MATC: IMPROVING SAFETY AND MINIMIZING RISK ASSOCIATED WITH INCREASING MULTI-MODAL FREIGHT MOVEMENTS

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Letter from the Director: Reflections on the Past Year

Welcome to the our first MATC Annual Report since our designation by the U.S. Department of Transportation’s Research and Innovative Technology Administration as Region VII’s University Transportation Center. We have had a very busy year with implementing our strategic plan—as you will see from the many research, education, and technology transfer activities described in this report.

The theme of our center is “improving safety and minimizing risk associated with increasing multi-modal freight movements,” which not only fits well with MATC researchers’ expertise, but continues to describe the most critical concerns of Region VII, which comprises Iowa, Kansas, Missouri, and Nebraska. Anyone who travels in Region VII knows of the recent increases in freight movements. Although we all enjoy the economic benefits associated with being located at the “cross roads” of America, which hosts world-class railroads, trucking firms, and logistics companies, we also understand that these increases could negatively affect safety and quality of life. Recent data indicate that freight movements in our region have grown dramatically and will continue to increase—in fact, freight tonnage is expected to double in the United States over the next 20 years, and our region will see much of that increase. The increase in freight movements calls for innovative solutions so that we can enjoy the benefits and reduce or eliminate the negative effects associated with these increases. As you will see in this report, MATC researchers have been working on a range of projects to accomplish this goal.

As this is our first annual report, I wanted to take the time to list the overarching philosophies we have adopted in order to ensure the ultimate success of MATC.

First, MATC is designed as a truly regional center. I am very proud of the fact that the MATC research program includes significant participation from researchers at major universities in all four states of Region VII, including the University of Nebraska, Kansas State University, the University of Kansas, the University of Iowa, and the Missouri University of Science and Technology (formerly University of Missouri-Rolla). More importantly, many of our research projects involve faculty from different universities working collaboratively, which allows our research program to be much greater than the sum of its individual components. In addition, even when a project is conducted by a single researcher, we ensure that all four states have the ability to participate. For example, our crash analysis research projects utilize data from all four states in Region VII, although the work is being conducted at only two of the universities in the region.

Second, MATC is designed to foster true collaboration among all stakeholders in Region VII. It is our belief that the only way that MATC will fulfill its mission is if all the principal players’ goals and objectives are considered during the decision-making processes. Consequently, 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—namely, Sandra Larson from the Iowa DOT, Mara Campbell from the Missouri DOT, Dick McReynolds from the Kansas DOT, and Moe Jamshidi from the Nebraska DOR—all actively participate as members of our executive committee. Moreover, our advisory board has significant federal, state, and private sector participants from all surface transportation modes. I am extremely grateful for the time and effort expended by our advisory board in helping us meet our goals. We have included a section in the Annual Report to introduce our advisory board; I am sure you will agree we have assembled an exemplary group of individuals.

Third, MATC is dedicated to transportation education at every level, from K-12 to undergraduate, graduate, and professional. For example, every one of our research projects has at least one graduate student working as a research assistant, which translates to 55 students in 7 schools throughout Region VII. In addition, we have developed an ongoing summer institute at the University of Nebraska-Lincoln (UNL), which brings middle and high school math and science teachers to campus in order to work with MATC faculty to develop innovative teaching resources. We are also committed to targeting students from under-represented groups as part of our research, education, and outreach activities. I am very pleased that we have developed meaningful and significant ties with Prairie View A&M University (PVAMU) and Lincoln University (Missouri) (LU). I appreciate the important contributions of Dr. Judy Perkins at PVAMU and Ty Westergaard at LU in helping us reach our research and education goals.

In the accompanying articles, you will find stories about MATC students and faculty and their success in our research, education, and technology transfer programs. You also will notice the substantial support we continue to receive from our partners in both the public and private sectors. Our partner support is instrumental to our success and includes, among other things, providing internships for our students, matching funds for our research and education projects, providing advice on our research and education goals, as well as technical support for our education and research projects. I look forward to working with our private and public sector partners in the future and I am very excited by the possibilities in the coming year as we continue to build one of the preeminent UTCs in the country.

As always, 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 (IdOT), 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 flagships 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 are 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 $500 million.

The primary conduit for transportation research at UNL is the recently created Nebraska Transportation Center (NTC). The NTC, which is headquartered at UNL, 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 (Missouri S&T) has a broad-based program with seven emphasis areas, including structures, geotechnical engineering, construction, materials, transportation, environmental engineering, and hydrogeos. The MS&T research activities related to structural 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 infrastructure 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.
Mid-America Transportation Center (MATC) is a public/private consortium of academic institutions dedicated to the advancement and improvement of transportation systems through research, service, and education. MATC was formed in 1987 to facilitate interdisciplinary research that addresses transportation issues at the local, state, and national levels. 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.

Institutional Resources

The institutional members of MATC have a substantial array of research libraries, state-of-the-art computer facilities, laboratories, and office space 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 (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 (NASA, Indy Racing League).

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

### 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
- Local Technical Assistance Program
- Rural Transit Assistance Program
- Transportation Research Institute
- Infrastructure Research Institute
- Information and Telecommunication Technology Center

#### KU
- Center for Infrastructure Engineering Studies
- University Transportation Center
- Natural Hazards Mitigation Institute
- Intelligent Systems Center

#### MS&T
- 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

#### UI
- National Advanced Driving Simulator

#### Resources
- 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
- Newberry Structural Engineering Laboratory
- Geotechnical Testing Lab
- Traffic Safety Lab
- Intelligent Systems and Automation lab
- Energy Research Center
- Highways Structures Laboratory
- Applied Microwave Nondestructive Testing Laboratory
- Trustworthy Systems Laboratory
- Structural Health Monitoring Laboratory

### Prairie View A&M University

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 90 academic majors, 17 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.
Meet the Associate Directors

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

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 45 research projects. She has authored or co-authored 89 journal papers and served as committee chair for 18 master’s students. Currently, she is supervising 5 master’s students and a doctoral student. Dr. Jones will serve as the MATC associate director for UNL.

Dr. Genda Chen
Professor - Civil, Architectural and Environmental Engineering
Associate Director, Mid-America Transportation Center, University of Science and Technology

Dr. Genda Chen is a professor in the Department of Civil, Architectural, and Environmental Engineering at the Missouri University of Science and 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 40 research projects, totaling more than 16 million for his teams and approximately 10 million for his share. He has supervised 17 doctoral students and 20 master’s students and has published over 150 peer-reviewed journal papers and an additional 100 conference papers. Dr. Chen will serve as the MATC associate director for the Missouri University of Science and Technology.

Dr. Linda Boyle
Assistant Professor, Department of Mechanical & Industrial Engineering
and Public Policy Center
Associate Director, Mid-America Transportation Center, University of Iowa

Dr. Linda Boyle is an assistant professor in the Department of Mechanical and Industrial Engineering at the University of Iowa. She holds a PhD in civil and environmental engineering and a MS in engineering from the University of Washington. She is on the editorial board of the Accident Analysis and Prevention Journal and is the recipient of the NSF Career Award. Her research area focuses on human factors and statistical modeling. She will serve as a MATC associate director for the University of Iowa.

Dr. Paul Hanley
Assistant Professor, Civil & Environmental Engineering
and Public Policy Center
Associate Director, Mid-America Transportation Center, University of Iowa

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 will serve as a MATC Associate Director for the University of Iowa.

Dr. Mustaque Hossain
Professor, Civil Engineering
Associate Director, Mid-America Transportation Center, Kansas State University

Dr. Mustaque Hossain is a professor and the graduate program director 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 25 research projects, published over 40 peer-reviewed journal articles, and has 4 patents related to his research. He will serve as the MATC associate director for Kansas State University.

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Dr. Tom Mulinazzi is a professor and former department chair of civil engineering at the University of Kansas (KU). In 2000, he was named Engineer of the Year by the Kansas Society of Professional Engineers and received the Outstanding Faculty Award from the Order of Omega, a KU honor fraternity. Dr. Mulinazzi will serve as the MATC associate director for the University of Kansas.

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Mr. E. Dean Carlson

Former Executive Director, FHWA
Former Secretary of Transportation, Kansas

Mr. E. Dean Carlson is the former Executive Director of FHWA, former Secretary of Transportation for the state of Kansas, and member of the National Academy of Engineering. In 2009, Secretary Carlson retired from his position as Kansas Secretary of Transportation and began his consulting practice. He has nearly 5 decades of experience in the field of transportation; in addition to his 8 years as Kansas Secretary, he served for 36 years with the Federal Highway Administration, including as executive director in 1994. His career with the Federal Highway Administration included many positions in various regional and division offices as well as 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 2012. He is also a former president of the American Association of State Highway and Transportation Officials Board of Directors. 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.” Election to the academy is one of the highest professional honors accorded an engineer. 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 American Trucking Association. The MATC Board of Directors met August 25, 2008 at the University of Nebraska–Lincoln to discuss and collaborate on opportunities that will shape the future of the center’s activities.

Mr. Dan Murray

Vice President, Research American Transportation Research Institute

Mr. Dan 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, analyses, and evaluations on a range of transportation issues, such as safety, technology, productivity and security. Mr. Murray is responsible for directing ATRI’s portfolio of research and has served as project manager for research initiatives sponsored by FHWA, FAA, FMCSA, USDOT, CFPB, 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 as a project administrator for the Regional Transit Board (Minneapolis/St. Paul). He also spent several years working in economic development for a Chicago-based Fortune 500 business consortium. Murray earned his BA from Gustavus Adolphus College and his MS degree from Northwestern University.

