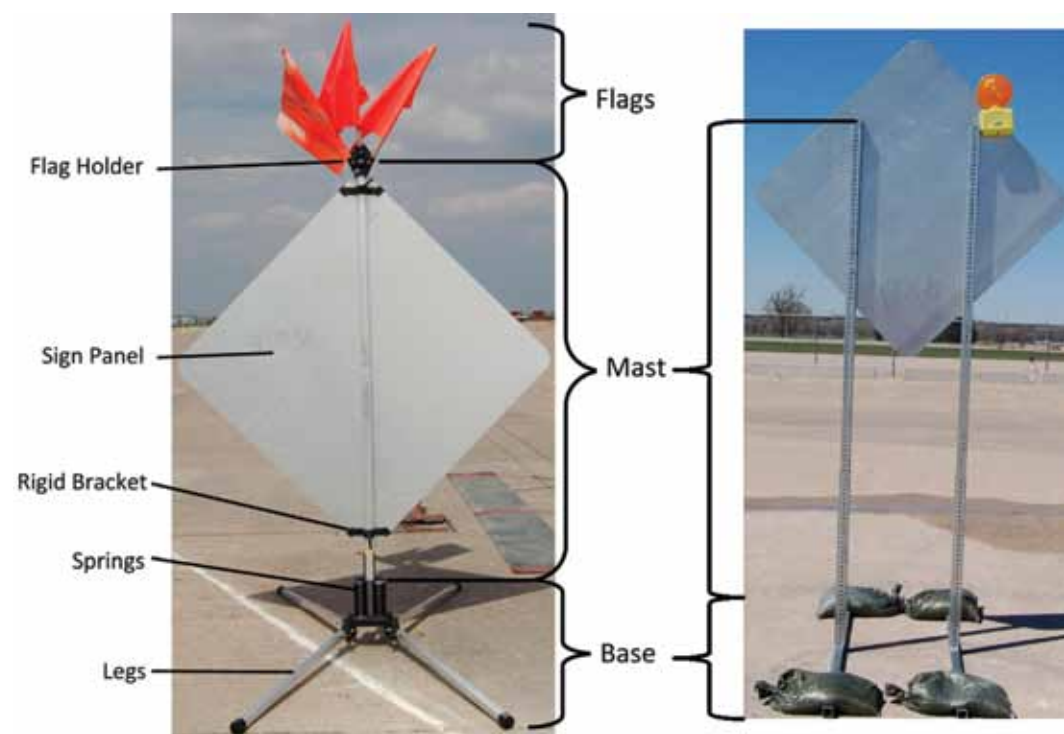
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Nebraska
Lincoln **University of Nebraska
Projects**

Project Title: Safety Investigation and Guidance for Work-Zone Devices in Freight Transportation Systems Subjected to Passenger Car and Truck Impacts with New Crash Standards

In this research project, crashworthy, work-zone, portable sign support systems accepted under NCHRP Report No. 350 were analyzed to predict their safety performance according to the new TL-3 MASH evaluation criteria. An analysis was conducted to determine which hardware features of current sign support systems would likely contribute to degraded safety performance under MASH. Several hardware features were predicted to be important contributors to the performance of systems when full-scale crash tested, which included sign panel material, height to the top of the mast, presence of flags, sign-locking mechanism, base layout, and system orientation. Eight full-scale crash tests were conducted on work-zone sign support systems that included these important features to validate the accuracy of the analysis. Four full-scale crash tests were conducted with a Dodge Ram 1500 Quad Cab pickup truck, and four full-scale crash tests were conducted with a Kia Rio sedan. One of the sign support systems successfully met the MASH criteria with the pickup truck, and two of the sign support systems successfully met the MASH criteria with the small car.

“These research findings will promote the development of new work-zone temporary sign stands, thus resulting in improved motorist safety on our nation’s highways and roadways.”

Manufacturers can use the analysis and crash testing results from this project to guide the design and/or modification of work-zone sign support systems to provide safe impact performance for a wide range of passenger vehicles. Highway engineers can also use the research results to assist with the selection of NCHRP Report No. 350-accepted, work-zone sign support systems that may more likely meet the MASH impact safety standards.



Features of a Typical Work-Zone Sign Support System



Dr. Ronald K. Faller
Research Assistant
Professor
University of
Nebraska-Lincoln
(402) 472-6864
rfalleri@unl.edu

Co-PI:
Dean L. Sicking,
Professor and
MwRSF Director,
UNL; Karla A.
Lechtenberg,
M.S.M.E., E.I.T.,
Research Associate
Engineer, MwRSF;
James C. Holloway,
M.S.C.E., E.I.T., Test
Site Manager MwRSF

Students:
Jennifer D. Schmidt,
M.S.C.E., E.I.T.,
Graduate Research
Assistant, UNL



Dr. Hosin "David" Lee
Associate Professor
University of Iowa
(319) 384-0831
hlee@engineering.
uiowa.edu

Co-PI:
Yongjoo "Thomas"
Kim, Postdoctoral
Research Scholar,
UI

THE UNIVERSITY OF IOWA University of Iowa
Projects

Project Title: Performance Measures of Warm Asphalt Mixtures for Safe and Reliable Freight Transportation

Warm mix asphalt (WMA) is an emerging technology that can allow asphalt to flow at a lower temperature for mixing, placing and compaction. The advantages of WMA include reduced fuel consumption, less carbon dioxide emission, longer paving season, longer hauling distance, reduced oxidation of asphalt, early opening to traffic and a better working environment in the field. In the United States, WMA has become popular in recent years. However, to provide a safe and reliable highway for heavier truck traffic with a high tire pressure, WMA mixtures must meet requirements for strength, stiffness, rutting, and moisture resistance.



Simple Performance Testing (SPT) Equipment

WMA mixtures with six commercially available WMA additives that include CECABASE RT®, Sasobit®, Asphalt-min®, Advera WMA, Evotherm J1, and Rediset™ WMX, along with the control WMA mixture without any additive and the control HMA mixture, were evaluated for their air voids, indirect tensile strengths and moisture susceptibilities. To evaluate a long-term reliable performance over a wide range of traffic and climatic conditions, the dynamic modulus and the repeated load tests were conducted on these mixtures using the simple performance testing equipment.

Based on the limited test results, Sasobit®, Evotherm J1 and Rediset™ WMX were effective in producing WMA mixtures in the laboratory that is comparable to HMA mixtures.

"Reliable Warm Mix Asphalt (WMA) technologies were identified based on their strength, moisture sensitivity, dynamic modulus and flow number."

The main product anticipated from this research is an evaluation of various WMA materials with respect to their strength, moisture sensitivity and performance characteristics. This information would be very useful for pavement engineers who are interested in WMA technologies for implementation. Identifying reliable WMA technologies would contribute to road safety by minimizing the accident risk caused by an unsafe road surface condition. With the increasing freight movements on the U.S. surface transportation system this information is imperative to pavement duration and, more importantly, public safety.



Pictures of Six Warm Mix Asphalt Additives

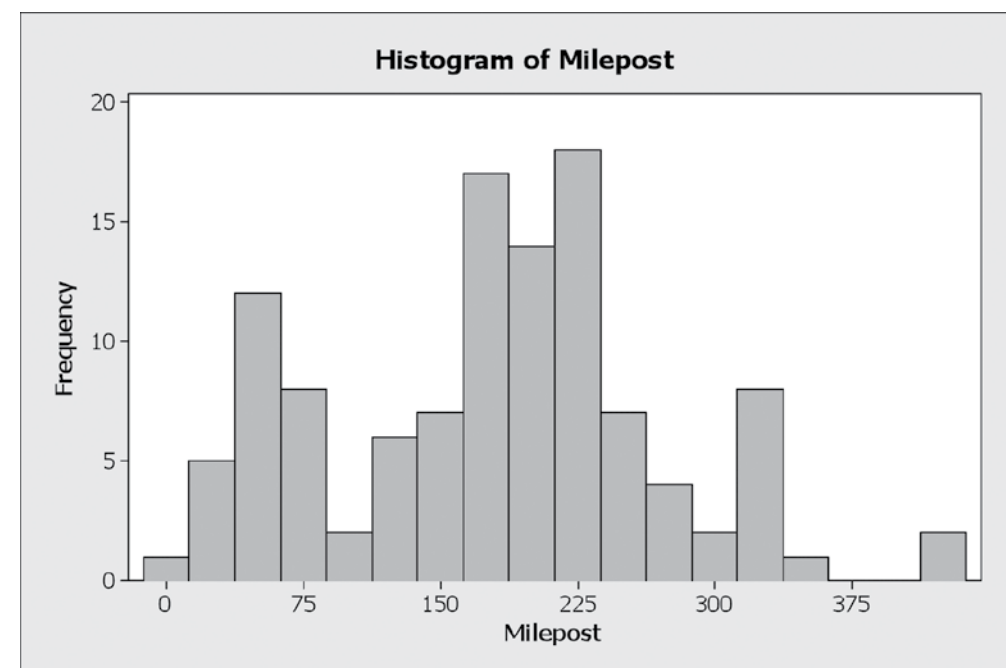
KU THE UNIVERSITY OF KANSAS University of Kansas
Projects

Project Title: Predicting and Mitigating Wind Induced Truck Crashes in Kansas

Dangerous weather and high wind in particular, is a common contributing factor in truck crashes. High wind speeds have been documented as a perennial cause of truck crashes in Kansas and other Great Plains states. The possibility of reducing such crashes, combined with the installation of dynamic message signs along Interstate 70, created an opportunity for further research. To this end, crash data were obtained from the Kansas Department of Transportation's Accident Records System for all heavy vehicle crashes on I-70 that involved strong winds. The data were analyzed to determine the correlations between the vehicle and freight characteristics, crash occurrences and weather conditions. The goal of this analysis was to construct a model that could predict the likelihood of such wind-induced truck crashes. Ideally, this model could furnish officials with a framework for preempting such crashes by imposing highway usage restrictions; thereby increasing safety for both truck drivers and the traveling public. After regressing the data into a model, however, it was found that wind speed was not a statistically significant factor in

"The Kansas Department of Transportation has another significant use for the Dynamic Message Signs they have installed on I-70, primarily to warn of snow conditions."

predicting such crashes. This finding agrees with some of the other literature on the subject and can be attributed to drivers altering their behavior as wind speeds change. From this research, we identified a dilemma zone of wind speeds in which drivers may not be making such a behavioral change. Furthermore, specific corridors in Kansas are identified as potential areas for the implementation of a warning system. It is recommended that Dynamic Message Signs be tied to weather data stations and/or lighted wind socks be installed on selected overpass bridges. Another recommendation is to change the DMS displays to read "STRONG WINDS" if the wind velocity is between 20 and 40 mph or to "WARNING, VERY STRONG WINDS" if the wind velocity exceeds 40 mph.



Histogram of Wind Induced Truck Crashes by Milepost, N=114



Dr. Tom Mulinazzi
Professor
University of Kansas
(785) 864-2928
tommm@ku.edu

Co-PI:
Steven D. Schrock,
Assistant Professor,
KU

Students:
Robert Rescot,
Graduate Research
Assistant, KU;
Romika Jasrotia,
Graduate Research
Assistant, KU; Kelly
Hovey, Engineering
Associate III, KDOT;
Yue Li, Graduate
Research Assistant,
KU; Jacob Pohlman,
Undergraduate
Research Assistant,
KU



Dr. Andrzej S. Nowak
Professor
University of
Nebraska-Lincoln
(402) 472-1376
anowak2@unl.edu

Students:
Marek Kozikowski,
Graduate Student,
UNL; Marta
Lutomirska,
Graduate Student,
UNL

UNIVERSITY OF
Nebraska
Lincoln
University of Nebraska
Projects

Project Title: Risk Mitigation for Highway and Railway Bridges

Performance of the transportation network strongly depends on the performance of bridges. Bridges constitute a vital part of the transportation infrastructure system and they are vulnerable to extreme events such as natural disasters (i.e., hurricanes, earthquakes, floods, major storms), as well as hazards stemming from negligence and improper maintenance, collisions (vessels and vehicles), intentional acts of vandalism, and terrorist attacks. These structures must be protected but the current approach to risk is not rational. Therefore, the objective of this project is to develop efficient risk analysis procedures for an assessment of the actual safety reserve in highway and railway bridges. The focus of this approach is at the system level using system reliability methods. Sensitivity analysis relates the reliability of bridges and of the transportation network. The results will then be used to identify critical parameters. The target risk will be determined depending on consequences of failure and relative costs. Rational selection criteria will be developed for the target risk level for bridges (components and systems) as a part of the transportation network, based on the consequences of failure and

“The developed procedures will serve for quantification of the risk and provide important tools in the transportation network’s decision making process as it concerns the operation, maintenance, repair, rehabilitation and replacement of bridges.”

relative costs. This will involve the development of efficient system reliability procedures that will be applied to perform sensitivity analysis relating various parameters and reliability. The resulting sensitivity functions will provide a rational basis for identifying the most important parameters that affect the network performance. Rational selection criteria for the target risk will find important applications in decision making processes regarding operation, maintenance, repair, rehabilitation and replacement of bridges. This proposal impacts education and development of human resources since it provides undergraduate and graduate students with research opportunities. The results will be included in courses and will be disseminated to wider audiences through presentations and publications.

Time Period	Primary Components		Secondary
	Single Path	Multiple Path	Components
5 years	3.50	3.00	2.25
10 years	3.75	3.25	2.50
		3.50	2.75

Recommended Target Reliability Indices

THE UNIVERSITY
OF IOWA
University of Iowa
Projects

Project Title: Automated Erosion System to Protect Highway Bridge Crossings at Abutments

Scour around the foundations (piers and abutments) of a bridge due to river flow is often referred to as “bridge scour.” Bridge scour is a problem of national scope that has dramatic impacts on economics and the safety of the travelling public. Bridge scour has resulted in more bridge failures than all other causes in recent history. Despite the recognized need for the collection of more field data to improve our predictive approaches for bridge scour, very few scour data were collected until the late 1980s. The FHWA, among other agencies, recognized the need to develop new methods and implement advanced instruments to collect field data and remotely monitor bridge scour during floods.