Mr. David Sehrt

Senior Vice President Ingram Barge Lines

Mr. David Sehrt is Senior Vice President of Ingram Barge Lines. Mr. Sehrt graduated with a BS in civil engineering from Tulane University in 1979. 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. Mark Stiles

Senior Vice President Trinity Industries Inc.

Mr. Mark Stiles is Senior Vice President of Trinity Industries, Inc., a diversified industrial company focused on growth. He also is the group president of the Construction, Energy, Marine and Components Group and conducts worldwide business operations for several business units, including Trinity Highway Products, Trinity Structural Towers, Trinity Containers Worldwide, with business operations in the U.S. and Mexico, Trinity Marine; Trinity Rail Parts and Components; and Concrete and Aggregates, which includes Transit Mix Concrete and Ready Mix, Armor Materials, and Trinity Materials, Inc.

Mr. Ed Trout

Chairman, American Trucking Association President, Cornhusker Trucking Motor Lines, Omaha

Mr. Ed Trout is past chairman of the American Trucking Association and current President of Cornhusker Trucking. In 1952, Mr. Trout graduated from Creighton Prep and then continued on to Creighton University, working nights on a dock for a local track line while attending school. In 1960, he went to work for a track line called Bee Line Motor Freight, and by 1965 he had moved up the ranks to vice president.

In 1972, Mr. Trout became president of Bee Line Transportation, where he started another division of Bee Line called Cornhusker Motor Lines, which he had the opportunity to buy in 1978. Since 1988, Ed and his three sons, Joe, John, and Tom, have run the enormously successful family trucking business. Ed has also served as chairman of both the Nebraska Trucking Association and the American Trucking Association.

Mr. Robert VanderClute

Senior Vice President, Safety and Operations Association of American Railroads

Mr. Robert VanderClute is a Senior Vice President of safety and operations at the 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 “Tellow” with CEE 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.

Mr. David Connell

Vice President, Engineering Union Pacific Railroad

Mr. David Connell is the Vice President of Engineering for Union Pacific Railroad. Mr. Connell has worked for Union Pacific and track research companies for 25 years, holding a variety of field and staff positions including AXP, construction, chief engineer, maintenance of way, and various track research positions. In his current position, Mr. Connell directs the design, construction, and maintenance of all track, signal, and bridge infrastructure in the nation’s largest railway. He holds a BS degree in civil engineering from North Carolina State University and attended the Harvard Business School. He currently chairs the Committee on Track Structure System Design of the Transportation Research Board and is a past subcommittee chairman of AREMA committee 5.
MATC Advisory Board: Public Sector

Mr. Michael Flanigon
Director, Office of Technology
Office of Research, Demonstration and Innovation
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 as one of the nation’s preeminent professionals in the field of accident causation. 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 The 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 Administrator’s Engineer of the Year in 2004. He is a member of the Institute of Transportation Engineers’ Transportation Safety Council.

Dr. Joseph Werning
Division Administrator
Federal Highway Administration — Nebraska Division

Mr. Joseph A. 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 1980. For the past 28 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.

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

Dr. Judy 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). In this position she assumed June 2009. This new 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
Missouri Department of Transportation

Mostafa Jamshidi is the materials and research division engineer for the State of Nebraska Department of Roads (NDDR). 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 NDDR. Mr. Jamshidi has been involved in the design and construction of transportation-related projects for over 23 years. He has served on numerous Technical Advisory Committees for asphalt-related research projects. Mr. Jamshidi has 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 NDDR.

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Mara Campbell is the organizational results director for the Missouri Department of Transportation (MoDOT). In this position she assumed June 2009. This new 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
Missouri Department of Transportation

Mostafa Jamshidi is the materials and research division engineer for the State of Nebraska Department of Roads (NDDR). 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 NDDR. Mr. Jamshidi has been involved in the design and construction of transportation-related projects for over 23 years. He has served on numerous Technical Advisory Committees for asphalt-related research projects. Mr. Jamshidi has 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 NDDR.

Richard “Dick” McReynolds
Engineer of Research
Kansas Department of Transportation

Richard McReynolds 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. McReynolds 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 and has been a member or friend of several different TRB standing committees over the past 20 years. Mr. McReynolds serves on advisory committees for the University of Nebraska Mid-America Transportation Center and the Kansas State University Transportation Center.

Mr. McReynolds has BS and MS degrees in civil engineering from Kansas State University and is a licensed professional engineer (Kansa). He has worked at KDOT for 38 years. Prior to being appointed as engineer of research in 1988, his experience was primarily in the geotechnical, pavement design, and pavement management areas.

Sandra Larson
Research and Technology Bureau Director
Iowa Department of Transportation

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 20 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 from Iowa State University in civil engineering and 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.

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Dr. Elizabeth “Libby” G. Jones
Associate Professor, Civil Engineering
Associate Director, Mid-America Transportation Center
University of Nebraska-Lincoln
Dr. Libby Jones serves as the MATC Coordinator for Education and Equity and will be responsible for coordinating the MATC educational and diversity programs.

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.

Education Administrators

Dr. Elizabeth Jones (UNL)
Mr. Tyrone Westergaard (LU)

MATC Staff

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

Ms. Lefler is the MATC Program Coordinator located at the University of Nebraska-Lincoln. She is responsible for the University Transportation Center reporting requirements and working with the MATC director to run the business of the center and carry out the activities in the strategic plan. Ms. Lefler serves as the MATC liaison for the public and private sectors as well as the university partner institutions.

Nebraska Transportation Center Staff

In carrying out the reporting requirements and activities within the MATC strategic plan, support from the Nebraska Transportation Center Staff is utilized on an as needed basis.

NTC staff members in back row left to right: Jordan Mueller, Jordan Pokorny, and Geoffrey Priester
Front row left to right: Mandy Artir, Bethany Carlson, Emilea Brook, and Jamie Williams
University of Nebraska-Lincoln
Lead Institution
Highlights at a Glance

MATC’s goal is to pursue new initiatives in transportation education that will simultaneously recruit new students into the transportation field while exposing them to multi-disciplinary issues faced by transportation professionals in academia as well as the public and private sectors. The following MATC educational activities are centered at the University of Nebraska-Lincoln:

• The Math and Science Professional Development Summer Institute and Engineering Excellence Experience Day activities are part of MATC’s goal to deliver an educational outreach program to encourage K-12 students to pursue careers in transportation-related fields. The Institute brings together K-12 educators to work with transportation professionals in developing materials for students based on transportation research. The Engineering Excellence Experience Day invites junior high and/or high school students interested in math and science to work with transportation faculty and professionals from the private and public sectors.

• The MATC Summer Internship program for undergraduates provides critical exposure to professions in the transportation field and encourages undergraduate students to consider graduate academic programs in transportation. More than 125 undergraduates have been involved in the UNL-MATC summer intern program since 1995. The success of this program has resulted in it being expanded to Missouri, with plans to continue expansion into Kansas and Iowa as well over the next year, thereby offering this program in all Region VII states.

• MATC currently has two additional educational activities in the planning stages: 1) The MATC Scholars Program (MATC SP) for Safety and Risk for graduate students, which will be designed to attract U.S. students to the transportation field, and 2) advanced undergraduate and graduate courses in safety and system risk analysis, which will be multi-modal in nature and available to all students in the Region VII consortium through interactive distance education methods as well as integrated into the appropriate outreach activities to reach practicing engineers. Dr. Elizabeth Jones is currently developing prototype online transportation engineering courses and course modules. The project seeks to develop modules for existing classes that can be used for online instruction, adapt one of these modules for use by middle school or high school teachers, and develop an engineering course that can be delivered as an online course.

• Additional MATC K-12 activities include:
  • McMillan Middle School Field Trip
  • Women in Engineering Experience Day
  • Bryan High School Visit
  • After-School Program Activity for Guller Middle School

For more details see pages 58-59.
For Letter from UNL Director see pages 6-7
University of Nebraska–Lincoln Research Projects

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

Foundation Design for High Tension Cable Guardrails

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

Impact of Trucks on Signalized Intersections

Investigation of Factors Associated with Truck Crashes Related to Skid Resistance in Region VII

Matching Funds Provided by:

NDOR
Nebraska Department of Roads

Investigation of Factors Associated with Truck Crashes Related to Skid Resistance in Region VII.

UNL - MATC Students Working on Research

Jennifer Schmidt, MS
Graduate Research Assistant, Civil Engineering
Project: Safety Investigation and Guidance for Work-Zone Devices in Freight Transportation Systems Subjected to Passenger Car and Truck Impacts with New Crash Standards

"A significant number of safety performance evaluations have been performed on work zone traffic control devices thus far, but these tests have only been done with small cars. Existing work zone sign supports are being analyzed to see if there are any safety concerns with larger vehicles, such as a full-sized truck. Four full-scale crash tests will be conducted with work zone sign supports using the future standards of safety performance."

Hang Yue, Ph. D
Graduate Research Assistant, Civil Engineering
Project: Impact of Trucks on Signalize Intersections

"Increasing deployment of transportation systems including ITSs throughout the United States or other countries has generated massive amounts of valuable traffic data. The function and theory improvements of constraint databases, especially spatiotemporal approaches, have brought awareness that constraint databases can offer some potentially better methods for transportation data archives. Furthermore, they can provide similar operations as relational databases and GISs. Therefore, it is helpful to design better traffic data archive systems, improve the current systems, and enhance Traffic Management Center (TMC) performance. Information technology innovation and progress should be duly applied for developing traffic data management systems. Exploring and mining advantages in constraint databases for future transportation data archive improvement is the key goal of this study."