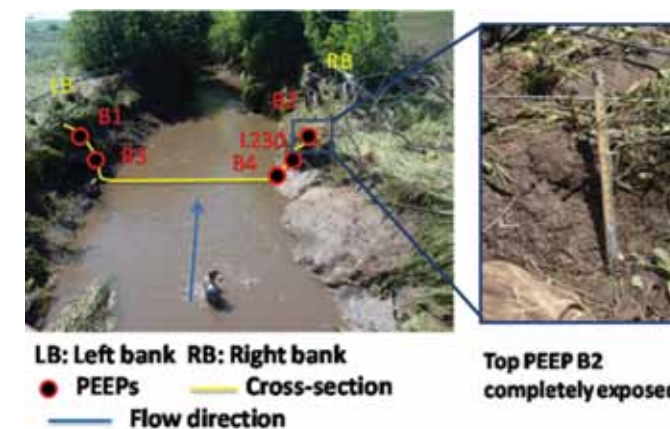
a) and b) Installation Procedure of the PEEPs; c) and d) Calibration of the PEEPs

The main objective of this study is to evaluate the capabilities of the Photo-Electronic Erosion Pins (PEEPs) technology in collecting field data and remotely monitoring bridge scour. The PEEPs are essentially a series of photovoltaic/ photo-resistance cells (or diodes) encased in a transparent waterproofed acrylic tube, thus, the PEEPs are light dependent. The photovoltaic PEEP provides a voltage as light (e.g., from the sun) strikes the diodes. The voltage is sent along a cable and is recorded on a datalogger. With the photo-resistance PEEP, an external voltage is supplied to the PEEP but is stopped when reaching the photo-resistors. As light strikes the photo-resistors their

“This research project developed an automated warning system to measure the rate of bank erosion.”

resistance drops, which allows a higher voltage to pass through to the datalogger, where the value is recorded. The successful field experiments of the PEEPs at the study sites proved that the PEEPs technology is transferable to the field.

These sensors can help facilitate the development of a warning system for bridge scour which would prevent the loss of life and property in a situation of catastrophic failure.



Study Reach at the Clear Creek Watershed (CCW) in Iowa Showing the Location of the PEEPs



Thanos Papanicolaou
Professor
University of Iowa
(319) 335-6448
athanasios-
papanicolaou@
uiowa.edu

Co-PI:
Christopher Wilson,
Assistant Research
Engineer, IIHR-
Hydroscience and
Engineering, UI;
Mohamed
Elhakeem,
Postdoctoral
Associate, IIHR-
Hydroscience and
Engineering, UI.

Students:
Fabienne Bertrand,
Graduate Student,
IIHR-Hydroscience
and Engineering, UI.



Dr. Albert Ratner
Assistant Professor
University of Iowa
(319) 384-0883
albert-ratner@uiowa.edu

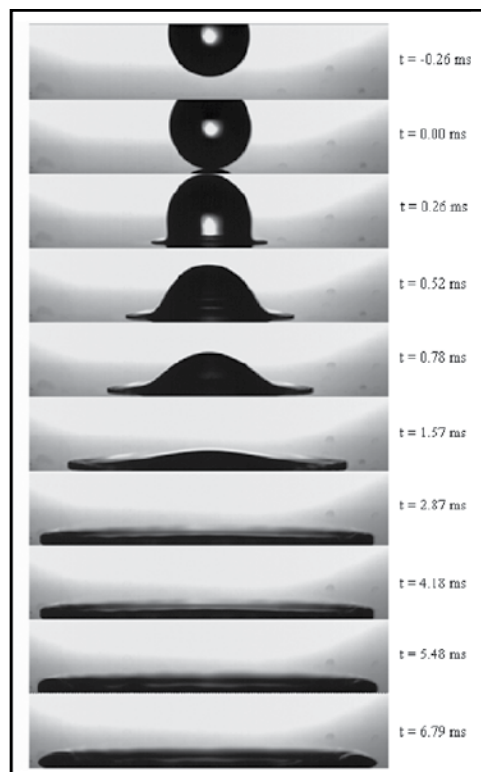
THE UNIVERSITY OF IOWA University of Iowa
Projects

Project Title: Improving Freight Fire Safety: Analysis and Testing of Real Engine Conditions to Progress Development of Mist-controlling Additives for Fire Mitigation

A fuel mist often forms in high intensity transportation accidents because of high shear stresses experienced by the fuel resulting from vigorous sloshing and tank rupture. Composed of very fine droplets of diesel, this mist burns explosively—causing severe damage to life and property. Adding long chained associative polymers to diesel has been proposed to suppress the formation of this mist. It is important to ensure that the change in liquid properties caused by the polymer additive does not affect the performance of fuel systems. In order to assess the shear stresses occurring in fuel systems, flow calculations were performed for a typical diesel engine fuel system, assuming representative operating conditions. Additionally, drop impact experiments using high speed imaging were carried out to characterize the flow behavior of diesel. Such experiments enable the effect of changes in liquid property due to shear stress on liquid flow to be observed.

“Measurements and modeling of real engine conditions are critical to understanding how new technology will impact our transportation system. It lets us make sure we will not have unintended consequences when we make improvements.”

The results so far have shown that it might be possible to modify the viscosity of diesel at shear stresses typical of accidents by adding suitable polymer additives. Because of the non-Newtonian viscosity that would be imparted to the fuel, its viscosity would increase when the fuel experiences shear stresses in the range identified above. This increase in viscosity would reduce the formation of fine droplets and hence the likelihood of explosive fireballs in transport accidents. Performance of the fuel system would not be affected by the additive since, outside the intended range of shear stresses, its effect on fuel properties would be minimal. Such additives would also ensure greater safety in fuel storage and its supply over long distances through pipelines. Current research would thus be extremely beneficial for passenger safety and for avoiding enormous financial losses that occur each year due to accidents.



Spreading of a Liquid Drop on a Solid Surface at Atmospheric Pressure

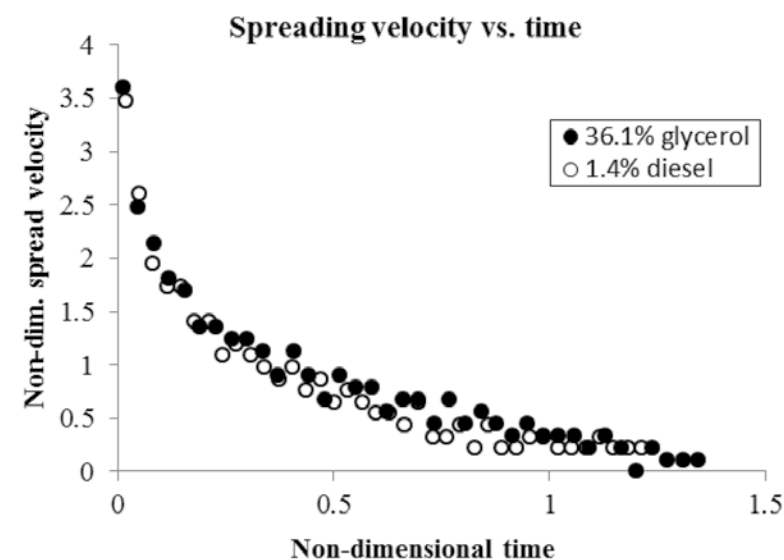
THE UNIVERSITY OF IOWA University of Iowa
Projects

Project Title: Improving Freight Fire Safety: Assessment of the Effectiveness of Mist-Controlling Additives in Mitigating Crash-Induced Diesel Fires

Fuel fires in transportation-related accidents are extremely hazardous causing human casualties and severe losses of property. This danger is aggravated since the energy of a crash can form a fuel mist that rapidly ignites and thereby intensifies fires. A practical method of mitigating such fires in accidents is to circumvent the formation of such a fuel mist altogether. That is, since large drops of even a highly flammable liquid like diesel are difficult to ignite and burn relatively slowly, it is an alternative that can allay the severity of fires. The addition of long chained polymers can retard the break-up of diesel into fine droplets by imparting non-Newtonian behavior to the mixture, in effect, making it like silly putty, which breaks into chunks when hit but stretches like taffy when pulled slowly. New research is focused on developing polymer additives that would activate in typical accident conditions and create bigger drops. At the same time, the polymers would remain inactive at typical engine and fuel system operating conditions so as to not affect engine performance.

“This research opens a whole new area of fuel modification whether it be for safety, fuel efficiency, or to enable alternative energy. Understanding how mechanics work in a single drop will open many frontiers.”

Current research at the University of Iowa is focused on testing the effect of commonly available polymers on the flow properties of diesel, and analyzing flow characteristics using computer models. The broader goal of this project is to provide information about the required properties of the polymer and the shear range in which it is most effective. With this information, the polymer chemistry can be adjusted accordingly. The drop experiments suggest that it is possible to reduce fuel misting by using suitable polymer additives with diesel. Polymers of this type could also be suitably added to alternate fuels, like ethanol, in order to make their viscosities comparable to diesel allowing it to be used with the existing fuel systems for diesel.



Comparison of variation of spreading velocities with time for the two liquid blends



Dr. Albert Ratner
Assistant Professor
University of Iowa
(319) 384-0883
albert-ratner@uiowa.edu



Dr. John Rohde
Associate Professor
University of
Nebraska-Lincoln
(402) 472-8807
jrohde@unl.edu

Co-PI:
Ling Zhu, Ph.D.,
Former Graduate
Research Assistant,
UNL

Students:
Ryan J. Terpsma,
B.S.M.E., Graduate
Research Assistant,
UNL

UNIVERSITY OF
Nebraska
Lincoln
University of Nebraska
Projects

Project Title: Foundation Design for High Tension Cable Guardrails

High tension cable guardrail is becoming increasingly popular in median and roadside applications due to the promise of reduced deflections upon impact and reduced maintenance. As the performance of these systems is observed in service, there is a growing concern over the end anchorage foundation performance of current systems. Foundations for high tension systems must not only be capable of restraining the impact load of a vehicle, but must also restrain the initial pretension on the cable system as well as temperature induced loads. While it may be acceptable for many roadside safety devices to require foundation repair after impact, foundation failure due to environmentally induced loads would be a serious maintenance problem. As initial tension and temperature induced loads can be greater than those loads applied during impact, this type of loading must be considered in foundation design. Foundation deflection can reduce cable tension, increasing deflection of the system during impact and letting the cables sag after impact. The soil conditions in which these foundations are placed vary significantly. This report considers the potential impact, tension, and temperature loads and develops a set of suggested



Cable Anchor Bogie Test Set-up

foundation designs to accommodate a range of in situ soil conditions. These designs will vary significantly in different areas around the nation due to variations in both weather and in situ soil conditions. Deflection during full-scale crash tests may not accurately represent the foundation deflection that will be experienced in the field.

“The development of site specific criteria for the design of high-tension cable foundations will significantly increase the safety and reduce the required maintenance of these systems in the future.”

	12-in. Diameter Shaft	18-in. Diameter Shaft	24-in. Diameter Shaft
	Minimum Embedment Depth (ft)	Minimum Embedment Depth (ft)	Minimum Embedment Depth (ft)
350 Soil	10	9	8
Stiff Clay	13	11	9
Sand	13.5	12.5	11.5

Recommended Embedment for Cylindrical Concrete Foundation

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University of Kansas
Projects

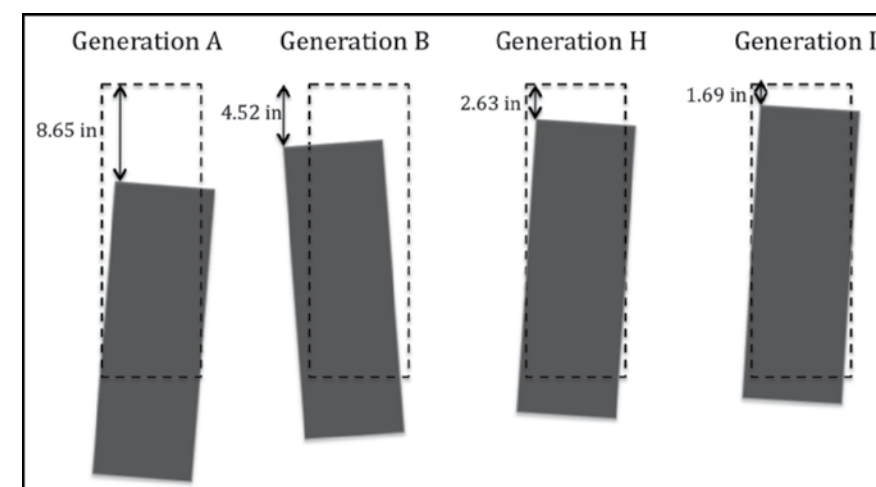
Project Title: A Closed Course Feasibility Analysis of Temporary Rumble Strips for Use in Short Term Work Zones

Work zone safety is of paramount importance for both drivers and workers. Driver distraction and speeding are two of the major contributors of crashes in construction and maintenance work zones. Many traffic control devices, such as static signing, barrels, and portable message signs have been used to indicate to drivers they are approaching a work zone. Rumble strips can be an effective device and have been used in some states to alert drivers to reduce speed in advance of an alteration in the driving situation, such as at intersections.

The purpose of this research was to compare the attention-getting characteristics, movements and vertical displacements of several portable, reusable rumble strips. The attention-getting characteristics and displacement were measured after passes of a fully loaded heavy truck and a passenger vehicle. For the sound and vibration, the devices tested were of two basic types: plastic rumble strips and adhesive rubberized polymer rumble strips. Lastly, the movements and vertical displacements were tested on four generations of plastic rumble strips and also steel reusable temporary rumble strips with a rubber bottom.

“A potential reduction in strips could result in a lower cost of materials as well as reduced installation and removal times—factors that could make their use in short-term work zones more feasible.”

The results show that the use of portable plastic rumble strips can provide improved vibration and sound performance relative to the tested adhesive rumble strip configuration, and even compares well with the tested permanent CIP rumble strip. Further, it appears that configurations with four or five portable plastic rumble strips may be just as capable as configurations with six strips in generating a comparable level of vibration and sound as the CIP rumble strips. This potential reduction in strips could result in a lower cost of materials as well as reduced installation and removal times—factors that could make their use in short-term work zones more feasible.