Ling Zhu, Ph. D
Graduate Research Assistant, Civil Engineering
Project: Foundation Design for High Tension Cable Guardrails

"There are two projects that I have been working on related to the high-tension cable system. One is the design of high tension cable system anchorage design to overcome the several inherent problems of current designs, such as anchor movement, permanent cable stretch, non-uniform tension distribution due to frictional drag on posts, and tension loss due to temperature fluctuations. The other project aims to come up with new designs for high-tension cable post bases to develop a new post base design that can be easily maintained as well as handle frost heave."

Luo Zheng, Ph. D
Graduate Research Assistant, Civil Engineering
Project: Investigation of Factors Associated with Truck Crashes in Region VII

"By conducting research on this project I am learning appropriate analysis of truck crash data and I hope to obtain a sound understanding of the various factors associated with truck crashes in Nebraska. Additionally, working on this project will improve my critical thinking and technical report-writing skills. Upon graduation I hope to improve the safety of traveling public by utilizing the understanding gained from this research project."

Casey Richards, M. S.
Graduate Research Assistant, Industrial and Management System Engineering
Project: Investigating RFID for Roadside Identification Involving Freight Commercial Vehicle Operators (CVO)

Rodrigo Franca, M. S.
Graduate Research Assistant, Industrial and Management System Engineering
Project: Investigating RFID for Roadside Identification Involving Freight Commercial Vehicle Operators (CVO)

Jane Silveray, M. S.
Graduate Research Assistant, Industrial and Management System Engineering
Project: Investigating RFID for Roadside Identification Involving Freight Commercial Vehicle Operators (CVO)

 матч Fonds Provided by: Nebraksa Department of Roads
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Kansas State University started working on the approved FY 2008 MATC research projects this summer. The technology transfer projects have also been defined. KSU research projects concentrate on the preservation and safety of our regional transportation infrastructure due to increased truck loads resulting from freight movements. In FY 2008, I’ll be investigating how thin surface treatments such as the ultra-thin bonded bituminous surface (Nova chip) and modified slurry seal (micro-surfacing) can extend pavement life. Extension of pavement life provided by these treatments has not been quantified precisely. Therefore, these treatments cannot be considered in value engineering. Thus, a study is needed to determine how these thin surfacing treatments can extend the life of pavements. Dr. Bob Peterman will be assessing the damage potential in pre-tensioned bridges caused by increased truck loads by accurately determining the stresses carried by in-situ bridge elements. This will reduce the inherent risks associated with our deteriorating infrastructure. Finally Dr. Sunanda Dissanayake will be investigating characteristics and contributory causes related to large truck crashes. Her work will recommend countermeasures and suggest focus areas needing particular attention to improve safety concerns during truck-related crashes.

KSU is also participating in the technology transfer aspect of MATC in FY 2008. A MATC-themed session will be organized in the Annual Kansas Transportation Engineering Conference in April 2009. KSU will also offer a one-day seminar on pavement preservation and two-day training classes on thin surface treatments for bituminous pavements at three different locations in Kansas.

Letter from the Associate Director - Dr. Mustaque Hossain

Kansas State University started working on the approved FY 2008 MATC research projects this summer. The technology transfer projects have also been defined. KSU research projects concentrate on the preservation and safety of our regional transportation infrastructure due to increased truck loads resulting from freight movements. The longevity of our transportation infrastructure is a major concern due to diminishing highway revenues and increased use. Thus, our effort is directed toward lengthening the lives of our transportation infrastructure elements. We’ll also be looking at the safety aspects of increased trucks on our highways due to increased freight movements. In FY 2008, I’ll be investigating how thin surface treatments such as the ultra-thin bonded bituminous surface (Nova chip) and modified slurry seal (micro-surfacing) can extend pavement life.

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Kansas State MATC Tech Transfer Activities

Kansas State University (KSU) accomplished two technology transfer projects. The first project used the Annual Kansas Transportation Engineering Conference as a medium to disseminate MATC research project findings. The Kansas Transportation Engineering Conference (KTEC), which is held each year in the K-State Student Union, attracts approximately 600 national and local transportation professionals to KSU in Manhattan, Kansas, for an exchange of information concerning the latest developments in transportation engineering policies and practice. The 90th annual conference, held at KSU in April 2008, proved to be an excellent forum for the dissemination and discussion of MATC research project findings.

KSU will also offer two classes related to pavement preservation: "Pavement Preservation (The Preventive Maintenance Concept)" will be a one-day course held in Spring 2009. This course will be intended to educate administrators, engineers, and maintenance superintendents involved in the implementation of preventive maintenance for pavement preservation concepts or substantial maintenance in Kansas. Instruction will be provided by experienced engineering experts in this field. In addition, "Thin Surface Treatments (Bituminous Pavements)" will be a two-day class—also offered in Spring 2009—intended to educate and certify engineers, maintenance superintendents, inspectors, technicians, and other personnel involved in the implementation of thin surface treatments for pavement preservation or substantial maintenance in Kansas. Instruction will be provided by a select group of instructors from the industry. Both classes will be offered in Topeka, Salina, and Hutchinson, Kansas.

Kansas State MATC Students Working on Research

Nishtha Bezwada, MS
Graduate Research Assistant, Civil Engineering
Project: Characteristics and Contributory Causes Related to Large Truck Crashes

Ms. Bezwada is a graduate research assistant under supervision of Dr. Sunanda Dissanayake. She started working on the MATC Project—Characteristics and Contributory Causes Related to Large Truck Crashes—this fall. The study aims to analyze crash data related to large trucks in Midwestern states with the objective of identifying problem areas. Currently, Ms. Bezwada is reviewing literature related to large truck crashes published in journals and reports and becoming familiar with the Fatal Analysis Reporting System database, which will be used in this study.

Vikranth Manepalli, MS
Graduate Research Assistant, Civil Engineering
Project: Extending Pavement Life Using Thin Surfacing to Counter the Effect of Increased Truck Traffic Due to Frequent Movements

Mr. Manepalli is a part-time research associate working under supervision of Dr. Mustaque Hossain. He received his master’s degree in civil engineering from KSU in 2007. He is working on how much extended pavement life can be obtained by applying Nova chip and modified slurry seal on bituminous pavements. Mr. Manepalli has completed a review of literature on the use and effectiveness of thin surface treatments. He has also prepared a survey of use of thin surface treatments in FHWA Region VII. He is currently compiling pavement performance data for the thin surface treatment sections in Kansas for the last ten years.

Jake Perkins, MS
Graduate Research Assistant, Civil Engineering
Project: Assessing the Damage Potential in Pretensioned Bridges Caused by Increased Truck Loads Due to Freight Movements (Phase I)

Mr. Perkins is working under Dr. Robert Perelman’s supervision on the FY’08 MATC project—Assessing the Damage Potential in Pretensioned Bridges Caused by Increased Truck Loads Due to Freight Movements (Phase I). Mr. Perkins received his Bachelor’s degree in civil engineering from Kansas State University. He is also working on his master's degree in civil engineering and a bachelor’s degree in construction science and management.

Kansas State MATC Affiliated Faculty

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The University of Iowa has been thrilled to be a part of the Mid-America Transportation Center (MATC) during FY 2008. MATC has made it possible for researchers across the University of Iowa to demonstrate the value of their research toward commercial vehicle operations, freight and logistics.

For example, Prof. Ratner of Mechanical Engineering is currently examining fire suppression in crashes involving freight. This is an area that has not been explored as yet in the driving domain but is of obvious importance in fire prevention and mitigation. Another project that will begin shortly will be conducted by Prof. Fuller of Urban Planning and Economics. This project will examine ways to improve freight transportation through redundancy to cope with temporary interruptions of service. Both of these projects would not have been possible without MATC.

In other related research supported by MATC, Prof. Boyle, Industrial Engineering, is examining the factors related to the safety culture surrounding commercial vehicle operations. This project provides a unique opportunity for us to collaborate with the American Transportation Research Institute and also support one graduate student. Professor Hossin Lee, Civil Engineering, was able to contribute to the MATC research through a project that studied the reliability of warm mixed asphalt. He supported two graduate research assistants, which would not have been possible without funding from MATC.

Both Profs. Boyle (as the associate director) and Hanley have had the opportunity to work alongside the Tier I UTCP whose theme is Transportation Safety through Improvements in Management Information Systems. This unique opportunity, to be a part of two transportation centers, ensures that unique project ideas are centered on each UTCP theme. This has allowed us to connect researchers across campus from Urban Planning, and the Colleges of Business, Public Health and Engineering.

As part of our educational commitment, we will be offering two new classes related to the MATC theme titled, "Public Transit Operations and Planning (undergraduate course, Spring 2009) and "Freight Transportation Planning (graduate course for Fall 2009)."

In summary, this first year of MATC involvement has been a very positive experience for the University of Iowa and look forward to working with the University of Nebraska, University of Kansas, Kansas State University, and Missouri University of Science and Technology for many years.

University of Iowa Research Projects
- Improving Freight Fire Safety: Assessment of the Effectiveness of Mist-controlling Additives in Mitigating Crash-induced Diesel Fires.
- Performance Measures of Warm Asphalt Mixtures for Safe and Reliable Freight Transportation
- Safety Climate of Commercial Vehicle Operation

Letter from the Associate Directors - Dr. Linda Boyle and Dr. Paul Hanley

University of Iowa Education Program
The University of Iowa is preparing two new transportation courses. The first of the courses, prepared by Professors James Stoner and Paul Hanley, is titled Public Transportation Operations and Planning. This course will be offered in Spring 2009 and is directed toward upper-level undergraduates and graduate students in engineering, planning, geography, and economics. The second course, prepared by Professor John Fuller and Adjunct Lecturer Bart Cramer, is titled Freight Planning and Policy. This course will be offered in Fall 2009 and is directed toward graduate students in engineering, planning, geography, business, and economics.

MATC cosponsored the symposium Transportation Finance and Economics: Policies for the Future held at the University of Iowa in Iowa City, Iowa, on September 11-12, 2008. The symposium featured a blend of national experts from government, practice, and academia presenting on issues concerning transportation finance. The MATC sponsored made it possible for over 24 graduate and undergraduate transportation students to attend the two days of sessions. Other co-sponsors of the event included the Economic Committee of the Transportation Research Board and the University of Iowa.

We are supporting the travel for a student to attend and present a paper in October to the Impact of Changing Demographics on the Transportation System Conference. In addition, we are supporting student travel for those who will be presenting at the TRB Winter Meeting in January.
As of now I have good expertise in conducting experiments on specific gravity and ITS tests. I found that the equipments in the lab were up-to-date and accurate. When we have some doubt, feedback from our colleagues Anand. We are in contact with my professor and also with my research assistant, Dr. Paul Hanley. Reliability and Learning from him has been a pleasure learning new things."

Manufacturers. Through the experiences I have been getting, it has been a wonderful experience being able to work in operating the machinery we generally watch videos on how to operate the machine which are provided by the machine manufacturers. Through the experiences I have been getting, it has been a pleasure learning new things."

As a Research Assistant and having a great mentor, Dr. Paul Hanley, I am gaining new things. Under my professor and also with my colleagues, we are in contact with the companies working outside US and also gathering the latest industrial information while we are working on this project."
The student chapter of the Institute of Transportation (ITE) was revitalized, with an average attendance of 20 students per meeting. The KU student chapter of ITE was awarded the student chapter of the year by the Missouri Valley Section of the Institute of Transportation (MOVITE).

Dr. Schrock hired seven undergraduate civil engineering students to help him with his research. The hope is to encourage some of these students to stay on for a master’s degree in transportation.

Data collection has begun in the area of the proposed Burlington Northern Santa Fe (BNSF) multi-modal terminal in the Gardner, Kansas, area. Traffic counts, videos of congestion at railroad crossings, and videos of actual train operations have been collected. This required purchasing of equipment to collect these data.

In June, I had the opportunity to attend the First Railway Engineering Educational Symposium at the University of Illinois. This was a great experience, and I am planning on teaching a railroad engineering course in the spring 2009 semester.

Brandon Bundy graduated in May and took a job with a traffic engineering consultant in Davis, California. Chen Fei See also graduated in May; he is staying on at the university as a researcher.

This first year of MATC involvement has been a very positive experience for the University of Kansas. We hope this working relation with the University of Nebraska and the other consortium schools is a long-lasting arrangement.
University of Kansas MATC Students Working on Research

Brandon Bundy, MS Graduate Research Assistant, Civil Engineering
Project: A Preliminary Appraisal of the Safety and Operational Effects on the Regional Transportation System Created by New Rail-Truck Intermodal Facilities
Mr. Bundy, a MS graduate, assisted Robert Rescot in the collection of data in the Gardner area.

Robert Rescot, PH. D. Graduate Research Assistant, Civil Engineering
Project: A Preliminary Appraisal of the Safety and Operational Effects on the Regional Transportation System Created by New Rail-Truck Intermodal Facilities
Mr. Rescot, a PhD student, has taken the lead with the data collection on the Gardner project. He attended several seminars and conferences.

Chen Fei See, MS Graduate Research Assistant, Civil Engineering
Project: Feasibility of Using Cellular Telephone Data to Determine the Truckshed of Rail-Truck Intermodal Facilities
Mr. Chen Fei See, a MS graduate, assisted Robert Rescot in collecting data. One of the important things Mr. Chen Fei See learned from the Rail-Truck Intermodal Facility Evaluation project is the ability to resolve technical/safety issues when limited resources are available in the field. The project field trips helped him corroborate that things are not always going to occur as planned, resulting in the need to anticipate problems and solve issues with minimal assistance. This great experience has prepared him to be a better engineer.

Missouri University of Science & Technology

Greetings from Rolla, Missouri!

The first-year research projects at Missouri University of Science and Technology are recently under way. They cover a number of MATC theme topics, including the transportation demand analysis of increasing multi-modal freight movements, the safety assessment of bridges with enabling measurement systems, the improvement of vehicle/human safety in work zones without significantly affecting human satisfaction with the level of service, and the increase of next-generation workforce in transportation industry. To better plan for the multi-mode transportation system in Region VII (roadway, airway, railway, and waterway in Missouri), a framework for the estimation of nationwide transportation demands will be established and the demands’ impact on the regional development can be forecast. To maximize the use of roadway capacities, the existing highways and bridges that have been in service for 40 to 50 years require either upgrading or rehabilitation. Therefore, efforts to develop rugged and large-strain optic sensors are timely and imperative. The outcomes will enable engineers to assess the structural safety in a quantitative manner.
Missouri Consortium MATC Education Program

To encourage U.S. undergraduate students to seek summer internships with the Missouri Department of Transportation (MoDOT), Mid-America Transportation Center worked with MoDOT to develop a recruiting plan and offer competitive pay to intern students from Missouri University of Science and Technology. Each student received hourly payments from MoDOT and a $1,000 scholarship from MATC (MS&T partner) over the funding period of MATC. The recruiting plan included:

- MoDOT reviewed all applications received from prospective students and selected summer interns based on various needs from MoDOT districts.
- MATC-MS&T awarded up to 15 scholarships to selected students for outstanding performance in their internship. Students also received checks at the end of their internships with MoDOT after they completed and submitted a one-page report to the MATC Associate Director at MS&T.
- MATC-MS&T distributed the information for the summer internship opportunity among all undergraduate students at MS&T, particularly those from the Department of Civil, Architectural, and Environmental Engineering.
- MATC-MS&T encouraged prospective students of the Missouri Consortium MATC Education Program to visit with MoDOT during the annual Career Fair on campus and apply for summer internships.

At the end of the summer internships, students had a group photo taken on campus at MS&T. The one-page report that each intern student prepared included at a minimum:

- a list of projects involved during the internship,
- a brief description of each project, roles the student played in each project, and an evaluation of the internship program, including good experiences and areas for improvement.

The first year of the program was extremely successful with 26 students selected by MoDOT to serve as interns! To meet the students please go to page 45-46 and learn about their experiences.

Missouri S&T MATC Students Working on Research

Yuepeng Cui, Ph. D.
Graduate Research Assistant, Civil, Architectural, and Environmental Engineering
Project: A Framework for the Nationwide Multimode Transportation Demand Analysis
Ms. Cui is a PhD student in the Department of Civil, Architectural, and Environmental Engineering. She joined MS&T in fall 2008. Her research area is transportation engineering (intermodal traffic assignment, GIS). Ms. Cui joined the “A Framework for the Nationwide Multimode Transportation Demand Analysis” project last month. Currently, she is conducting intensive literature reviews on existing nationwide transportation models and collecting corresponding data sets. Using the information collected, she will eventually analyze both nationwide passenger and freight demands on an intermodal transportation network.

Ying Huang, Ph. D.
Graduate Research Assistant, Civil, Architectural, and Environmental Engineering
Project: Pilot Study on Rugged Fiber Optic Brillouin Sensors for Large Strain Measurements to Ensure the Safety of Transportation Structures
Ms. Huang is a PhD student in the Department of Civil, Architectural, and Environmental Engineering. She joined MS&T in fall 2008. Her research area is structural engineering (rigidged sensors, laboratory validation). In her study, she reviewed the recent development of various rugged optic fiber sensors. Further developments were conducted to increase their large strain measurements. A strain transfer mechanism is proposed to use optic fibers, which can endure limited strains, for the measurement of large strains. Calibration and validation of the strain transfer mechanism are the focus of this study.

Bhanu Sireesha Javvadi, MS
Graduate Research Assistant, Civil, Architectural, and Environmental Engineering
Ms. Javvadi is an MS student in the Department of Civil, Architectural, and Environmental Engineering. She joined MS&T in fall 2007. Her research area is transportation engineering.

Mathur Durga Raj, MS
Graduate Research Assistant, Civil, Architectural, and Environmental Engineering
Mr. Raj is an MS student in the Department of Civil, Architectural, and Environmental Engineering. He joined MS&T in winter 2008. His research area is transportation engineering. In his study, four Vehicle Mounted Attenuators (VMAs) used by the Departments of Transportation (DOT) in mobile work zones were evaluated for the effectiveness of various pattern designs and color combinations using participants in a driving simulator. The driving simulator was used to analyze the reaction of drivers to different VMA patterns. In the driving simulation experiments, participants drove through virtual highway work zones as variables such as lane change distance, mean speed, and 85th percentile speed were used to analyze their reactions to different patterns and color combinations used for VMAs.
Missouri S&T MATC Affiliated Faculty & Partners

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RESEARCH
RESEARCH SPOTLIGHT
2008 FUNDED RESEARCH PROJECTS
Radio Frequency Identification (RFID) is an emerging technology that has been introduced into the transportation system. 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. Approaches such as random screening do not allow for the correct attention to be placed upon those carriers and vehicles most likely to be in violation of the law. These random screenings can be an inefficient use of enforcement resources, which can be improved with modern data collection technologies. In order to utilize automated technologies for more effective roadside enforcement, pertinent information must be accessible and collected in a reliable way.