The Average Movement of each Generation of the Plastic Rumble Strips



Dr. Steven Shrock
Assistant Professor
University of Kansas
(785) 864-3418
schrock@ku.edu

Co-PI:
Yong Bai, Associate
Professor, KU; **Kevin**
Heaslip, Assistant
Professor, USU; **Ming-Heng**
Wang, Post Doctoral
Researcher, KU

Students:
Romika Jasrotia,
Graduate Research
Assistant, KU; **Robert**
Rescot, Graduate
Research
Assistant, KU; **Brandon**
Brady, Undergraduate
Research Assistant,
USU.

MATC Research Projects Funded in Fiscal Year 2010

University of Nebraska Projects



Effect of Freeway Level of Service and Driver Education on Truck Driver's Stress - Phase 1

PI: Dr. Anuj Sharma, Assistant Professor, Civil Engineering, University of Nebraska—Lincoln

Co-PI's: Dr. Senem Velipasalar, Assistant Professor, University of Nebraska—Lincoln; Mr. David Engel, Project Coordinator, Community College Hastings; Dr. Sanjay Singh, Associate Professor, University of Nebraska Medical Center

DESCRIPTION: This project conjectures that truck driver's stress on freeways is a function of variables such as level of service, time of day, weather conditions, and level of driver training. The Highway Capacity Manual uses density to measure the level of service on basic, weaving, and merging sections of freeways. The efficiency of flow can be estimated by calculating the speed of traffic and travel time from density. Yet, there is a need for a methodology to estimate safety as a function of density. By utilizing truck driver's stress as a model, this study will be able to supply this knowledge. The predicted stress level can be used as a surrogate measure for safety. A sample set of 50 subjects will be observed under simulated and real-world driving environments for the data collection. The study subjects will include trainees from a six-week truck driving certification course offered by Central Community College's Truck Driving Program (which hosts more than 100 participants per year). The driver's stress will be measured using technology (such as electrocardiograms), and physiological markers (such as respiration temperature, posture and blood pressure). The technology used for these measurements will not interfere with the subjects' capacity to perform their role as drivers. As this study will focus on driver's stress in local areas, a second phase for this proposal will be submitted next year to evaluate truck driver stress in urban street settings. Partial support for this proposal comes from the Layman Award endowed on Dr. Anuj Sharma and Dr. Senem Velipasalar by the University of Nebraska Lincoln to produce prominent scholarly work.

BENEFITS: The model of truck driver stress levels for this project can be applied as a measure of safety for improving the traffic facility design.

Heavy Vehicle Adjustment Factors for High Percentages of Trucks

PI: Dr. Elizabeth Jones, Associate Professor, University of Nebraska—Lincoln

DESCRIPTION: The most common reference for analyzing the operational characteristics of multi-lane highways and freeways is the Highway Capacity Manual (HCM). The general procedure used by the 2000 HCM to account for heavy vehicles is to use a heavy vehicle adjustment factor that converts heavy vehicles to passenger-car equivalents. In this manual, this heavy vehicle adjustment factor, fHV, is independent of the percentage of heavy vehicles for extended highway and freeway segments. It varies by percent of heavy vehicles for specific grades, but the tables in the 2000 HCM only provide analysis guidance for heavy vehicle percentages of 25% or less. Nebraska's highways carry a significant portion of heavy vehicle (trucks, buses and RVs) traffic. The NDOR 2004 Statewide Traffic Flow Map indicates that on I-80 alone, the percentage of AADT represented by heavy commercial vehicles is more than 25% from Lincoln to the Wyoming border. Just west of the I-80/I-76 junction on I-80, this percentage reaches a maximum of 60.9%. The objective of this research is to quantify the impact of heavy vehicles on multilane highways and/or freeways for heavy vehicle percentages of greater than 25%.

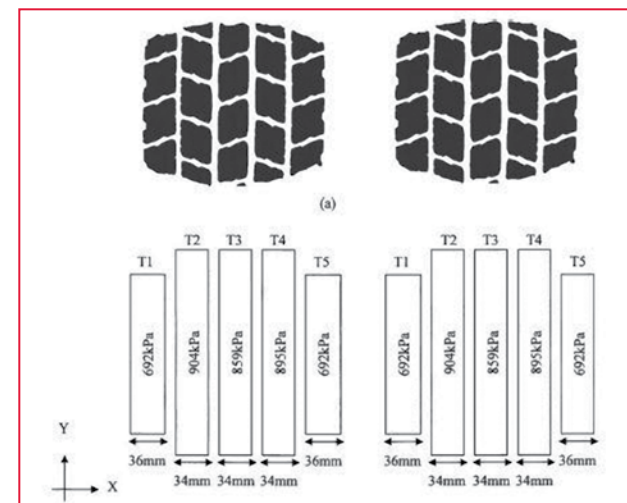
BENEFITS: The expected benefit is more accurate reporting of levels of service and performance measures for multilane highways and freeways that have percentages of heavy vehicles in excess of 25%.



Impact of Truck Loading on Design and Analysis of Asphaltic Pavement Structures - Phase II

PI: Dr. Yong-Rak Kim, Assistant Professor, University of Nebraska—Lincoln

DESCRIPTION: Trucking is the dominant mode of transportation for U.S. freight, and is expected to grow significantly in the future. Better preservation of existing roadways against



Tire Footprints for Heavy Trucks

heavy-load trucks is therefore crucial, and success in this aim necessitates a more accurate and realistic analysis of pavement structures. To this end, a research project led by the PI was initiated in FY 2009 to investigate pavement performance predictions, and particularly focused on the impact of heavy truck loading on pavement damage. Both the newly-released "Mechanistic-Empirical Pavement Design Guide" approach, or MEPDG, and the "purely mechanistic approach based on the Finite Element Method", or FEM were used as guides for this study. Preliminary outcomes and significant findings during the FY 2009 necessitate this effort being continued, and this "Phase II" research with extended work scope is herein proposed. Phase II will specifically focus on the effects of truckloading configurations and constitutive materials behavior on actual pavement structural responses.

BENEFITS: The proposed effort will provide a better understanding of the effects of heavy-load trucks on the overall structural performance and life of pavements in Region 7. In addition, more appropriate use and future advancements of the current MEPDG for pavement analysis and design can be achieved based on proper incorporation with mechanistic approaches.

Reducing Impact of Heavy Truck Traffics on Service Life of Bridge Structures

PI: Dr. Atorod Azizinamini, Endowed University Professor, University of Nebraska—Lincoln

DESCRIPTION: Heavy truck traffic pounds on expansion joints



armors daily and pushes debris into the joints causing extensive damages. This study envisions an innovative system that will completely eliminate expansion joints.

BENEFITS: The proposed system will eliminate the safety risk associated with road closure, and result in significant saving over long period of time.

Simulation and Evaluation of a Cable-to-Post Attachment for High-Tension, Cable Barriers Placed in Medians along Freight Transportation Systems

PI: Mr. Robert Bielenberg, Research Associate Engineer, University of Nebraska—Lincoln

Co-PI's: Dr. John Reid, Professor, Mechanical Engineering Department; Dr. Ronald Faller, Research Assistant Professor; Dr. Dean Sicking, Professor, Midwest Roadside Safety Facility

DESCRIPTION: The research described herein will aid in the development and implementation of a new cable-to-post attachment for the four-cable, high-tension cable median barrier being developed at MwRSF. Completion of the attachment design will allow MwRSF to execute the full-scale crash tests necessary for the system to be safely implemented on the nation's highways. In addition, this research will help evaluate the performance of the terminal design required for the ends of the barrier. It is anticipated that this non-proprietary cable barrier design will be implemented by a large number of State Departments of Transportation. This undertaking represents a significant step forward in the design of cable median barriers.

BENEFITS: In terms of safety and constructability, this research can provide a vast improvement in the performance of cable median barriers. The completed cable median barrier design would have the ability to be placed at any location within a 4H:1V V-ditch median. This makes it easy to implement and gives designers more flexibility, thus ensuring that economical median barriers can be installed in areas where they are needed. This project has the potential to improve the safety of our nation's freight and public transportation systems by reducing the number of cross-median accidents as well as the number of severe injuries and fatalities. Finally, this research study will also allow for upcoming engineers (graduate research assistants) to gain knowledge and experience in the field of transportation safety and learn to develop and apply innovative solutions to those problems found within our U.S. transportation system.



MATC Research Projects Funded in Fiscal Year 2010

Investigating RFID for Linear Asset Management

PI: Dr. Erick Jones, Associate Professor, University of Nebraska—Lincoln

DESCRIPTION: Linear assets, traffic lights, and highway billboards can be hard to physically access, and information files that were captured previously may be inaccurate. Local Departments of Transportation and Departments of Roads are investigating technologies that will assist in solving this asset inventory problem. The focus of this project is to evaluate the feasibility of utilizing Radio Frequency Identification (RFID) as a means of gathering, verifying, and storing information.

BENEFITS: This project will extend the relationship between the Nebraska Department of Roads, the university, and the Departments of Transportation in other states. This project will support students who may become employees, as well as provide positive marketing for NDOR along with other transportation initiatives that support future funding.



Characteristics and Contributory Causes Related to Large Truck Crashes-Phase II

PI: Dr. Sunanda Dissanayake, Associate Professor, Kansas State University

DESCRIPTION: In order to improve the safety of the overall surface transportation system, each of the critical areas need to be addressed separately with more focused attention. Statistics clearly show that large truck crashes contribute significantly to



an increased percentage of high severity crashes. It is therefore important for the highway safety community to identify the characteristics and contributory causes related to large truck crashes. During the first phase of this study, fatal crash data from the Fatality Analysis Reporting System database are studied to achieve that objective. In this second phase, this study will analyze truck crashes of all severity levels with the intention of identifying the factors contributing to increased severities of truck crashes, which could not be achieved by analyzing fatal crashes alone.

BENEFITS: Upon completion of the project, the characteristics and contributory causes related to increased severities of large truck-related crashes will be identified, which will in turn be used to recommend countermeasure ideas to reduce severities and focus areas needing particular attention for improving the safety situation of truck related crashes.

Determining the Stresses in Steel Railroad-Track Rails Due To Freight Movements using Non-Contact Laser-Speckle

PI: Dr. Robert Peterman, Professor, Kansas State University

DESCRIPTION: The ability to accurately determine the existing stresses in railroad track rails is extremely valuable when assessing the condition of an existing railway line. This is especially important for routes that pass through Kansas and Nebraska transporting heavily loaded coal-carrying cars from Wyoming's Powder River Basin. This project focuses on the extension of a non-contact strain measurement technique for use on steel rails as a means of determining the stresses in the rails under heavy freight movements.

BENEFITS: The specific outcome will be the extension and optimization of the laser-speckle strain measurement technique for use on steel rails, and the establishment of the procedures necessary to determine the corresponding stresses in the rails. Upon the successful completion of this project, the laser-speckle device will be demonstrated and will provide key information that can be used to make decisions about track maintenance and the impact of heavy freight movements along the rails.



Crash Analysis in MoDOT I-64 Closure Project

PI: Dr. Hojong Baik, Assistant Professor, Missouri University of Science & Technology

Co-PI: Dr. Ghulam Bham, Assistant Professor, Missouri University of Science & Technology

DESCRIPTION: For the I-64 reconstruction project, MoDOT has been reconstructing approximately 10 miles of the highway since January 2008. Reconstruction is being carried out in multiple stages at different sections of the highway, but during each stage, all roadways within the specified section are completely closed. Roadway closures prompted traffic safety engineers to question: "Could closing the roadways possibly contribute to accidents?" Furthermore, if noticeable changes exist in the number and types of accidents, are these changes a result of closing the roadways? This study aims to answer these questions by examining crash data before and after the roadway closings, and providing scientific explanations for any relevant findings.

BENEFITS: A better understanding of the safety impacts of the lane-closure reconstruction will assist transportation agencies in enhancing safety performance and planning for highway reconstructions with total lane closure.

I270/I-255 Variable Speed Limit Study

PI: Dr. Ghulam Bham, Assistant Professor, Missouri University of Science & Technology

DESCRIPTION: This research project will determine the effectiveness of the Variable Speed Limit (VSL) system on I-270/I-255 corridor in St. Louis County, Missouri.



BENEFITS: The potential benefit of the study is to find measurable indications of success with the system. The purported benefits of the VSL system include improvement in the traffic flow, speed harmonization and vehicle safety. The desired outcome from the study is a report on findings with recommendations for improvements.

Initial Study and Verification of a Distributed Fiber Optic Corrosion Monitoring System for Transportation Structures

PI: Dr. Hai Xiao, Associate Professor, Missouri University of Science & Technology

Co-PI: Dr. Genda Chen, Professor, Missouri University of Science & Technology

DESCRIPTION: Corrosion has long been recognized as one of the major contributors to catastrophic failure of transportation structures. Cost-effective technologies for large-scale transportation structures are basically unavailable. A recent study by Koch et al (2002) indicated that the annual direct cost for the corrosion-related maintenance of U.S. highway bridges was estimated to be \$8.3 billion. This proposal aims to develop an innovative distributed fiber optic corrosion monitoring system for long-term deterioration assessment of bridges. Core to the monitoring system is a novel corrosion sensor that can be constructed by coating a thin layer of iron-epoxy around the surface of an optical fiber that is inscribed with a long period fiber grating (LPFG). Due to its coupling effect with strain and the need for monitoring of the corrosion environment (e.g., pH and temperature) in practical applications, a polymer-coated LPFG sensor and an uncoated LPFG sensor will be integrated with the corrosion sensor to form a multiplexed, self-referencing monitoring system.

The proposed study will focus on the design, characterization, integration and demonstration of the triple-sensor monitoring system. Two reinforced concrete (RC) blocks will be used to test and demonstrate the feasibility of the above monitoring system towards practical applications.

BENEFITS: The proposed research will lead to the development of a comprehensive, distributed corrosion monitoring system that provides important information on corrosion, its environment and its implication on structural health and safety. Such information is critical for the assessment of corrosion-induced structural deterioration. In turn, timely preventive actions can be taken against a catastrophic failure in order to ensure the safe and smooth operation of our nation's transportation structures.