RFID technologies have performed well in transportation operations with simple egress and ingress operations, such as toll road systems, and in logistics operations for robust operations such as port security container tracking (e-seal products). The development of this technology within license plates provides an innovative step in the research area that supports a strong practical use for state agencies and Commercial Vehicle Operators (CVOs) to support information capture at roadside check stations as well as intermittent capture points. Information needs such as vehicle inspections, road usage, and road speed information can be captured and effectively managed to facilitate CVO and state operational efficiencies.

Graduate Student Objective, Goals, and Tasks
The overall goal of this initiative is to develop a system capable of providing accurate, real-time information to government agencies at a marginal cost to the users. The goal of the research is to investigate the viability of embedding RFID tags into license plates so that readers strategically located alongside streets and roads can capture information. The main objective of the research is to study the issues—both technical and political—related to embedding RFID tags into Nebraska license plates.

Graduate Student Objective, Goals, and Tasks

The following experiment was conducted in the RFID lab at Prairie View A&M University. The experiment tested the reading range of the Generation 2 tags at two different antenna and tag heights. The MATC students working on the project were instructed to start at different distances away from the antennas, according to the strength between antenna and tag. The students held a designated tag in the specified tag height on their bodies. When the tag was read by the antenna, the assigned name for that tag was displayed on the computer screen along with a designated tune. The experiment results demonstrate that Gen 2 tags can read at higher distances than 10 feet, but height is a major factor.

To meet this objective, we seek to meet the following specific objectives:

1. Investigate how RFID can be utilized to capture data along the roadside
   a) Graduate student tasks include designing and testing scenarios in which different RFID technologies will work to capture information along the Nebraska roads

2. Investigate how RFID can improve the efficiencies of commercial vehicle registration and motor carrier safety improvement processes
   a) Graduate student goals are to interview and flow chart how operations can use the RFID-enabled data captured and the impacts of data system architecture, database utilization, and operational processes

3. Develop an RFID-enabled license plate “prototype” that can be used to facilitate automatic vehicle data capture
   a) Graduate students will work with the RFID equipment to design and test an RFID prototype

4. Investigate how RFID compares to other automatic data capture technologies such as barcodes, Global Positioning Systems (GPS), and Automatic License Plate Recognition (ALPR) systems
   a) Graduate students will work to compare how RFID compares to other related technologies.

This project is supported by Expanded CVISN program from the Federal Motor Carrier Safety Administration (FMCSA) to the Nebraska Department of Motor Vehicles (NEDMV).
MATC Research Projects Funded in Fiscal Year 2008

University of Nebraska Projects

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

*PI:* Dr. Ronald Faller, Research Assistant Professor, Midwest Roadside Safety Facility, University of Nebraska—Lincoln, rfaller1@unl.edu

*Co-PIs:* Karla A. Lechtenberg, Research Associate Engineer; James C. Holloway, Research Associate Engineer, Midwest Roadside Safety Facility, University of Nebraska—Lincoln

**DESCRIPTION:** This research study will determine whether typical work-zone devices provide acceptable safety performance when impacted by a broader range in vehicle class and/or width than specified in the MASH 2008 guidelines.

**BENEFITS:** The final report will include guidance for future testing of work-zone devices or existing safety performance of selected work-zone devices in terms of new MASH 2008 standards. The results will provide recommendations regarding which temporary sign stand configurations may be more at risk for penetrating the occupant compartments of a larger range of passenger vehicles versus those that may be at risk for one vehicle class (i.e., small car).

**Foundation Design for High Tension Cable Guardrails**

*PI:* Dr. John Rhode, Associate Professor, Geotechnical Engineering, Midwest Roadside Safety Facility, University of Nebraska—Lincoln, jrohde@unl.edu

*Co-PIs:* Dr. Ronald K. Faller, Research Assistant Professor, Karla A. Lechtenberg, Research Associate Engineer; James C. Holloway, Research Associate Engineer, Midwest Roadside Safety Facility, University of Nebraska—Lincoln

**DESCRIPTION:** This research examines the development of optimized foundation systems for high tension cable guardrails. The result of this study will be a rational design methodology based on in-situ soil conditions for foundations for high tension cable systems. This design method will rationally compare maintenance and construction costs to minimize the life cycle costs of the anchorage system while ensuring acceptable performance under a variety of weather and soil conditions.

**BENEFITS:** Tension loss in these systems has significant effects on safety as well as increased maintenance costs. An optimized foundation design will provide states with tools to ensure safety while minimizing costs.

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**Investigating RFID for Roadside Identification Involving Freight Commercial Vehicle Operators (CVO)**

*PI:* Dr. Erick Jones, Assistant Professor, Industrial and Management Systems Engineering, University of Nebraska—Lincoln, ejones1@unl.edu

*Co-PI:* Dr. Judy Perkins, Chair, Department of Civil Engineering, Prairie View A&M University

**DESCRIPTION:** This research examines the development of a simulation model of the study intersections. The result of this study will be a rational design methodology of accomplishing these goals by investigating the potential of RFID for identifying commercial CVO trucks automatically at the roadside, from which timely information may be made available to an officer at a weigh station or a portable unit before the vehicle crosses the Weigh-on Motion (WIM). Officers could then target the vehicle for inspection.

**BENEFITS:** Benefits include providing over-the-road information in a real-time use of CVISN and PRISM Roadside Electronic Screening Databases; extending the relationship among state agencies, the university, FMCSA, and COV; supporting students who may become employees; and providing positive marketing of the state for future DMV, CVISN, PRISM COV, and other transportation initiatives that support future funding.

**Impact of Trucks on Signalized Intersections**

*PI:* Dr. Elizabeth Jones, Associate Professor, Civil Engineering, University of Nebraska—Lincoln, ejones1@unl.edu

**DESCRIPTION:** The objective of this research project is to quantify the impact of trucks on the performance of signalized intersections through a better understanding of truckers' perspectives on signalized intersection performance and the establishment of a "state of the system" for signalized intersections using real-time information. This will be accomplished through field data collection and the development of a simulation model of the study intersections.

**BENEFITS:** The expected results of this research project include quantifying effects of trucks on the performance and level of service on traffic signal operations. Better quantification of truck impacts on signalized intersection performance can lead to more reliable and potentially safer travel conditions.

**Investigation of Factors Associated with Truck Crashes Related to Skid Resistance in Region VII**

*PI:* Dr. Aemal Khattak, Associate Professor, Civil Engineering, University of Nebraska—Lincoln, akhattak@unl.edu

**DESCRIPTION:** The two objectives of this research are 1) to investigate and quantify the relationship between skid resistance of the highway and the reported crashes on that highway and 2) to investigate and quantify the relationship between skid resistance and the most severe occupant injury reported in a crash.

**BENEFITS:** The information resulting from the project can be used in judging an optimal skid resistance from a safety standpoint and in developing a systems-based approach to determine when skid resistance of pavements is improved.

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**Screening Databases; extending the relationship among state agencies, the university, FMCSA, and COV; supporting students who may become employees; and providing positive marketing of the state for future DMV, CVISN, PRISM COV, and other transportation initiatives that support future funding.**
MATC Research Projects Funded in Fiscal Year 2008

Characteristics and Contributory Causes Related to Large Truck Crashes (Phase I)

PI: Dr. Sunanda Dosanayake, Assistant Professor, Civil Engineering, Kansas State University. sunanda@ksu.edu

DESCRIPTION: The project will gather crash data related to large trucks, which will be analyzed and modeled to identify characteristics and contributory causes. Based on that, countermeasure ideas and focus areas needing particular attention for improving highway safety situation of large trucks will be suggested.

BENEFITS: Upon completion of the project, the characteristics and contributory causes of the large truck-related crashes will be identified, which will in turn be used to recommend countermeasures and focus areas needing particular attention to improve safety concerns during truck-related crashes.

Extending Pavement Life Using Thin Surfacing to Counter the Effect of Increased Truck Traffic Due to Freight Movements on Highways

PI: Dr. Mustaque Hossain, Professor, Kansas State University. mustak@ksu.edu

DESCRIPTION: Thin surfacing has been touted as one of the most cost-effective measures for extending the life of pavements. Thin surfacing, such as the ultra-thin bonded bituminous surface (Nova chip) and modified slurry seal (micro-surfacing), are increasingly being used by some states. However, the extension of pavement life provided by these treatments has not been quantified precisely and, therefore, cannot be used in value engineering. Thus, a study is needed to determine how these thin surfacing treatments can extend the life of pavements with high truck traffic.

BENEFITS: The project is expected to produce recommendations regarding use of thin surfacing for high truck traffic routes. The most common type of thin surfacing with the most potential for a given, existing pavement condition and truck traffic volume will also be identified.

Pilot Study on Rugged Fiber Optic Brillouin Sensors to Ensure the Safety of Transportation Structures

PI: Dr. Genda Chen, Professor, Missouri University of Science and Technology. ghchen@mst.edu

DESCRIPTION: This project aims to characterize the ruggedness of carbon-coated optical fibers and validate their performance as sensors. The objective of this project is to characterize carbon-coated fiber ruggedness against shear action and lateral compression, to study the optical signal loss along carbon optical fibers, and to apply fibers to strain and temperature measurements in concrete.

BENEFITS: Benefits of the projects are reduction in variability of speeds and rear-end crashes, improved safety, reduced delay, and improvement in flow of traffic.

Impact of Trucks in the Development of Work Zone Capacity Guidelines

PI: Dr. Ghulam Bham, Assistant Professor, Missouri University of Science and Technology. gbham@mst.edu

DESCRIPTION: The objective of this research project is to examine the criteria for setting work zone speed limits on highways. The researchers will evaluate the effects of higher or lower speed limit on driver compliance and safety of the workers and drivers in the work zones.

BENEFITS: Benefits of the project are reduction in variability of speeds and rear-end crashes, improved safety, reduced delay, and improvement in flow of traffic.
**MATC Research Projects Funded in Fiscal Year 2008**

### Improving Work Zone Safety for Freight Vehicles: Effective Design Patterns for Vehicle Mounted Attenuators

**PI:** Dr. Chulam Bham, Assistant Professor, Missouri University of Science and Technology, cbham@mst.edu

**University of Iowa Projects**

#### University of Kansas Projects

**PI:** Dr. Hyoung Baik, Assistant Professor, Missouri University of Science and Technology, baik@mst.edu

**DESCRIPTION:** The project is to develop a modeling framework that estimates the nationwide multimodal transportation demand for the U.S. transportation system.

**BENEFITS:** The resulting framework will provide an analytical tool to estimate multimodal transportation demand. In addition, it will provide a tool to model the impacts of proposed multimodal transportation improvement plans.

#### A Preliminary Appraisal of the Safety and Operational Effects on the National Transportation System Created by New Rail- Truck Intermodal Facilities

**PI:** Dr. Thomas Malinazzi, Professor, Civil Engineering, University of Kansas, tommalaz@ku.edu

**Co-PI:** Steven Schrock, Assistant Professor of Civil, Environmental and Architectural Engineering, University of Kansas

**DESCRIPTION:** The BNSF Railroad is building a massive intermodal rail-truck facility in Gardner, Kansas, which is located southwest of the Kansas City metro area. It is anticipated that over 300 trains per day from the west coast will be using this facility. These trains move traffic through the state of Kansas, and in other states, and the impact of these trains on the highway system in the immediate area.

**BENEFITS:** Since the intermodal facility will be built, this project will provide data upon which a definitive impact analysis can be made. Recommendations will be made to the appropriate agencies/properties on possible approaches to make the transportation networks safer. This data could also be used to predict the impacts resulting from future intermodal facilities.

### Performance Measures of Warm Asphalt Mixtures for Safe and Reliable Freight Transportation

**PI:** Dr. Hossein "David" Lee, Associate Professor, Civil and Environmental Engineering, University of Iowa, hleeengineering.uiowa.edu

**DESCRIPTION:** Four types of asphalt mixtures (OGFC, SMA, WMA, and HMA) were evaluated with respect to their mix design procedures, dynamic creep, and frictional characteristics. The main product anticipated from this research is the evaluation result of WMA and HMA with respect to their rutting and moisture susceptibility and frictional characteristics.

**BENEFITS:** The information will be very useful for all pavement engineers who are interested in WMA and HMA for application.

### Safety Climate of Commercial Vehicle Operation

**PI:** Dr. Linda Boyle, Assistant Professor, Department of Mechanical and Industrial Engineering and Public Policy Center, University of Iowa, linda-boyle@uiowa.edu

**DESCRIPTION:** Movement of freight by trucks has increased tremendously in the U.S. Studies have shown that a stronger safety culture can provide more positive attitudes among the drivers and thereby help reduce the number of crashes. This study will add onto the existing literature with multivariate analyses conducted with data from a previous survey on the safety management’s perception of a good safety climate. The analyses will provide insights into the key factors that exemplify best management practices.

**BENEFITS:** The benefits of this research project include quantifying the safety culture of trucks and motor carriers, and guidelines for a follow-on study with emphasis on the driver’s perceptions. Factor analysis of the survey data will enable insights to be gained on key characteristics for best management practices.

### Improving Freight Fire Safety: Assessment of the Effectiveness of Mist-controlling Additives in Mitigating Crash-induced Diesel Fires

**PI:** Dr. Albert Rattner, Assistant Professor, Mechanical and Industrial Engineering, University of Iowa, prattnerengineering.uiowa.edu

**DESCRIPTION:** This work will examine the applicability and performance of a polymer-based fuel additive designed to mitigate fire, previously tested for kerosene-based aviation systems, to diesel-based ground transportation systems. This work is fundamental to establishing the general behavior and validity of such approaches to ground fire prevention/mitigation.

**BENEFITS:** If, as expected, these additives are effective in diesel, then a full-scale evaluation can be undertaken to examine the issues involved in transportation system implementation of such additives in order to reduce accidental fires and improve safety in the transportation system.

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**University of Iowa Projects**

**PI:** Dr. Linda Boyle, Assistant Professor, Department of Mechanical and Industrial Engineering and Public Policy Center, University of Iowa, linda-boyle@uiowa.edu

**DESCRIPTION:** Movement of freight by trucks has increased tremendously in the U.S. Studies have shown that a stronger safety culture can provide more positive attitudes among the drivers and thereby help reduce the number of crashes. This study will add onto the existing literature with multivariate analyses conducted with data from a previous survey on the safety management’s perception of a good safety climate. The analyses will provide insights into the key factors that exemplify best management practices.

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**University of Iowa Projects**

**PI:** Dr. Albert Rattner, Assistant Professor, Mechanical and Industrial Engineering, University of Iowa, prattnerengineering.uiowa.edu

**DESCRIPTION:** This work will examine the applicability and performance of a polymer-based fuel additive designed to mitigate fire, previously tested for kerosene-based aviation systems, to diesel-based ground transportation systems. This work is fundamental to establishing the general behavior and validity of such approaches to ground fire prevention/mitigation.

**BENEFITS:** If, as expected, these additives are effective in diesel, then a full-scale evaluation can be undertaken to examine the issues involved in transportation system implementation of such additives in order to reduce accidental fires and improve safety in the transportation system.
The Mid-America Transportation Center summer internship program at the University of Nebraska just completed its 13th year. The popular program provides undergraduate students the opportunity to learn more about transportation engineering careers by working for a transportation engineering consulting firm or public transportation agency. Although the host agencies are located primarily in the Midwest, this year’s program also included an internship at Kimley-Horn Associates in Dallas, TX.

Interns work full time for their sponsors for approximately 13 weeks during the summer, which culminates in a presentation that showcases each intern at his/her workplace.

The internship program aims to:

- Broaden the students’ view of transportation facilities as an intermodal network;
- Enable students to see how regional professionals handle major transportation problems;
- Introduce participants to cutting-edge transportation technology in action; and
- Provide opportunities for interns to network with their peers and other professionals.

After viewing all presentations, the interns vote for the most informative presentation. This year, Derek Nieveen, who interned with Iteris, Inc., in Lincoln, NE, won the award.

A banquet is given at the end of the internship to celebrate the students’ achievements and to thank their sponsors. In addition, the Patrick T. McCoy academic scholarship—named in honor and memory of the program’s creator, former University of Nebraska transportation engineering professor, Dr. Pat McCoy—is presented to the intern who develops the best report. This year’s scholarship recipient was Jon Markt, who interned with Olsson Associates-Rail Division in Omaha, NE.

Women and American students of color on average represent 24% of the total participants in the program. Utilizing special recruiting efforts, the program encourages students from these groups to become involved in the internship program.

Many sponsoring firms of MATC interns have branch offices in neighboring states. Indeed, this year’s special case of a second-year MATC intern working in Dallas, TX, has served as a prototype for future efforts by the MATC staff to facilitate senior-level students’ travel to regional or nationwide offices in order to further broaden students’ transportation engineering expertise.

This year Missouri University of Science and Technology started their intern program with 26 interns with the Missouri Department of Transportation and we anticipate the summer of 2009 to expand the program to our other partner institutions and numerous other private and public sector agencies in Region VII and throughout the Midwest.
Meet the 2008 UNL MATC Interns

Christopher Hennings, HDR Consulting, Roadway Design, Omaha, NE
“This past spring I was introduced to the MATC Intern Program. Not knowing what area of civil engineering I wanted to pursue, I decided to give the transportation discipline a hard look. I need to thank MATC for setting me up with a great engineering company.”

Derek Nieveen, Iteris, Intelligent Transportation Systems, Lincoln, NE
"Through the course of my work, I was able to complete many tasks, such as pedestrian counts, travel time runs, crash data collections, and more. My main responsibility for a traffic project with the University of Nebraska Kearney was to create a conceptual redesign of the campus roadway network. This was a very thrilling project for me because I had a real impact on the future construction of a major street system.

Garret Schram, Iteris, Hott and Ullevig, Traffic Engineering, Omaha, NE
"Over the course of the summer, I was given the opportunity to work on a variety of different types of projects, which allowed me to gain a vast amount of knowledge in many different areas of transportation engineering. These projects included a railroad crossing safety study, several traffic studies, and a roadway design project.

Shashwat Rijal, Mid-America Transportation Center, Transportation Research, Lincoln, NE
“As any person moves from one day to the next, one thing is guaranteed: we learn a little more every day. Our activities and actions help us learn and understand things better with each passing experience. This summer was full of memories that will last me a lifetime.”