MATC Research Projects Funded in Fiscal Year 2010



Enhanced Sustainability of Railroad Ballast

PI: Dr. Robert Parsons, Associate Professor, University of Kansas
Co-PI: Dr. Jie Han, Associate Professor, University of Kansas

DESCRIPTION: Railroads require continuous supplies of crushed stone for use as ballast to maintain tracks. Under the repeated loading of rail traffic, this stone is degraded through crushing and this damage is compounded by the upward migration of fines from soft subgrades below. For this project a full scale section of track will be constructed with ballast that is reinforced with geosynthetics. This study will evaluate the improvement in the durability of the ballast and reductions in track deformation that occur with said reinforcement.



BENEFITS: The potential benefits of reinforcing the ballast is that it will enable the stone to last longer, which will reduce the demand on quarries for new stone along with reducing the time and money required for maintenance. It also may enhance safety by stiffening the foundation of the track, thus reducing the movement of the track under loading and potentially resulting in a more stable track.



Improving the Long-Range Tracking Algorithm for use in Tracking Long-Haul Trucks using Cellular Data

PI: Dr. Steven Schrock, Assistant Professor, University of Kansas

DESCRIPTION: Previous research has shown that it is technically possible to estimate the extent that heavy trucks will travel from a specific facility, such as a rail-truck intermodal facility, based solely on the remote tracking of these vehicles using cellular telephone position data. The use of cellular tracking data to determine travel times along highway corridors is well developed, but in other areas the entire process is contingent on cellular coverage. In order to properly track freight departing from a facility a different approach is needed. An effective tracking process must be able to track a vehicle for hours or days depending on the truck's ultimate destination, as well as the ability to differentiate between freight-hauling trucks and other non-freight vehicles (e.g., cars). The latter is necessary in order to spend effort only tracking vehicles of interest. In previous research, this aspect of the tracking process was developed ad-hoc, and may not have been an optimal technical solution. This research effort is focused on improving both the ability to differentiate between freight and non-freight traffic as well as improving the capacity to determine when the tracked trucks have reached their destination.

BENEFITS: This research will improve on the ability to determine the extent of freight traffic on the highway and from specific businesses, such as rail-truck intermodal facilities.

Modeling Truck Speed in the Upstream of Two-lane Highway Work Zones: Implications on Reducing Truck-Related Crashes in Work Zones

PI: Dr. Yong Bai, Associate Professor, University of Kansas
Co-PI's: Dr. Steven Schrock, Assistant Professor, University of Kansas; Dr. Thomas Mulinazzi, Professor, University of Kansas

DESCRIPTION: Truck-related crashes constitute a major safety concern for government agencies, the transportation industry, and the traveling public. Due to rising needs in highway maintenance and construction, the number of work zones is increasing throughout the United States, and, simultaneously, freight movement using trucks is augmented nationwide. Developing effective safety countermeasures to reduce the truck-related crashes is a major challenge that the government agencies and transportation industry face. The main objective of the proposed research project is to model the truck speeds in the upstream of two-lane highway work zones.
BENEFITS: Understanding actual truck speed and speed deviation will help traffic engineers to better design work zone traffic control, thus avoiding truck-related crashes and improving safety for construction workers and drivers.



Improving Freight Fire Safety: Experimental Testing and Computer Modeling to Further Development of Mist-controlling Additives for Fire Mitigation

PI: Dr. Albert Ratner, Assistant Professor, University of Iowa

DESCRIPTION: This project will continue to develop the science and technology required to implement fuel additives that improve fire safety for trucks and trains. The polymer-based fuel additives reduce fuel misting in accidents, and thereby reduce the chance of fire. Current project work includes both experimental testing and computer simulation.

BENEFITS: Being able to characterize and classify additive behavior will enable faster and less expensive development of better polymers, thereby bringing a fire reducing polymer into service quicker.



Six Warm Mix Asphalt Additives

Performance Measures of Warm Asphalt Mixtures for Safe and Reliable Freight Transportation (Phase 2: Evaluation of Friction and Raveling Characteristics of Warm Mix Asphalt Mixtures with Anti-stripping Agents)

PI: Dr. Hosin "David" Lee, Associate Professor, University of Iowa
Co-PI: Dr. Yongjoo Kim, Research Associate, University of Iowa

DESCRIPTION: It is anticipated that more highway pavements will be constructed using warm mix asphalt (WMA) mixtures in order to reduce carbon dioxide emission while achieving the longer performance life due to the significantly reduced oxidation of asphalt. During the phase 1 study, six commercially available WMA products were evaluated in the laboratory: Advera WMA, Asphalt-min®, CECABASE RT®, Evotherm J1, Rediset WMX and Sasobit®. Based on the laboratory test results obtained from the phase 1 study, it was found that these WMA mixtures were susceptible to moisture damage. Therefore, it is critical to consider anti-stripping agents for WMA mixtures with the end goal of using it in highways with heavy traffic and high tire pressures. Using the control WMA mixture and the control HMA mixture, characteristics of friction and unraveling will be evaluated and compared to determine which mixture can accommodate high-pressure tires on high-traffic highways.

BENEFITS: The main product anticipated from this research is the safe and reliable WMA mixtures with a WMA additive and an anti-stripping agent. Upon completion of the proposed phase 2 study, the most appropriate WMA additive and anti-stripping agent will be identified to produce WMA mixtures with a resistance to moisture damage, skidding, and raveling. This information would be very useful for all pavement engineers who are interested in utilizing the WMA pavement under a heavy traffic with a high tire pressure.

EDUCATION

MATC SUMMER INTERN PROGRAM

KSU/KDOT MATC INTERNSHIP

KU INTERN PROGRAM

MS&T INTERN PROGRAM

AWARDS AND RECOGNITION

DOCTORAL STUDENT OF THE YEAR

MS&T LEGISLATIVE DAY

TEACHERS AND STUDENTS SUMMER INSTITUTE

MATC FIELD TRIPS

SCHOLARS PROGRAMS

MS&T SCHOOL DAY AT THE K

SEMINARS, LECTURES AND COURSES



2010 MATC Summer Intern Program

UNIVERSITY OF
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Education

On Wednesday, May 12th 2010, the MATC Intern-Sponsor Introductory Luncheon was held in the Jackie Gaughan Multicultural Center on the University of Nebraska-Lincoln campus. This event brought together interns and their sponsors as the preliminary proceeding

to the thirteen week summer internship, beginning May 17th and ending on August 13th.

After introductions from the students and the sponsors, Karen Schurr, MATC intern coordinator, explained the intention of the summer internship as a program that was mutually beneficial for students, faculty and sponsors. According to Schurr, the purpose of the summer internship is to attract the best students to transportation engineering and to create an experimental environment for the students in which they can apply the knowledge they have gained in the classroom. The experience also allows students to discover the diversity and challenges that transportation engineering offers by actually working in the job field. While students learned about career possibilities, the sponsors benefited from cost-effective labor and a thirteen week trial period of the student as a potential job candidate. Accordingly, students use this internship as an opportunity to network with professionals and become more motivated about their career path. Furthermore, the MATC internship program allows a dialogue between sponsors and university faculty so that class curriculum can correspond, as much as possible, with ever-changing occupational needs.

One component of the internship was a field trip, which took place on July 16th. This activity provided interns an opportunity to showcase newly-honed skills and on-the-job experience. The day included visits to internship sites throughout Lincoln, including the newly remodeled Whittier research center, traffic management firm Iteris, Nebraska Department of Roads, and the City of Lincoln Public Works and Utilities Department.

Interns created presentations that introduced the sponsoring firms and agencies while describing their roles and experiences in these new environments. In the afternoon, everyone met in Nebraska Hall to hear from interns working at other Lincoln and Omaha sites, including the Metro Area Planning Agency, Fellsburg Holt & Ullevig, Lamp Rynearson, MATC Pavement Design and Transportation Systems Engineering, and UNL's innovative Radio-Frequency Identification for Supply Chain and Logistics (RFISCL) Laboratory. At the close of the day, Schurr expressed how impressed she was with how well this year's interns not only demonstrated their learning

and strong contributions to their sponsors, but their excellent communication skills as well.

The end of the Summer Internship Program was marked by the Recognition Luncheon on August 13th. Karen Schurr gave a presentation highlighting the wide variety of sponsor sites, students, and projects that comprised this year's program. Out of fifteen interns, eight worked with research faculty, four worked with public entities, and three with private companies. To choose the most informative presentation from the field trip session, interns voted for one of their peers. Jeff Bohlken was chosen as the winner for his presentation on his work with the Midwest Roadside Safety Facility. David Stuart, who interned with the Metro Area Planning Agency in Omaha, received an honorable mention for his engaging presentation.

In addition, all interns wrote a report reflecting on their experiences. The intern who composes the most informative and well-written report receives the Patrick T. McCoy Scholarship. This year's winner was Adam Denney, who spent the summer at Felsburg, Holt, and Ullevig in Omaha. In his thoughtful reflection, he wrote about how this experience had "solidified the choice of civil engineering as a career path." Carrie Mohlmann, who interned with the City of Lincoln, and Jeff Bohlken were the runners-up for this honor.

At the end of the internship, MATC provides a scholarship to each of the students if they have completed their work in a satisfactory manner and have adhered to the expectations of the sponsor. Beginning in 1996, the MATC summer internship program has provided 139 students with 176 positions over a fifteen year period. Many students have the opportunity to intern during multiple summers, whether for the same or a new sponsor each year.





KSU/ KDOT Internship

The KSU internship, held during the summer months, was a resounding success. The program was formed to provide students with the motivation to pursue a career in transportation engineering by allowing them to gain experience in the field. The KSU intern program was in cooperation with the summer internship program coordinated by the Kansas Department of Transportation (KDOT). Eleven students participated in the internship: MATC supported nine interns and two interns were funded by KSU's University Transportation Center. The student interns included: Jessica Hennes, John Handke, Nick Theimer, Heath Brunton, Peter Tobaben, Terrance Dobbins, Neil Ostermann, Garrett Sharpe, Brenton Boyer, Abram Harpel, and Luke Fangman.



Student Intern Spotlight:

"I am junior in civil engineering at Kansas State University. I had a summer internship at the Kansas Department of Transportation in the Road Design section in Topeka under Steven King. This was my second summer working in this squad with Steven King. I have enjoyed learning Microstation and working on many different projects. I have learned about calculating guardrail,

sizing drainage structures, vertical alignment of roadways, and preparing plans. This was a great learning experience and it was an invaluable opportunity to have a summer internship in civil engineering."

- Jessica Hennes



Student Intern Spotlight:

"My internship with KDOT was a great experience. Being out in the workforce helps you learn things you can't pick up in a classroom. Internships provide valuable experience that will help later on down the road."

-Peter Tobaben

KSU Summer Interns

Jessica Hennes
John Handke
Nick Theimer
Heath Brunton
Peter Tobaben
Terrance Dobbins

Neil Ostermann
Garrett Sharpe
Brenton Boyer
Abram Harpel
Luke Fangman



From L to R: Pete Tobaben, Garrett Sharpe, Luke Fangman, Heath Branton, John Handke and Jessica Hennes (not pictured: Brenton Boyer, Terrance Dobbins, Abram Harpel, Neil Ostermann & Nick Theimer)

Awards and Recognition



University of Kansas Intern Program

The first year of the University of Kansas' MATC intern program, coordinated by Dr. Tom Mulinazzi and Dr. Robert Schrock, was a success. Three students—Lucy Munz, Ryan Hagerty, and Jessica Peat—spent the summer as interns for KDOT. A number of students worked on transportation research projects at KU, including Aaron Boehmler, Lee Baer, Mona Khoshabeheh, Tiffany Brown, and Jordan Herbert. Johnson County Public Works sponsored Zach Breault and Hilary Orkevich. Kayla Kukuk, Elizabeth Riedel, and Brett Wagoner worked for local consulting agencies: George Butler and Associates, Kaw Valley Engineering, and BG Consultants, respectively.

Interns learned about the attitude and skills necessary for a career in transportation engineering and for contributing to successful research endeavors. They practiced professionalism, multi-tasking, and organizational skills. Jordan Herbert, who worked on research at KU's School of Engineering, had a chance to learn more about traffic engineering than coursework alone would have permitted. Working alongside graduate students also helped to show him the possibilities available with graduate study in transportation engineering, Herbert said. One important objective of the intern program is to encourage talented students to pursue an advanced degree in transportation.

Herbert also said the experience offered him perspective on the ways in which KU and KDOT's mutual relationship functions to optimize infrastructure statewide. Considering that KDOT has hired twenty-one of KU's Civil Engineering graduates in the past three years, such knowledge may be important background for a future career path. KDOT intern Ryan Hagerty learned about the many roles that a KDOT engineer may move between as a manager, educator, and decision-maker. Hagerty also appreciated the chance to work at sites in the field to better understand the material he is learning in courses.

The skills learned throughout the internship, including the ability to carefully and consistently document one's work, are skills transferable to other coursework, Herbert noted. Intern Aaron Boehmler reflected on the research skills he learned, including how to select quality information and use different types of resources. Interns had professional opportunities, such as networking, attending conferences, and presenting at meetings, which are essential experiences to prepare students for their future profession.



Missouri S&T Introduces Intern Program with MoDOT

For the past few years, the Missouri Department of Transportation (MoDOT) and Mid-America Transportation Center (a Missouri S&T Partner) worked in conjunction to develop a recruiting plan that will encourage undergraduate students to seek employment with MoDOT after graduation. With this aim in mind, MoDOT and MATC offered a competitive financial package for students at the Missouri University of Science and Technology (Missouri S&T) which included a summer internship and hourly pay from MoDOT. As an additional incentive, each student received a scholarship from MATC over the funding period.

In order to locate interested candidates, MoDOT and MATC developed a recruiting plan. First, MATC distributed the summer internship opportunity among all undergraduate students at MS&T, particularly those from the Department of Civil, Architectural, and Environmental Engineering. MATC also encouraged prospective students to visit with

MoDOT during the annual career fair on campus and apply for summer internships. All applications received from prospective students were reviewed by MoDOT staff, who then selected summer internships based on various needs across MoDOT districts.

Following the summer internship, students composed a one-page report that included a brief description of the projects they were involved in during the internship, an explanation of their role in each project, and an evaluation of the internship program. Once finalized, these reports are submitted to the MATC associate director at Missouri S&T. MATC awards up to fifteen scholarships to selected students upon their completion of the internship and submission of the final report.