Alex Kotrotsios, City of Lincoln Public Works and Utilities, Traffic Operations, Lincoln, NE
“I never knew how a city functioned as a whole until the beginning of this summer when I began working for the City of Lincoln, where I’ve learned a great deal about what goes on in the transportation engineering field.”

Patrick T. McCoy, Academic Scholarship

Jon Markt, HDR Consulting, Rail Engineering, Omaha, NE
“It was so exciting just to take what I have learned in school and put it to use with the same software programs that real transportation engineers use.”

Greg Sieb, Olsson Associates, Traffic Engineering, Lincoln, NE
“My second year as a MATC intern provided me with a much different experience in transportation engineering than my first year working at the University of Nebraska-Lincoln, which gave me a look into the roles that education and research play in the field. This summer I have been able to transfer much of the knowledge and skills gained into my work with my sponsor’s traffic team.”

Shayla Wages, Felsburg, Holt and Ullevig, Traffic Engineering, Omaha, NE
“Through the course of my work, I have been able to transfer much of the knowledge and skills gained into my work with my sponsor’s traffic team.”

Daniel Carpenter, Mid-America Transportation Center, Transportation Research, Lincoln, NE
“This past spring I was introduced to the MATC Intern Program. Not knowing what area of civil engineering I wanted to pursue, I decided to give the transportation discipline a hard look. I need to thank MATC for setting me up with a great engineering company.”

Tim Myer, City of Lincoln Public Works and Utilities Department, Traffic Operations, Lincoln, NE
“After collecting driver speed data along city routes, it was fun making a call on what an appropriate speed limit should be. How many people wish they could do that? I’ve done 28 speeds studies in Lincoln that are waiting to be approved.”

Joshua Redwine, Kimley-Horn Associates, Roadway Design, Dallas, TX
“My internship opened my eyes to the variety of options that are available to me with a transportation engineering degree. The ability to relocate to a different city for my internship has shown me that there are opportunities to take my degree anywhere I would want to live.”

Robert DuVall, Mid-America Transportation Center, Transportation Research, Lincoln, NE
“When I started this internship, I was unsure of the civil engineering field I wanted to pursue. Over the course of this summer I learned a great deal on the traffic analysis process. I think that this summer’s internship has pointed me in the direction of the transportation engineering career. I would like to thank Dr. Elizabeth Jones and MATC for giving me this opportunity.”

Paul Roh, Metro Area Planning Agency, Transportation Planning, Omaha, NE
“My internship exposed me to several ‘real-world’ applications and let me see firsthand the interactions between engineers from both the public and private sectors. It provided me great insight into a career field that I would like to pursue, and it didn’t disappoint. It was a great experience that could not have been learned in a classroom.”

Craig Schiller

Craig Schiller is a PhD candidate at the University of Nebraska-Lincoln (UNL) whose research has focused on transportation data management, particularly as it applies to multimodal freight movements and the analysis of system performance. He received his bachelor’s and master’s degrees in civil engineering from Washington University in St. Louis. He plans to pursue an academic career after graduation.

His numerous academic awards include an Omber Fellowship, UNL’s most prestigious undergraduate student award. He is currently vice president of the UNL student chapter of the Institute of Transportation Engineers and has served in several student leadership positions in Chi Epsilon and the National Society of Collegiate Scholars.

Craig was selected for this award based on his academic excellence and the leadership qualities that he has continually exhibited throughout his college career. The Mid-America Transportation Center is pleased to select Craig Schiller as its 2007 Outstanding Student of the Year.

The Mid-America Transportation Center (MATC) is a cooperative transportation research and education program of the State of Nebraska, the University of Nebraska, and the University of Iowa. MATC is dedicated to improving the quality of life through strategic transportation planning and policy development, and providing the best in transportation education and research.

2008 Annual Report
Missouri S&T Intern Program

Tim Brown

“MoDOT was a great internship because they allowed me to join in on some of their major projects. I received hands-on experience in a professional environment. I felt as though my work had a purpose and they valued my input. While interning at MoDOT, I was surprised that one of the most valuable skills that I learned was how to communicate with coworkers.”

David Craft

“What I liked best about my internships with MoDOT (Missouri Department of Transportation) is how each summer I get to see a different aspect of the project. Working with the survey crew my first summer, the design team my second, and the construction crew, I got to see the pre-design, design, and construction phases of a project, respectively. I have also gained skills with AutoCAD while interning with MoDOT and learned how to work with other people.”

Kyle Kammer

“I was surprised by and liked the fact that my internship at MoDOT gave me a wide variety of experiences. I wasn’t stuck doing one thing all summer; I got to go out and work on bridges, ramps, roads, and earthworks. I got to learn quite a bit about all of these various things, and I think these skills will help me out after I graduate.”

Renée Moreland

“I had a great summer working at MoDOT. I had a wonderful group of co-workers that were willing to help me. At first, I was nervous about not being able to do much because, at that time, I had not had any civil engineering courses in school. However, that was not the case; my co-workers were very friendly and educated me on processes while doing field work. I learned hands-on how to do my tasks, run tests, and calculations—all while having a great time this summer.”

Jeycea A. Bobo

“I really enjoyed my experience with MoDOT. I learned things such as testing concrete using the slump and air test before actually learning it in class. Having an internship with MoDOT for two years gave me a chance to get real-world experience.”

Josh Boeckmann

“The best thing I liked during my internship was the people. They always made it enjoyable to work at the office with their friendly and welcoming attitude. They were willing to help with any problems or questions, and they were eager to work with the interns and show them the ropes.”

Ryan Pensel

“While working for the Missouri Department of Transportation, I have gained many valuable experiences. I have learned how the engineering and construction industries work. I am glad that I had an opportunity to do this internship.

During my internship with MoDOT, I was able to tour the Bill Emerson Memorial Bridge in Cape Girardeau, MO. It is a cable-stayed bridge. I was able to tour underneath and on top of the bridge. I was very impressed with the seismic dampeners and seismic sensors that are installed on the bridge. It was quite an experience to be on top of one of the 160-foot towers of the bridge.”

James Pflum

“The thing I enjoyed the most about my internship was the variety I saw every day at the job. Some days I was using common sense to solve problems, others I was using my background in engineering. Some days were long, some were short. I always looked forward to going to work because I never knew what the day held.”

Sarah B Pratt

“I worked as an intern in construction on a new highway project. As someone who has never been around heavy construction, it was exciting to watch this large project come together. The best part for me was the exposure to so many different parts of the project. Just in our single project there were bridges, large rock cuts, hills, erosion control, drainage, MSE walls, striping, guard rails, etc. There was always something changing shape on the job site.”

Joseph A. Ridpath

“While working at MoDOT this summer as an intern, I learned how to use Microstation proficiently. This skill will be a significant benefit to me in the future because it is a CAD program that a lot of companies are turning to. Also, since it is a CAD program, it has the same concepts as a lot of other CAD programs and all companies use some form of CAD.”
The Mid-America Transportation Center helped sponsor a Math and Science Professional Development Summer Institute, engaging 18 junior high and high school math, science, and industrial technology teachers in learning about engineering in order to give them state-of-the-art technology and tools with which to teach in their classrooms.

In today’s educational setting teachers are faced with the challenge of meeting numerous metrics from state standards and district regulations. MATC set out to offer teachers materials that could not only engage students and interest them in engineering, but also help them develop lesson plans that align with state standards, thus making the concepts jump off the page into real life.

In this way, MATC wanted to make those more complex, often harder-to-explain lessons come alive with multi-media tools such as crash testing video footage or traffic simulations without creating additional work for the teachers.

This represents a unique education/transportation industry collaboration. The project goal is to increase student STEM performance and interest in STEM and transportation careers through real-life applications engineering and transportation.

The summer institute consisted of two parts. During the first part, a three-day professional development seminar, teachers heard presentations from five University of Nebraska-Lincoln (UNL) faculty members on guardrails, crash testing, geometric design of roadways, transportation systems safety, and logistics. The faculty explained some of the common math and science principles they use in engineering research for the teachers to apply to their junior high and high school classrooms. The teachers learned about transportation engineering and transportation research, received state-of-the-art technology and tools for developing multi-media lesson plans, and subsequently developed lesson plans based on lessons teachers and instructional professionals taught in the summer institute. The teachers also listened to presentations from the public and private sector as well as a curriculum specialist to help acquire tools for developing lesson plans embracing diversity in the classroom.

The Engineering Excellence Experience Days, the second part of the Summer Institute, invited 40 junior high and high school students—selected by their teachers for their exemplary math and science accomplishments—to the UNL campus to evaluate and test out the lesson plans. While on campus, the students also toured transportation-related engineering labs in geo-materials, bridge testing, water resources, radio frequency identification, intelligent transportation systems, and crash testing.

Over 40 lesson plans (with catchy titles such as “May the Forces Be With You” or “Me, Myself, and Inertia”) have been developed for various transportation-related themes and tested in the classroom during the three years that the summer institute has been in existence. All these lesson plans will be made available on the MATC website so that teachers in Region VII and across the country can use these to bring transportation concepts to middle and high school students.
Professional Development
Math and Science
Summer Institute

This research project involves the collaborative efforts of:
MATC: K-12 Outreach Activities

Bryan High School Visit to Mid-America Transportation Center — Over forty sophomore and junior high school students interested in engineering as a possible career spent a half day the MATC, University of Nebraska-Lincoln Campus. During their visit they had a presentation on Civil Engineering from MATC Graduate student Jay Ling and also had a chance to tour several labs including the Intelligent Transportation Systems Lab, Logistics/RFID Lab, and Structures Lab.