For more information contact Genda Chen at gchen@mst.edu or call (573) 341-4462.

Awards and Recognition

Governor Safety Awards



Congratulations to Nate Burnett for receiving the Governor Safety Award for the Intelligent Transportation Engineering chapter.



In April of 2009, LOCATE (Lincoln, Omaha, Council-Bluffs Association of Traffic Engineers) was presented with the Governor's Transportation Safety Challenge Special Recognition Award for reducing the fatality rate for young drivers. Dr. Aemal Khattak serves as the director of education on the LOCATE board.



Jeff Thiele Winner in IRF Essay Competition



University of Nebraska—Lincoln graduate student Jeff Thiele was selected as one



of the five winners of the International Road Federation's annual student essay competition. An international panel of judges evaluated essays submitted in five separate areas, and Jeff Thiele's essay was chosen as the winner in the "Innovative Financing" category. Thiele expressed excitement about his achievement: "I was completely surprised. I'm very thankful to the International Road Federation for this award, and I'm honored that my essay was selected as a winner."

A complete list of winners and their essays can be viewed at: <http://www.irfnews.org/news-events/press-release-detail/irf-announces-2009-student-essay-competition-winners/>

Midwest Roadside Safety, Challenge Award



Congratulations to Dr. Dean Sicking, who was selected by the Midwest Roadside Safety Facility as winner of the "Challenge Award." Dr. Sicking was presented with the award at the 2009 Nebraska Highway Safety Summit held last April in Kearney, Nebraska.

MATC Doctoral Student of the Year



from Prairie View A&M University, a Historically Black College and University

Maurice D. Cavitt is a Ph.D. student at the University of Nebraska—Lincoln in the Department of Industrial and Management System Engineering (IMSE). He holds a B.S.E.E. degree

(HBCU) located near Houston, Texas. Cavitt has been selected as the 2010 MATC Doctoral Student of the Year, an award which includes a scholarship and some travel funds to attend the 2010 Transportation Research Board meeting in Washington DC.

"It is an honor and a great privilege to be recognized as the Mid-America Transportation Center (MATC) Doctoral student of the year. It is an awesome feeling to be acknowledged for my research efforts and it was exciting to be

able to attend the 89th Annual Transportation Research Board (TRB) Conference. Being invited to the same conference as other great researchers and intellectual minds allowed me to network and see great research," states Cavitt. He would like to thank his professors, including Dr. Erick Jones, and his family for inspiring him to achieve this award.



MID-AMERICA TRANSPORTATION CENTER

MISSOURI S&T Legislative Day in Jefferson City

By Laura Rathe, MS&T Graduate Student

On March 2nd, a group of civil engineering graduate students from Missouri S&T attended Legislative Day at the Capitol in Jefferson City. Legislative Day gave Missouri S&T the opportunity to present current research and practical applications to both legislators and the public. The students, including Chenglin Wu and Laura Rathe, presented projects focused on the infrastructure research taking place in the Civil, Architectural, and Environmental Engineering Department at Missouri S&T. Some of the research topics presented included: highway construction and safety, bridge strengthening and repair, and structure behavior monitoring. The legislators showed interest in and were thrilled by the progress that has been made at Missouri S&T. The exhibition also attracted many elementary school students who happened to come and visit the Capitol building that day.



Students Experience Engineering Excellence: 2010 Summer Institute Engineering Experience Day

Teachers Equipped with Knowledge, Resources at Summer Professional Development Institute

MATC's efforts to create the next generation of engineers start long before students ever set foot into a college classroom. Recognizing that many science and math teachers may lack the tools and knowledge to incorporate engineering into their curriculum, a team of educators, Dr. Larry Rilett of NTC and MATC, Dr. Gina Kunz and Dr. Gwen Nugent, both from UNL's Center for Youth and Family Services, embarked on an interdisciplinary endeavor to offer teachers a deeper understanding of engineering. This event was the annual Professional Development Science and Math Summer Technology Institute.

The intensive three-day institute served to equip teachers with the knowledge needed to help students learn while experiencing engineering in meaningful ways, and cultivating positive attitudes toward engineering. Twenty-nine middle and high school math and science teachers across Eastern Nebraska, in Lincoln, Omaha, Lexington, and Hastings, participated in the Institute. Linked by a teleconferencing system, CYFS and engineering faculty offered teachers a variety of presentation, tours, and activities from June 15-17, providing an introduction to areas within transportation engineering.

During his opening presentation, Dr. Rilett discussed what an engineer is and brought home how much engineers affect everyday life: "Who's saved more lives: doctors or engineers?" Dr. Rilett asked. "The answer is engineers." Throughout the rest of the day, NTC faculty and staff offered presentations and interactive activities to spark ideas for classroom application. Dr. Anuj Sharma demonstrated the hidden complexities of the "World of Traffic Signal Timing," inspiring one teacher to design a

lesson that will help students improve traffic flow in front of their school. Teachers learned about concepts of highway safety and research from Dr. Aemal Khattak. In Omaha at the state-of-the-art Peter Kiewit Institute, teachers had a chance to tour the Building Information Modeling and Automation Facility and the Flow Simulation Laboratory.

Teachers had time set aside for development of lesson plans to introduce to students during Engineering Experience Day in July. Twelve teachers who previously attended the Summer Technology Institute served as "peer coaches" for new participants as they shared their preliminary lessons plans on the final day of the Institute.

Transportation engineering provides an ideal context for practical applications of science and math, teachers discovered. Mary Herrington, a science teacher at Culler Middle School in Lincoln, remarked, "All the lessons have a real world connection. It really builds interest and excitement for engineering and technology." They also noted the benefits of the connection between educators at the secondary and post-secondary levels. "I've gained a lot of resources. I use UNL's College of Engineering website a lot," said Charmain Satree, Industrial Technology Department Chair at Lincoln North Star High School.

In the fall, these hands-on lessons will be implemented in classrooms and made available for other teachers, as well. In addition to focused time and support for creating lesson plans, STI provides funds so teachers can purchase resources, such as software, needed to take their ideas from concept to classroom.

For the fifth annual Engineering Experience Day on July 8th, thirty middle and high school students descended onto the University of Nebraska-Lincoln campus to learn about what an engineer is and what a day's work includes. Dr. Larry Rilett, Director of MATC, provided an introduction to help students understand the various roles of engineering professionals, contextualizing the many jobs within the field. He explained how major companies rely on the work of transportation engineers, as in the case of NASCAR's adoption of the Midwest Roadside Safety Facility's soft-wall barrier system. His overview of construction engineering, geotechnical engineering, transportation engineering, environmental engineering, and water resources engineering offered students a sense of the diverse opportunities within the profession.

This also serves as an essential opportunity for middle and high school teachers who attended the June 2010 Summer Institute to use the lesson plans they created. Teachers designed creative, hands-on classroom activities to teach concepts to students. One involved using Hot Wheels cars in conjunction with math calculations to determine the projection of the tiny car out of a tube. Another lesson asked students to modify the inside of a toy car and test it on a track to understand how momentum and mass can be manipulated through changes in design. In a road modeling activity, students used contour maps to create a simple road following the geographical contours.

Students spent the afternoon visiting different engineering facilities in small groups for an interactive engineering experience.

Structural engineering students in the Structures and Bridges Lab demonstrated the weight capacity of concrete by applying pressure to a block of concrete until it blasted into pieces. In the Pavement Materials Lab, students learned how pavement samples are cored and then scanned for use in computer simulations, while cored pieces are subject to vibration tests to measure durability of the sample. Graduate students in the Radio-Frequency Identification (RFID) lab used a scanner with labeled objects on a conveyor belt to show the widely applicable uses of RFID technology.

Transportation Systems Engineering graduate student John Coburn offered a presentation on Geographic Information Systems (GIS). He demonstrated how GPS is used in various Google Earth functions and an interactive Bing zoning map of the City of Lincoln. In a perennial student favorite, participants learned about laser detection by using Lydar Guns to determine the speed of oncoming traffic. At the end of the day, students and teachers had a chance to offer their feedback about the experience.

Engineering Experience Day proved to be a successful culmination of the teachers' efforts and a unique learning experience for middle and high school students. Engineering faculty and students had a valuable opportunity to use their expertise for educational outreach while showcasing exciting MATC research projects and introducing students to career possibilities.

McMillan Middle School Students Enjoy "Super Fun Time" at MATC Field Trip



On February 19th and May 6th, McMillan middle school students traveled from Omaha to visit the University of Nebraska-Lincoln campus for a "Transportation Engineering Experience" field trip. Conducted by MATC and NTC and led by transportation engineering graduate students, the field trip introduced McMillan students to transportation engineering by demonstrating the technology used in this field. The students were divided into groups and the day was organized so that each group visited five stations: geographic information systems, video detection and microsimulation, speed guns, radio frequency identification and logistics, and bridge and structures engineering. During these twenty minute sessions, McMillan students were taught how to map routes on a computer, measure car speed, use speed guns and other tracking devices, and a myriad of other skills.

After a morning full of sessions, the students enjoyed pizza before their big competition. The groups were tested on their knowledge and the team with the best score was awarded for their efforts. The highlight of the field trip for many students was using the radar guns to capture speeds, while others were impressed with the technology used in transportation engineering. When asked about the field trip experience, one student answered: "it is a super fun time working as a transportation worker, and it also takes a lot of work. It was a very fun field trip!"



Middle School Students Go with the (Traffic) Flow

It will be a few years before they even get their learners' permits, but students at Culler Middle School got an early look at what goes into optimizing traffic flow in their neighborhoods. On July 17th, science teacher Christina Argo from Bryan Middle School in Omaha piloted a lesson on transportation engineering, which she developed as part of the Professional Development Science and Math Summer Technology Institute.

As a precursor to the lesson, UNL undergraduate intern John Coburn gave a presentation introducing students to civil engineering as they munched on pizza. He discussed what an engineer does and how they are different from and similar to scientists. Students gasped as he showed examples of engineering marvels such as the spectacular Dubai Towers and "World Islands." To offer a peek at transportation engineering research conducted at MATC, Coburn showed footage of crash-testing at the Midwest Roadside Safety Facility. He explained how researchers run the crash tests, after one concerned student asked, "Who's driving that truck?"

Ms. Argo started her lesson with a lively discussion about what traffic flow is. She asked students to think about what causes traffic issues. Students

eagerly volunteered answers, launching a discussion of what kind of traffic signs they had seen on the roadside and what each indicates.

Then, it was time to put these ideas into action. Ms. Argo showed a YouTube video of a chaotic intersection in India with no traffic signals or signs. Students then worked in pairs to sketch a safer, intersection with traffic signs and signals to regulate flow. As they worked, Ms. Argo encouraged them to think of the many issues involved, such as where pedestrians will walk, how fast the cars should go, and on which side of the road the signs should be placed. Afterwards, students presented the new and improved intersections to their peers and explained the choices they made. One student remarked, "Engineers are smart — this is harder than I thought!"

When Ms. Argo takes the lesson back to her 7th grade students at Bryan, they will extend this exercise into practical application. After students gather data about traffic flow near their school, MATC post-doctoral research associate Justice Appiah will set up a control simulation of how the traffic currently flows. Then, in groups, students will experiment with alternatives in order to make traffic flow in front of the school more efficient, and make recommendations based on what they discover.



Best field trip ever

Lincoln Northeast High School Students visit NTC & MATC

Janet Emery & Adell Stiles
Teachers from Lincoln Northeast

"Best field trip ever" was the reaction of Lincoln Northeast High School students after spending the day at NTC and MATC. Students picked the crash track test site and the speed guns as easily their favorite parts of the tour. These experiences helped to excite the students and set the tone for the rest of the day.

It was "real cool" for the students to stand outside Nebraska Hall with the speed guns. They were amazed at all the details involved in creating red-light stop times. Students were surprised when drivers slowed down as they pointed the speed gun toward the car.

Engineers at the track were excellent in their manner of presentation, reinforcing how math and science are used daily in their field. Trial and error processes, as explained by the engineers, gave the students a realistic picture regarding the invention of the NASCAR safety bumper.

Donnie Butler's explanation at the ITS Detection lab intrigued the students. Because LNE students are familiar with the 35/Adams Street intersection, the data collected by the three real-time cameras was meaningful. Students were impressed by the process used to create solutions to the two problems being studied at that intersection. Moreover, Dr. Anuj Sharma's first-rate presentation helped the students realize the broad job opportunities available with a civil engineering degree.

"It was great to have a quiz," commented many students as the day ended with a friendly competition among four groups of students. They all wanted to win a T-shirt and water bottle. At the end of the day, students and teachers alike felt it was an extremely successful field trip.

Bhaven Naik
Graduate Student

My presentation illustrated how transportation engineers conduct spot speed studies using Lidar guns. The students had the opportunity to conduct a simple spot speed study using the Lidar guns. After this demonstration, I explained that the speeds they collected could be used for defining the posted speed limits on the highways, timing traffic signals or as input for micro-simulation models. They were also introduced to other traffic data collection devices such as loop detectors, video recording, and the simple stop watch. The use of the video and loop detection devices interested the students the most.

Walter Moy
Graduate Research Assistant

At the MATC tour, I presented on Geographical Information System (GIS) software. This program enables the user to assign information to a line or shape which is then displayed according to these specifications. Everyday uses for this software include map production and programs, such as Google Earth. During my presentation I explained the

basics of the program, and allowed time for the students to explore it themselves. The students made different kinds of maps and, overall, I think that they enjoyed their time learning about GIS software.

Justice Appiah & Chung-Jen Hsu "CJ"
Janet Emery & Adell Stiles
Teachers from Lincoln Northeast

We spoke about the traffic micro-simulation model, VISSIM, and how it is used at UNL and institutions across the nation to analyze many complex transportation problems. One of the projects we discussed was the development of a state-of-the-art traffic micro-simulation model of the I-80 freeway between Lincoln and Omaha. When completed, this model can be used to predict the likely impact of changes in traffic patterns resulting from modifications in traffic flow (such as on game days) or from alterations to the physical environment (such as lane closures). The ability to predict or anticipate these potential impacts means engineers, planners, and policy makers can proactively develop, test, and implement possible remedies. The students were particularly impressed with the potential cost savings and the safety implications of these projects—some even expressed interest in pursuing a career in transportation.

Donnie Butler
Graduate Research Assistant

Of the many aspects of transportation engineering, my presentation at the MATC tour focused on traffic detection systems. The students listened attentively as I presented the origins and types of vehicle detection devices. We discussed some example applications of video detection systems, as well as the associated benefits and disadvantages. For instance, I showed the students the City of Lincoln website and explained that they can use traffic cameras, accessible at this site, to check traffic congestion and determine the best driving route. The students particularly enjoyed the futuristic application opportunities of

video detection, such as vehicles that can detect other vehicles and respond by slowing down or stopping to prevent an accident.





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MATC Scholars Program to Help Prepare Students for Successful Graduate Study

One of the most important aspects of MATC's goal to educate a new group of future engineers is actively encouraging diversity in the field. The MATC Scholars Program aims to improve diversity among graduate programs in the STEM fields by encouraging potential graduate students to prepare for the experience. Dr. Erick Jones said that there is often inadequate consideration of the unique challenges faced by students from underrepresented groups at Tier I institutions. Talented students may find themselves bewildered by the prospect of graduate study and related admissions processes, but the Scholars Program will provide the information needed to make the right choices.

Dr. Judy Perkins of the MATC advisory board carefully assembled a diverse team of science and engineering faculty from Southern University, Tennessee State University, and the University of Maryland-Eastern Shore to facilitate the MATC Scholars Program Conference. The conference will take place on September 23 and 24th at the University of Nebraska-Lincoln. Over these two days, students will attend sessions from faculty and graduate studies administrators on how to choose, prepare for, and succeed in graduate school. Each faculty member will bring several students to the con-

ference for an opportunity to network and learn about topics such as communication skills, choosing faculty mentors and advisors, budgeting, and the social aspects of the graduate school experience.

Dr. Erick Jones and Dr. Perkins hosted an intensive conference planning session at the University of Nebraska-Lincoln on July 27th with Dr. Ibibia Dabipi of UMES, Dr. Deo Chimba of Tennessee State, and, from Southern University, Dr. Edgar Blevins and Dr. Ella Kelley. Dr. Erick Jones asked the faculty, "What would we have wanted to know when we were in graduate school?" as they discussed the most relevant topics for students to learn about in September. According to Dr. Jones, this meeting represents a unique "faculty-up" program for improving the quality of education, rather than a solely administrative "top-down" approach, allowing faculty to use their own experiences to optimize success for a new generation of students.

While the planning session was punctuated with the sounds of laughter and camaraderie, the focus remained on making a difference in the future of young scholars and changing the face of engineering graduate programs.



Conference facilitators plan the upcoming program.



L to R: Edgar Blevins, Valerie Lefler, Deo Chimba, Judy Perkins, Ibibia Dabipi, Ella Kelley, Erick Jones

KU Jayhawk Transportation Scholars Program Offers Unique Opportunity to Undergraduates

The University of Kansas once again offered the Jayhawk Transportation Scholars Program, which provides undergraduate students with an all expense paid trip to the Annual Meeting of the Transportation Research Board (TRB). Held in Washington D.C., the TRB is the world's largest

transportation research symposium. It features colleges from across the nation; over 3,000 presentations on transportation related topics; and agencies from the federal, state, local and private sectors.

TRB is one of six major divisions of the National Research Council—a private nonprofit institution that is the principal operating agency of the National Academies in providing services to the government, the public, and the scientific and engineering communities. Attendance at this conference benefits undergraduate students by providing the opportunity for them to meet professionals and learn about current research in the transportation engineering field. Requirements for this program stipulated that the candidate must study civil engineering and be a currently enrolled KU undergraduate student in good academic standing.



Missouri S&T Interns Shake Things Up at Fox 4 "School Day at the K"

by Laura Rathe, MS&T Graduate Student

The meteorologists of Fox 4 News in Kansas City recently held the 12th Annual "School Day at the K" for local school children at Kauffman Stadium in Kansas City. "School Day at the K" promoted awareness of everyday and extreme weather conditions. The day began with a Fox 4 demonstration consisting of large scale experiments, interviews with professionals from various backgrounds, and interactive weather quizzes. This is the largest weather education event in the world and every year it attracts over 20,000 students from elementary, middle, and high schools.

The Missouri S&T team presented the earthquake shake table during the aforementioned show. First, they demonstrated how important frequency is in determining the damage suffered by a building. Three buildings of different heights and stiffness were run on the shake table at varying frequencies to illustrate the

results. Then, MS&T demonstrated soil liquefaction by making a small plastic house sink into sand.

After the show, the students were invited to the parking lot for hands-on experiments. The students had the opportunity to build their own structures and test them on the shake table to see if they could withstand a "real earthquake." The buildings were constructed from K'nex building pieces, attached to the shake table, and then subjected to a simulated earthquake. The kids were thrilled when their building survived a quake!

This event allowed students to engage in transportation projects as they constructed structures and tested the effectiveness of their models. Much like bridge development or structure testing done at MATC facilities, the students were able to see how structures react to real weather conditions.





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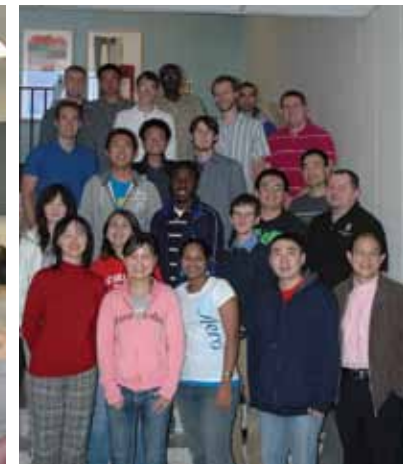
MATC Transportation Engineering Seminar features Diverse Group of Guest Lecturers

The MATC Transportation Engineering Seminar was taught this past fall by Dr. Rilett with the stated purpose of introducing graduate level transportation engineering students to everyday issues in the profession that standard coursework may not address. To this end, a professional from a specific division of transportation engineering was scheduled to lecture each week. The lecture series benefited faculty and students in the transportation field generally, as these events were open for all to attend.

Class time was also scheduled to facilitate the students' attendance of a Valmont Industries Incorporated's testing facility tour in October, as well as the Omaha-Council Bluffs Traffic Forum and the Nebraska Highway Commission Meeting in November. When asked about his experience in this course, graduate assistant Nathaniel Burnett replied: "as the field of transportation continues to grow, possessing a thorough knowledge of concerns and problems throughout transportation is imperative. MATC's Transportation Seminar offered students the unique opportunity of learning about the various sectors."

Lecturers represented different sectors of the discipline including private, public, and academic spheres:

- Joe Werning, Division Administrator, FHWA, NE**
- Justice Appiah, NTC Post-Doctoral Engineer, UNL**
- Mike Malone, Vice President-Heartland Region, ITERIS, IA**
- Virginia Baldwin, Professor of Library Science, UNL**
- Cindy Newsham, Response and Recovery Division Manager, NEMA**
- John R. LaRondeau, Inland Navigation Program Manager, Army Corps of Engineers**
- Erin E. Sokolik, Traffic Signal Engineer, City of Lincoln**
- Qizhou Shi, Professor, Tongji University, China**
- Anuj Sharma, Assistant Professor, UNL**



Dr. Guo presents on UNL's FHWA Flow Simulation Lab for Graduate Seminar

The Department of Civil Engineering at the University of Nebraska-Lincoln held a graduate seminar in "Water Resources Engineering" on April 16th. Led by Dr. Junke Guo and open to faculty and students, the seminar introduced the development and achievements of the FHWA Flow Simulation Lab on the UNL campus. This lab was established through the collaborative efforts of UNL, FHWA Hydraulics Lab and Argonne National Lab. Some results have become national design standards. The lab not only supports the UNL hydraulics graduate program, it also supports MATC hydraulic research initiatives. One such program is bridge hydraulic research, which was the focus of this seminar as Dr. Guo provided an overview and explanation of the experiments that have occurred on campus relative to this issue.

Dr. Junke Guo's MATC project titled "Computational Design Tool for Bridge Hydrodynamic Loading in Inundated Flows of Midwest Rivers" described that the 1993 and 2008 Midwest floods showed that, with weather pattern changes, the period between returning extreme floods may be shortening. These changes threaten existing bridges over rivers. This study transfers the recent supercomputer simulation technology of inundated bridge hydrodynamics from laboratory scales to practical design scales.

According to Guo, bridge hydraulic research is important to the sustainability of bridge infrastructure because more than 50% of bridge failures are due to hydraulic causes. Guo's presentation explained the research results of three on-campus research efforts: computational bridge hydrodynamics, bridge pressure flow scour, and cohesive sediment incipient motion.

University of Iowa Transportation Symposium

PI: Dr. Paul Hanley, Associate Professor, UI



To encourage undergraduate and graduate students to seek careers in the transportation sector and provide an opportunity for local, regional and state transportation professionals to obtain current information on transportation finance policy, the Public Policy Center, with the assistance of the Mid-American Transportation Center, brought together national experts for a symposium. Many aspects of Transportation Policy, from highways and transit to the externalities of transportation, such as land use and equity, were the focus of this meeting.

The Public Policy Center of the University of Iowa, through the Forkenbrock Series on Public Policy, facilitated a two-day symposium on the topic of transportation finance and economics. The series was open to the public and targeted transportation professionals from all levels of public agencies and private industry to debate the future of transportation. Twenty-four speakers—representing the federal and state departments of transportation, four universities, four consultancies, and three private freight service providers—were scheduled during the two-day symposium. At the conclusion of the event, the slides and audio transcripts of each session were made available for download at the Public Policy Center's website.

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Industry-Oriented Freight and Public Transit Planning Courses

PI: Dr. Paul Hanley, Associate Professor, UI



The University of Iowa, with the assistance of the Mid-America Transportation Center, now offers two upper level undergraduate/graduate courses to encourage students to seek careers in the transportation sector. The two courses are "Public Transit Operations" and "Planning and Freight Transportation Planning" and subsequent offerings will be available to MATC partner universities. The Public Transit Operations and Planning course focuses on bus, light and heavy rail, and paratransit modes as well as transit operations, planning, modeling and optimization, transit agency economics, transit finance, and evolving transportation policy. This course also emphasizes skills essential to planners and engineers who intend to work for either a planning agency, transportation provider, or

a transportation or planning consulting firm. This class is especially geared towards undergraduate and graduate engineering students and graduate urban and regional planning students.

The Freight Transportation Planning course focuses on surface modes, primarily trucking and rail, as well as trade-offs in bulk movements by inland waterways and pipelines. Recent developments in policy, planning, and practice for surface transportation in other developed economies are also of primary concern in this course. The purpose of these two courses is to ensure that curriculums are altered to reflect the changes in the transportation industry's demand and to create an opportunity in which undergraduate and graduate students can be encouraged to consider careers in the transportation sector.

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TECHNOLOGY TRANSFER

TRB CONFERENCE
 INDO-US WORKSHOP
 ITS HEARTLAND ANNUAL MEETING
 ITS TRAINING WORKSHOP AND SYMPOSIUM
 MOVITE SPRING MEETING
 LOCATE CONFERENCE
 KANSAS STATE CERTIFICATES AND PROGRAMS
 MATC VISITS VALMONT
 ITERIS EQUIPMENT DONATION
 TOUR OF UNION PACIFIC

TRB

MATC Scholars go to Washington for Transportation Research Board Conference



Pictured above: MATC students pose together at TRB.



Attendees from KU pictured left to right: Cheryl Bornheimer, Matthew Pierson, Romika Jasrotia, Carl Schwarzer, and Vinur Kaul.



meet people involved in their field of interest.

Jeff Thiele, a UNL graduate student and MATC scholar, attended the TRB for the first time and it was a memorable experience: "the conference provided me with a better perspective on how problems are solved through research. It helped me understand the scope of my field both as an area of study as well as a career path. The field of transportation is huge, and there are thousands of professionals improving many different aspects of the field that I'll never work in. It's inspiring and humbling to see how many people dedicate their professional lives to working in these different areas."

This year's TRB conference offered a multitude of presentations on relevant topics in transportation. The presentations addressed the latest research, standards, and practices and also introduced new areas of potential research. For the MATC students who were in attendance—one MS&T, two UI, eleven UNL, eleven KU and seven KSU students—it was a chance to learn about innovative findings, new areas of research, and to

The sheer expansiveness of the conference circumscribed many students to their particular area of research, and this allowed them to network with professionals in their area. Jennifer Schmidt, a UNL graduate student and MATC scholar, considers networking to be one of the most valuable aspects of the TRB: "the conference exposes students to many professionals in the transportation field. Positive contact with these professionals encourages students to continue pursuing the transportation field and provides them with many possible job opportunities." Professionalization is a beneficial aspect of the TRB and students are granted the opportunity to present or discuss their own research with professionals and other students. Nathaniel Burnett, a UNL graduate student and MATC scholar, felt that the best moment of the conference was presenting at a poster session on an article he co-authored with

his advisor, Dr. Sharma. While at the conference, students from different MATC-affiliated universities were able to meet and discuss their interests, creating a network of discourse that may be useful during their coursework and career. The TRB conference was a fantastic opportunity for students and professionals alike to share research and ideas, and to create connections that are invaluable to future success.



Attendees from UI pictured left to right: Nick Hatz, and Beth Westlake.



Attendees from UNL pictured left to right: Yifeng Chen, Xiang Lan, Justice Applah, Maurice Caviatt, Nate Burnett, Jennifer Schmidt, Jacob Schmitz, Bhaven Naik, and Jeff Thiele. Jennifer Schmidt, Jacob Schmitz, Bhaven Naik, and Jeff Thiele.



Attendees from KSU pictured left to right: Abhiteja Rallabandi, Farhana Rahman, Brian Geiger, Loshaka Perera, Ranjit Godavarthy, and Chandra Manandhar.