McMillan Middle School Field Trip — McMillan Middle School of Omaha Public Schools visited the Mid-American Transportation Center — University of Nebraska Lincoln Campus and enjoyed a day full of activities learning about transportation, logistics, and structural engineering. The students had to earn all A’s and B’s in their Math courses to attend the field trip. McMillan is Junior High Engineering Magnet Program, which means that students take specialized courses in math, science, and technical education that pertain to the knowledge and skills needed by engineers. At the end of the day the students had a quiz bowl to compete for prizes by answering questions on Transportation engineering, Radio Frequency Identification Engineering, and Structural Engineering. McMillan Middle School is a representation of a diverse population with approximately 66% of the student population consisting of minorities.

After School Program Activity for Culler Middle School — Students from Lincoln Public Schools, Culler Middle School in Lincoln, Nebraska participated in transportation engineering after school activity under direction from their teacher, Ms. Mary Harrington (who was a participant in the Professional Development Math and Science Summer Institute). MATC faculty and graduate students assisted the middle school students in gathering information for the lesson that required them to collect traffic data. The students then went back to the classroom and applied the data collected from a unit lesson on mean, median, mode, momentum, distance, and speed. Culler Middle School is diverse with almost one in four students who attend Culler is non-native English speaking when they enter school and approximately one in two students a member of a minority population.

Women in Engineering Experience Day — Six straight-A math science female students from smaller western Nebraska Schools visited the Mid-America Transportation Center and met with University of Nebraska Civil Engineering Transportation Professor Elizabeth Jones, Civil Engineering Lecturer Karen Schurr, and Midwest Roadside Safety Engineer Karla Lechtenberg. Graduate Students, Miao Gao and Kelly Kopocis, discussed with the girls why they chose engineering as a career and their experiences as women in the engineering workplace. In the afternoon they also toured several civil engineering labs on campus to get a better understanding of some of the activities involved in civil engineering research.
In April of 2008 at the University of Nebraska a summit was held to discuss the Challenges and Solutions for the Transportation and Logistics Industry. Over 120 transportation leaders from the private and public sectors were in attendance. Chancellor Harvey Perlman, Vice Chancellor for Research, Prem Paul, Dean of the College of Engineering, David Allen, and Mid-America Transportation Center Director, Larry Rilett opened the plenary session of the summit and welcomed delegates. The keynote addresses were given by four prominent national leaders who discussed the challenges and opportunities facing the transportation industry today.

John Craig, Director of the Nebraska Department of Roads, was the first keynote speaker. A central theme of Craig’s address was the importance of public and private partnerships: “National transportation policy and freight work within a global economy allows for a clear priority to be established at local and state levels in conjunction with private sectors.” Later in his presentation Craig discussed the importance of university programs such as MATC in developing future transportation professionals: “Leadership is important from my perspective. In this challenging world, the leaders that universities produce will be the ones who lead us into the future.”

Tonn Ostergard, President and CEO of Crete Carrier Inc., gave a keynote address discussing the importance of the central location of the transportation infrastructure of Nebraska. He emphasized: “We have the ability to move the goods through our rail and highway systems much faster than any other place in the world because they do not have the infrastructure to get them to the market. We have been blessed by the leaders who had the foresight and saw those opportunities.” Mr. Ostergard also touched on several challenges that the transportation industry is facing in the Midwest and nationally, such as safety, aging infrastructure, an aging work force, the rising cost of energy, and the challenges of environmental sustainability and information management.

Mark Stiles, Senior Vice President of Trinity Industries, Inc. and MATC private sector Board Member gave his keynote presentation on the resources that are affecting the United States infrastructure. “Transportation is key to the economy of this country. If you want your future generation to continue in this way of life that so many people are taking for granted, then we have to realize that these centers create tomorrow’s leaders and replenish the workforces,” he said. Stiles also discussed the importance of embracing increased prices due to limited resources and the necessity of maintaining and improving the nation’s infrastructure. “We don’t have enough money to maintain the roads, let alone build any new ones. If we don’t stay on the curve, we will be bypassed.”

David Connell, Vice President of Engineering at Union Pacific and MATC private sector Advisory Board Member focused his keynote address on the challenges of capacity and the numerous areas of opportunity for development in the rail industry. Connell’s remarks addressed the issues of stress on the network, axle loading, train control systems, distributive power, insulated joint signal systems, switch position indicators, off track maintenance and condition monitoring. “We have been challenged with increased demand over the past 5-6 years, and as a result we have to adapt very quickly to solving capacity challenges without building a new railroad.”
The Nebraska Chapter of the American Society of Civil Engineers (ASCE) held their annual transportation conference at the Scott Conference Center in Omaha on April 18, 2008. Sessions featured during the conference included:

- Nebraska Transportation Center: Overview of Research, Education, and Technology Transfer Initiatives – Larry Rilett, Keith W. Klaasmeyer Chair in Engineering and Technology, and Director, Mid-America & Nebraska Transportation Centers, University of Nebraska - Lincoln
- Status Report on Omaha Beltway Study – Matt Tondl, Senior Vice President, HDR Engineering
- The State of Nebraska Bridges – Sam Fallaha, Assistant State Bridge Engineer, Nebraska Department of Roads (NDOR)
- Antelope Valley Project in Lincoln – Wayne Teten, Antelope Valley Project Manager, City of Lincoln
- NDOR District #2 Operation Center and ITS Deployed Devices – Gary J. Forman, Highway District Operations Center Manager, NDOR; Jon Ogden, ITS Manager, NDOR
- Transportation in the Nebraska Legislature – Dustin Vaughan, Legal Counsel, Transportation & Telecommunications Committee, Nebraska Legislature
- Urban Interstate Update: Present, Future, and Crystal Balling – Brian Johnson, Engineer IV, Interstate Section, NDOR
- NDOR’s Erosion Control and MS4 Programs – Ronald Poe, Highway Environmental Program Manager, NDOR
- K-12 Transportation Outreach in Nebraska – Randy Vlasin, Executive Director, FutureForce Nebraska; Gina M. Kunz, Research Assistant Professor, UNL Nebraska Center for Research on Children, Youth, Families and Schools
- Streets by Design: Context Sensitive Solutions – Martin Stukert, Principal, RDG Planning & Design
- Revenue / Funding Panel Discussion – John L. Craig, NDOR; Stu Anderson, Iowa Department of Transportation; Greg Maclean, City of Lincoln; Robert Stubbe, City of Omaha

Over 132 professionals attended the conference including numerous graduate students from the University of Nebraska-Lincoln affiliated with MATC. The Mid-America Transportation Center assisted in the conference by serving on the planning committee, and assisting with the registration process. We look forward to assisting in the development of this conference in the future.

ITS Heartland held its 9th Annual Meeting, April 3-9, at the Springfield, Missouri’s University Plaza Hotel. There were 244 ITS Professional Transportation System professionals in attendance, with almost 30 vendors present.

Pre-conference activities included a technical workshop of IP video solutions and a tour of the Ozarks Traffic Management Center: ITS Heartland attenders also enjoyed their own hospitality tent at the Springfield Cardinals’ baseball game.

ITS Heartland President, Tom Dancy, Missouri Highway & Transportation Commission/ Springfield Chamber of Commerce President, Jim Anderson, and ITS America President and CEO, Scott Belcher welcomed attendees, introduced vendors, and presented the ITS engineers update. Mrs. Rozelle Cooks from the National Highway Traffic Safety Administration was the featured keynote speaker of the morning session.

In the afternoon the first two concurrent sessions began focusing on Incident Management and Planning/City/Metro Issues. The day was concluded with the second set of concurrent sessions on Multi-State Cooperative Programs and Data/Video Sharing.

Once sessions ended there was a vendor reception and platinum sponsor suite hosted by Delcan. The Ozarks Traffic Management Center also provided another technical tour of their facilities.

On the third day, presentations were made on Intelligent Transportation Systems Performance Measures and Integrated Corridor Management and on Suburban-Rural Transit and Advanced Traveler Information Systems. A final general session featured the subject of emerging technologies.

This year’s ITS Heartland conference was a resounding success due to the contributions of countless individuals including many wonderful local, regional, and national speakers, sponsors and vendors. The Mid-America Transportation Center has been assisting in the development and administrative support of the ITS Heartland Chapter since it was chartered with ITS America in 1995.

(Mark your calendars for our next annual meeting in Topeka Kansas, March 29, 30, and 31, 2009/1)
MATC Financial Information for FY 2008

**Planned Expenditures**
Funds Allocated for Education, Research, Administration & Technology Transfer

- **Education/Human Resources/Diversity**: 22%
- **Technology Transfer**: 11%
- **Research**: 53%
- **Administration**: 15%

**Distribution of Federal Funds to Partners**
TOTAL = $792,170

- **Other Partnerships**: 8%
- **KSU**: 23%
- **KU**: 23%
- **MS&T**: 23%
- **UI**: 23%
- **UNL**: 23%

UNL receives 50% of the federal funds and the remaining 50% is distributed to our partners.

**MATC Source of Funds**
TOTAL = $3,266,400

- **University**: 11.69%, $381,473
- **Private**: 4.36%, $149,934
- **State DOT**: 33.75%, $1,102,422
- **RITA - USDOT**: 56.00%, $1,633,200

For More Info:

www.matc.unl.edu

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