MID-AMERICA
TRANSPORTATION CENTER

Indo-US Workshop: "Emerging Trends in Intelligent Transportation Systems (ITS)"

Indo-US speakers

US Speakers and India Speakers

US Speakers

- Dr. Abbas Mohaddes President and CEO, Iteris Inc.
- Dr. Anuj Sharma Assistant Professor, UNL
- Dr. Darcy Bullock Professor, Purdue University
- Dr. Dick Reiser Executive Vice President and General Counsel Werner Enterprises, Inc.
- Dr. Elizabeth Jones Associate Professor, UNL
- Mr. John L. Craig Program Manager, Oregon Bridge Delivery Partners
- Mr. John Lower Traffic & Transportation Manager, City of Anaheim
- Dr. Joseph L. Peters Director Office of Operations Research & Development, USDOT
- Dr. Laurence R. Rilett Keith W. Klaasmeyer Chair in Engineering, Director of MATC, UNL
- Dr. Mark Hickman Associate Professor, University of Arizona

India Speakers

- Mr. Ashok Kumar Saroha Director, Urban Transport, Ministry of Urban Development
- Dr. Aravind S Bharadwaj Chief Executive Officer, Automobile Infotronics Ltd.
- Dr. Gitakrishnan Ramadurai Visiting Assistant Professor, Indian Institute of Technology Madras
- Mr. C. Kandasamy Chief Engineer, Ministry of Shipping, Road Transport and Highways
- Mr. Krishna Kumar Vice President, CMS Traffic Systems Pvt. Ltd
- Dr. Lelitha Devi Vanajakshi Assistant Professor, Indian Institute of Technology Madras
- Mr. Md. Shakeel Akhter I.P.S. Additional Commissioner of Police, Traffic, Chennai Police
- Mr. Muralidharan Additional Director & Head CIG, CDAC Trivandrum
- Dr. Partha Chakroborty Professor, Indian Institute of Technology Kanpur
- Dr. Praveen Kumar Professor, Indian Institute of Technology Roorkee
- Dr. Ram Ramjee Senior Researcher Microsoft Research Lab India Pvt. Ltd.
- Mr. Syed Zameer Pasha, I.A.S. Managing Director Bangalore Metropolitan Transport Corporation
- Dr. Tom V. Mathew Associate Professor, Indian Institute of Technology Bombay
- Dr. S. Velmurugan Scientist E II Traffic Engg. and Safety Division Central Road Research Institute

This spring the Indo-US Workshop on "Emerging Trends in Intelligent Transportation Systems (ITS)" was held at the Indian Institute of Technology Madras in Chennai, India on February 11th through the 13th. The workshop, which was funded by the Indo-US forum, brought together twenty-seven leading ITS experts from academia and the public and private sectors to discuss the future of ITS. The principle investigators for this conference were Lelitha Devi Vanajakshi, an Assistant Professor in the Department of Civil Engineering at ITT Madras, and Laurence R. Rilett, Keith W. Klaasmeyer Chair in Engineering and Director of MATC at UNL. The workshop included over 100 participants from the US and India. Presenters included MATC Advisory Board members Abbas Mohaddes, Dick Reiser and John Craig. The recommendations of the conference emphasized an interdisciplinary and multi-institutional approach that will join academia, the public sector and the private sector in addressing transportation concerns. There is great potential for US and Indian academics and researchers to work together because



Mr. John L. Craig, a MATC Advisory Board member, spoke on ITS issues from a state and governmental perspective.

each group has expertise from which they can mutually benefit. The workshop demonstrated that this was possible and, in fact, many of the workshop participants, from both India and the US, indicated their commitment to collaboration. This commitment came in the form of in-kind staff support and equipment donations as well as education resources, such as joint course development and reciprocal student internships (from US to India and India to US).



Dr. Abbas Mohaddes, a MATC Advisory Board member, provided a private sector perspective of ITS issues.

A proposal for an Indo-US Joint Centre on Intelligent Transportation Systems between the University of Nebraska Lincoln and Purdue University in the US and IIT Madras and IIT Mumbai is currently under development.



Featured on this page are India and US attendees collaborating ideas and research at the Indo-US conference.

ITS Heartland Annual Meeting Facilitates Conversations and Connections



The 11th Annual ITS Heartland Meeting was held March 29th-31st in Omaha, Nebraska and brought together new research and ideas from the public and private sectors. ITS Heartland is a chapter of ITS America and is intended to create a dialogue between five heartland states: Missouri, Iowa, Kansas, Nebraska, and Oklahoma. The state departments of transportation along with the major universities in each state work alongside the Federal Highway Administration in maintaining the organization's goal to improve transportation through technology and communication. The Mid-America Transportation Center has supported the ITS Heartland Board of Directors with chapter administration and an annual meeting event coordinator since their first conference in Omaha in 1999.

Each year the ITS Heartland chapter holds a meeting to allow members to discuss ITS issues, share ideas, learn about activities in other states, and to provide a venue in which vendors can showcase new products. At this year's meeting the first day was utilized for a large group session which addressed operations and priorities in the region given the available resources and funding allocations. The afternoon of the same day was used to establish plans, discuss goals and formalize a schedule of action based on the ideas raised in the morning session. Speakers included Bill Troe, President,

URS Corporation; Jeffrey Lindley, Federal Highway Administration Associate Administrator; Douglas Kindig, Mayor, City of LaVista; John Jacobsen, Deputy Director-Operations; Mark Shook, OU – ODOT; Shari Hilliard, KDOT; Missy Wilbers, MoDOT; Jon Ogden, NDOR; Willy Sorenson, IDOT; and Paul Feenstra, Vice President of Government Affairs, ITS America. The second and third days of the annual meeting were used for general meetings and concurrent panel sessions with paper presentations by students, professors, and members of the public and private sectors. Some of the topics addressed by the panels included travel information systems, non-highway applications, technology and safety, the economic benefits and sustainability of ITS systems, incident management, ITS efficiencies and corridor management, and communications systems.



Bill Troe, 2009-10 president.



Mike McKenna, 2011 president, presents Zheng Lou, a UNL master's student, with the 1st place award for best student essay.





FHWA Workshop Offered by ITS Heartland

As part of an ongoing commitment to training, on May 19th and 20th ITS Heartland offered an FHWA workshop

on "Managing Travel Demand: A Contemporary Approach to Mitigating Congestion." The workshop was held on May 19th in St. Louis and May 20th in Kansas City. More than forty participants attended, including MATC graduate students Yifeng Chen, Zheng Luo, and Zifeng Wu. This training addressed improving efficiency of existing transportation systems through the application of innovative management and operations strategies. For urban areas, the philosophy of "predicting and providing" more capacity is often not a practical option for addressing traffic congestion and system performance. Instead, the FHWA Office of Operations is advancing a more contemporary approach to traffic congestion issues in key urban corridors that integrates both demand-side and supply-side strategies.

One objective of the workshop included demonstrating the linkage between supply and demand strategies for all aspects of urban mobility challenges. Participants also worked to articulate the opportunities and effectiveness of travel demand management (TDM) – which includes providing advanced choices to travelers about how, when, where, and whether

to travel – in urban areas to improve system efficiency. The next step was to create a conceptual framework for TDM management as part of the overall effort to advance an integrated approach to congestion mitigation. Finally, the integrated approach and demand-side strategies were applied to the local situation via a table-top exercise.

Three eminent presenters included Eric Schreffler, a transportation consultant in San Diego who specializes in planning and evaluating TDM measures to reduce traffic while improving air quality. Ralph Volpe is a Freight Technology & Operations Specialist for the FHWA's Resource Center Operations Technical Service team. He provides technical assistance and deploys strategies and techniques for freight analysis, truck size and weight, managing travel demand, and planning for operations. Deepak Gopalakrishna has more than 8 years of experience in transportation operations and intelligent transportation systems. Currently, he works as a principal research scientist at Battelle. The combined expertise of these presenters facilitated collaboration between the participants that will help implement advanced, integrated approaches to their local congestion issues.

ITS Heartland Operations Symposium

March 29th marked the 3rd Annual ITS Heartland Operations Symposium. This event promotes coordination and cooperation in traffic operations throughout the ITS Heartland region and beyond. One focus and major outcome of this year's symposium was the creation of a Regional Operations Coordination Working Group within ITS Heartland to support these efforts throughout the year. Matt Volz proposed the new regional coalition to the ITSH Board on March 31st. Members include representatives from

traffic management centers and other operations staff throughout the region, who will work to develop actions, share contacts, and prioritize needs for ITS Heartland.

Four breakout groups engaged in discussions of how to address regional challenges and operations priorities. These included working with neighboring states and defining what exactly is "regional." Another much-discussed operations priority focused on the issues associated with

24/7 versus non-24/7 operation and how to manage accompanying staffing and funding issues while still providing quality customer service. There was also extensive strategizing about ways to maximize the efficiency of communication efforts, including use of social networking and a website to support the working group's efforts. The creation of this group is an important step toward sustained efforts to address operations priorities and optimize communication across the region.



MOVITE Spring Meeting

by Robert Rescot, KU Graduate Assistant



MATC Students Recognized at MOVITE Spring Meeting

In late April, the Missouri Valley ITE division (MOVITE) held their annual spring meeting in Kansas City, Missouri. MOVITE comprises part of district 4 of ITE and has over 600 members from Arkansas, Iowa, Kansas, Missouri, Nebraska and Oklahoma. A priority in MOVITE's mission is supporting transportation students, which was certainly evident at this meeting.



Current and former MATC students participated in the event and several gave presentations or were honored with awards for their research. Bhaven Naik, a University of Nebraska-Lincoln Ph.D. student, won third place in the student poster competition with a poster titled "Developing a State-Wide Traffic Simulation: Issues and Challenges." Robert Rescot, a University of Kansas Ph.D. student, presented on the MATC funded project "Evaluation of the Gardner (Edgerton), Kansas Rail-Truck Intermodal Facility," and served on the conference planning committee. University of Kansas master's students Romika Jasrotia and Cheryl Bornheimer won first place in the student poster competition with a poster titled "Pavement Condition Assessment & Best Management Practice Analysis for the city of Haiwatha, Kansas." Brian Geiger, a recent master's degree graduate from Kansas State University now employed with Parsons Brinckerhoff, presented on a MATC-funded project titled "Opinions of Rural Public Transportation Riders and Non-Riders." Five volunteers from the University of Kansas ITE student chapter further supported the MOVITE spring meeting by assisting with registration and on-site hospitality.

Graduate Students Learn and Network with Professionals at ASCE / LOCate Transportation Conference



By Benjamin Grone, UNL Master's Student

The Nebraska Section of the American Society of Civil Engineers (NEASCE) and the Lincoln, Omaha, Council Bluffs Association of Transportation Engineers (LOCate) teamed up on April 9th to present their annual Transportation Conference in Omaha. A number of MATC graduate students took advantage of complimentary student registration to attend the conference. This year, it featured speakers on a number of pertinent topics in transportation engineering and was a great opportunity for networking with well over 100 industry professionals.

Presentations given throughout the day covered numerous topics ranging from a proposed alteration of EPA emissions standards to an overview of the South Omaha bridge project. Modal interactions were emphasized in three presentations, including one by MATC/UNL professor and researcher Dr. Aemal Khattak, who spoke on his research involving unsafe driver behaviors at railroad-highway grade crossings. Other presentations discussed the topics of driver distraction, pavement management, and highway safety.

Two of the presentations that addressed highway funding were of particular interest, as transportation funding policy has become a pressing issue for the industry in recent years with the depletion of the Highway Trust Fund, but has generally not been addressed in academia. The first of these two presentations addressed the concept of a "Federal Fund Exchange Project," which would permit local governments to exchange federal funding (with numerous strings attached) for slightly less state funding (with fewer strings attached). This would allow these local governments to more efficiently pursue their smaller projects while leaving the state to pursue larger projects that comply with the stipulations attached to the federal dollars.

The second of these two presentations was given by Nebraska Senator Deb Fisher and addressed one potential path that the state legislature may pursue for the future of highway funding in Nebraska. Funding is an area that greatly affects the industry and is due for significant restructuring in the near future. From highway financing to pavement management, the organizers brought together knowledgeable presenters on a broad spectrum of topics. The conference was a memorable experience, one that left students with a number of concepts to ponder and ideals to strive toward in their future endeavors.

Superpave Field Certification

Kansas State University offered four sessions for Superpave Field Laboratory Technician (SF) Certification Training with cooperation from the Kansas Department of Transportation (KDOT) and under the sponsorship of the Mid-America Transportation Center. This course is intended to certify engineers, technicians, and other personnel who will be involved in construction of Superpave hot-mix asphalt (HMA) pavements using Quality Control and Quality Assurance (QC/QA) specifications in the State of Kansas. Superpave represents an improved system for specifying asphalt binders and mineral aggregates, developing asphalt mixture design, and analyzing and establishing pavement performance prediction. This system is expected to extend the life of asphalt pavements—thereby, reducing construction-related congestion and enhancing public safety.

A selected group of instructors from KDOT, KSU, and industry professionals provided the training. Approximately eighty engineers, technicians and constructors from public and private sectors attended. Successful completion of the course and certification (subjected to a passing score on a test given at the end of the course) are required for all KDOT and contractor personnel performing tests on these projects.

The course included the following sections: an overview of Superpave volumetric mixture design; asphalt mixture volumetrics; hands-on training in the required tests for Superpave HMA construction; and Superpave mixture data analysis and interpretation as required in the QC/QA special provisions. Class sessions were held on Kansas State University campus during the 2010 spring semester.

Pavement Construction and Materials Technology Transfer

PI: Mustaque Hossain, Professor, KSU
Co-PI: Robert Stokes, Professor, KSU

KSU is offering courses this fall on pavement construction, preservation and Superpave mixture materials both in Kansas and nationwide via webinar. As many in the transportation workforce retire, a pool of highly qualified transportation professionals is required to plan, design, operate and maintain the nation's transportation infrastructure, facilities and services. Continuing education and technology transfer of new developments is

essential for the success of the transportation field. This program will satisfy these two goals by educating the work force in the latest technology to build and maintain road pavements to cope with the increasing truck traffic due to freight transportation. Conferences, short courses, workshops and webinars are effective media that will be used as educational tools in the course. This project will also help distribute results obtained from various MATC research projects via the annual Kansas Transportation Engineering Conference.

Transportation Workforce Development Initiative

PI: Mustaque Hossain, Professor, KSU
Co-PI: Robert Stokes, Professor, KSU

To expand workforce education and technology transfer, KSU established a Transportation Workforce Development Initiative. The main objective of this project is to educate and motivate the next generation of transportation students and professionals. The components of this program are KSU-MATC academic year internships, KDOT-KSU-MATC summer internships, and a certificate program in transportation engineering. The aforementioned initiatives are designed for students and future transportation professionals who want to expand their knowledge

and skills. For undergraduate students, internships provide experience in the transportation field that may motivate them to pursue a career in transportation engineering. The transportation engineering certificate program provides transportation professionals with the opportunity to pursue a focused collection of courses that, when completed, allows them to receive recognition of their continued effort in the area of transportation engineering. This program is less extensive, and different from, a traditional master's program. However, it allows the candidate to accumulate credit hours toward their master's degree, if they decide to continue their education. The internships and the certification program each functions to cultivate a better educated workforce.

MATC Seminar Students Visit Valmont Manufacturing Plant

By Benjamin Grone, UNL Master's Student

On October 30th, the MATC Seminar joined with UNL's Institute of Transportation Engineers (ITE) student chapter and the Lincoln-Omaha-Council Bluffs Association of Transportation Engineers (LOCate) to tour the manufacturing facility for Valmont Industries, Inc. Located near Valley, Nebraska, Valmont Industries manufactures engineered support structures, utility poles and structures, tubing, and irrigation structures. Valmont Industries also provides various metal coating services. During the tour, participants observed some of the production processes that take place at the Valley location. We were able to observe small and middle-sized pole production, as well as fluting, and galvanizing processes. I was impressed by the degree of automation involved in lighting/traffic signal pole production from raw steel coil. One of the exciting stages of the process was laser beam welding technology, which is a rapid and precise method of welding the pole cylinder.

Of the various processes observed, the most interesting was the hot-dip galvanizing line. Galvanization is a process by which steel (or other metals) may be coated in a layer of zinc which reacts with oxygen and carbon dioxide in the air to form a compound that protects the underlying steel from corrosion. In the production facility, large steel products were moved by cranes and systematically submerged in a series of (approximately) 30,000 gallon tanks full of various chemical baths to cleanse their surfaces. Finally, they were submerged in

molten zinc (800° F) which chemically bonded to the surface to create the corrosion resistant coating. When the steel encountered the hot zinc, air pockets were heated rapidly—creating violent explosions of molten zinc from the bath. Accordingly, the safety precautions in place to protect technicians and visitors were quite extensive.

After the tour, a structural engineer offered a short presentation about Valmont's onsite testing facility. He discussed the structural concerns with the poles and support structures manufactured by Valmont. He introduced the problem of fatigue in pole products through a multi-media presentation. Interestingly, poles can be designed to withstand high velocity winds, but at specific lower velocities fatigue failure can occur relatively early. After an explanation of the testing being conducted on pole resonance, the Valmont representative introduced an innovative patented design that increases the fatigue life of square poles by altering the base section.

The tour and presentation at Valmont was an enjoyable and impressive experience for all who attended. We extend our gratitude to the organizers, tour guides, and employees who let us share their workspace, as well as to the engineer who acquainted us with the complications in the light pole design.

Research Potential Enhanced with Donation of Video Detection Equipment from Iteris

MATC would like to extend their gratitude to Iteris, Inc. for their donation of vehicle video detection equipment to the Intelligent Transportation Systems Lab. On September 28, 2009 Mike Malone and Mark Fayta of Iteris, Inc. and Scott Carlson of Brown Traffic Inc. installed the equipment in the Nebraska Transportation Center ITS Lab.

The video detection components donated included a Vantage TS1 VRack, a Vantage Edge2 dual camera input video detection processor, a four channel extension module for the Edge 2 processor and a Vantage Edge Connect video communication module. Additionally, a vantage video detection camera was installed, as well as the

various cables and DVD players required to complete the lab test station. The donated equipment will be used for both research and teaching purposes; the video recorded at the test site can be processed to provide valuable information on both microscopic and macroscopic traffic characteristics.

The new equipment will allow greater connectivity between researchers by creating an integrated system. MATC is excited about the research opportunities that such equipment will afford both teachers and students alike. We extend our sincerest thanks to Iteris, Inc. for their generosity in donating this technology.



MATC Students Tour **Union Pacific** Gothenburg Ultrasonic Detection Site & Bailey Switching Yard



In early May, MATC students toured two Union Pacific facilities: the Gothenburg State of the Art Inspection Station and the Bailey Switching Yard. At the Gothenburg Inspection Station, Bill GeMeiner, senior manager of methods and research for Union Pacific Railroad, gave a detailed explanation of the fifteen detectors located across the three main tracks and the three varieties of machine vision inspections systems (wheel profile, low air hose, brake shoe, and friction wedge rise) utilized at the site. The students were shown the advanced detection system which includes a wheel defect scanner, wheel profile measurement system, acoustic bearing detection, wheel impact load detector, and RFID tag readers. These sensors notify Union Pacific of any maintenance or repair issues that will need to be addressed at the Bailey Yard. For example, load

sensors are built into the rail to detect the force that the train is exerting on the track; thus, these sensors can detect flat spots on the wheels because they would exert more force on the rail than the normal round wheel. All the data collected at the Gothenburg site is then sent via a microwave tower to North Platte and to Omaha.

Union Pacific Railroad's Bailey Yard is located in North Platte, Nebraska and is the largest railroad classification yard in the world. The yard covers 2,850 acres, processes 10,000 railroad cars every twenty-four hours, and employs 2,200 rail-workers. Serving as a mid-point for east and west moving trains, the Bailey Yard inspects, repairs, sorts and directs rail-traffic. Since the first train entered the station in 1866, the Bailey Yard has adapted throughout the decades to meet the fluctuating needs of railroad users and rail-traffic. The tour at the Bailey Yard, lead by Dean Buhlig, director of terminal operations, included a trip to the command center, where the guide explained the functioning of the rail yard, the guidance and dispatch system used to guide traffic into eastbound or westbound hump yards, and the standard work day for yard employees. In the locomotive workroom, MATC students learned about locomotive maintenance, inspection and repair. The Golden Spike Tower was the final stop on the tour, allowing the students a panoramic view of the entire yard. The Gothenburg and Bailey Yard tour, funded in part by Union Pacific, was a special treat for MATC students; they left with their intellectual curiosity piqued and were eager to learn more about career possibilities in railroad engineering.



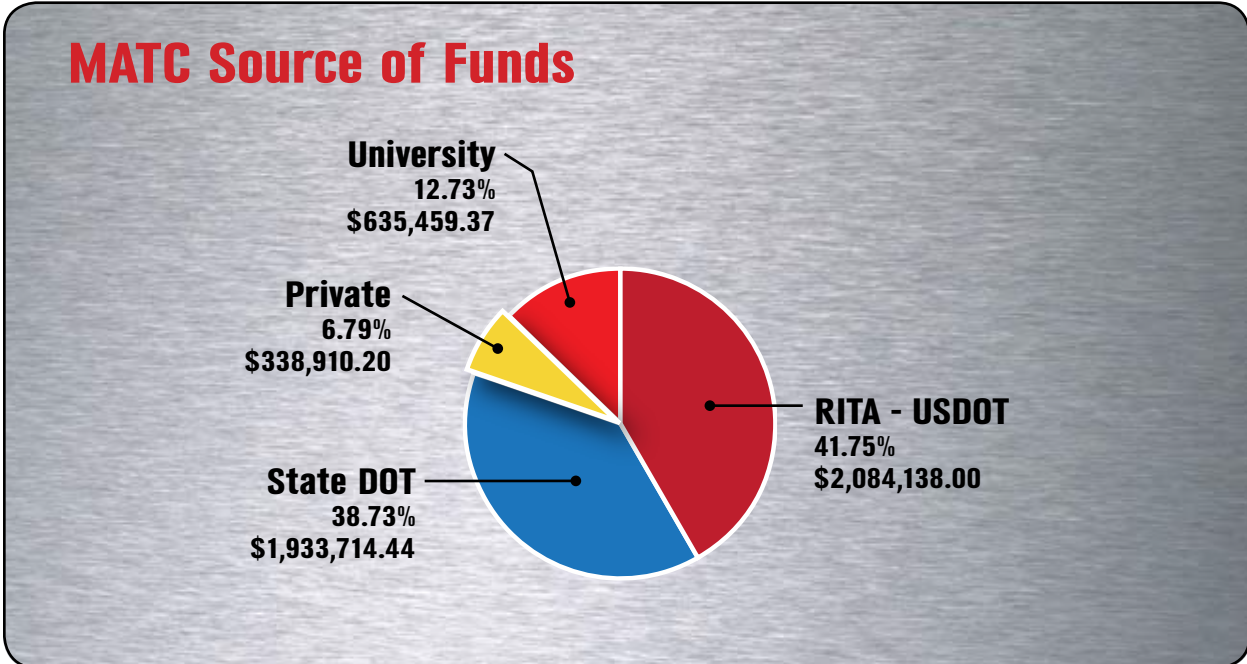
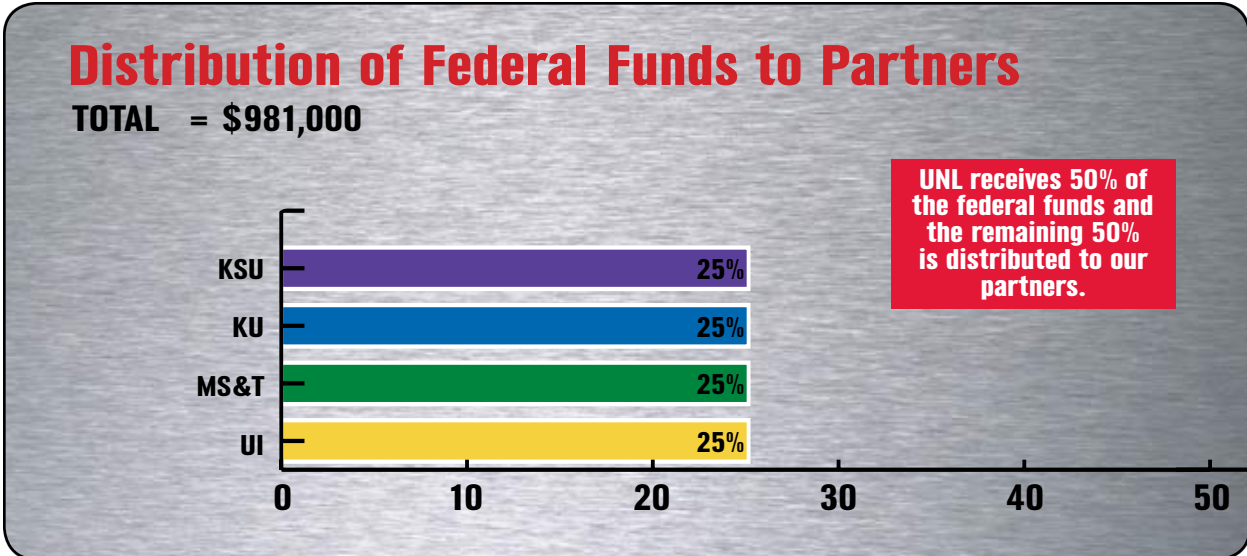
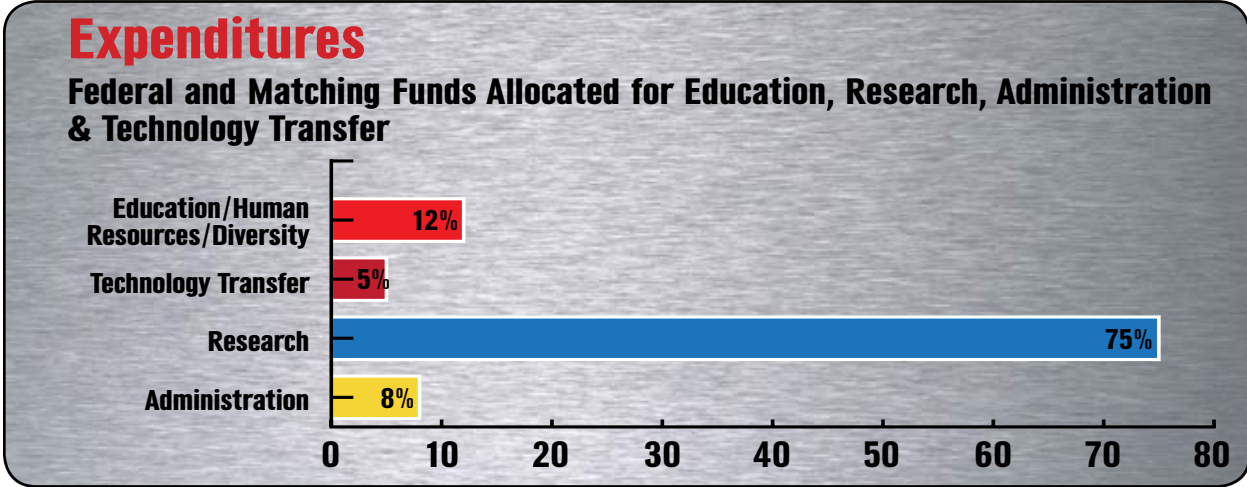
MATC students meet Bill GeMeiner, senior manager at Union Pacific; attendees visit the Union Pacific Ultrasonic Detection Site; and Bill GeMeiner shows MATC students the sensors on the tracks.



On this page (clockwise from top): the Union Pacific logo as a train passes through the rail yard; Dean Buhlig provides a tour of the Bailey Switching Yard; the monitoring area; a railroad classification hump at the Bailey Switching Yard; and Dean Buhlig, director of terminal operations, with MATC student Zheng Lou.



MATC Financial Information for FY 2010



For More Info:

<http://matc.unl.edu>

Mid-America Transportation Center
University of Nebraska-Lincoln

Dr. Laurence Rilett
MATC Director
Keith W. Klaasmeyer Chair in Engineering and Technology

2200 Vine St.
262 D Whittier Research Center
Lincoln, NE 68583-0851

Phone: (402)472-1992
Fax: (402)472-0859
Email: lrilett2@unl.edu

Valerie Lefler
MATC Program Coordinator

2200 Vine St.
262 F Whittier Research Center
Lincoln, NE 68583-0851

Phone: (402)472-1974
Fax: (402)472-0859
Email: vlefler2@unl.edu



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