



MID-AMERICA TRANSPORTATION CENTER

Volume 2 Issue 2

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

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THE UNIVERSITY OF IOWA



Union Pacific TRT 909 Tour

University of Nebraska–Lincoln civil engineering students and faculty members took advantage of a unique opportunity to view Union Pacific’s track renewal train, the TRT 909, by traveling to the site of its operation on a field trip organized by the Institute of Transportation (ITE) and the

American Society of Civil Engineers (ASCE). A total of twenty-one participants, including graduate students, undergraduate students, and faculty members, went on the trip, which took them to an area between the towns of Silver Creek and Clarks in Nebraska.

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McMillan Middle School Students Visit MATC on Engineering Field Trip

On a recent field trip, forty seventh-grade students from McMillan Magnet Middle School (Omaha Public Schools) visited the Mid-America Transportation Center...

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Union Pacific TRT 909 Tour



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The tour, which took place in October 2008, began at Duster's restaurant in downtown Columbus, where Union Pacific's Kevin Hicks, Jay Farrar, and Drew Bokenkamp gave attendees a brief presentation on the history of Union Pacific and the background of the renewal train. Hicks also provided the students in attendance with information on jobs with Union Pacific that would be available in the future.

After receiving their safety equipment, the party headed out to the job site in a bus. Miles before the actual site, train cars full of concrete ties that were to be fed to the TRT

announced the proximity of the machine. With their bus driving in the right-of-way of the railroad tracks, participants were able to get an up-close view of the old ties, soon to be replaced by the renewal train.

The TRT 909, which is comprised of 30 rail cars, is about half a mile long. When running, this train can replace the rails and ties in one swoop, presenting an amazing spectacle as the old ties are replaced with new ones in a matter of seconds. Old rails are weaved out of the way as new rails are moved into place without interrupting the course of trains, which can run on the

parallel track while work on the rails is underway. Decades ago, workers would have spent hours doing what the TRT 909 does in minutes. In one eight-hour day, this machine can replace up to 3,000 rail ties, which amounts to an average of about six ties per minute.

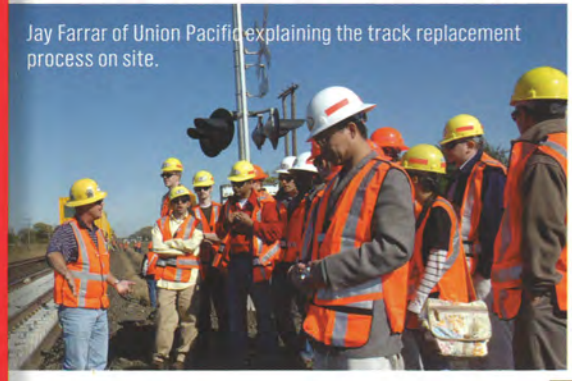
After viewing the process for an hour, the party returned to Lincoln, impressed with this model of engineering ingenuity. Many of the students voiced their appreciation of the remarkable learning experience afterward, expressing gratitude to the ITE and ASCE for the invitation to the field trip and to the volunteers from Union Pacific for their informative presentations. Union Pacific's TRT 909 is the only one of its kind in the nation, and the field trip provided students with the extraordinary opportunity to view this machine in action.



Group photo in front of the tour bus.



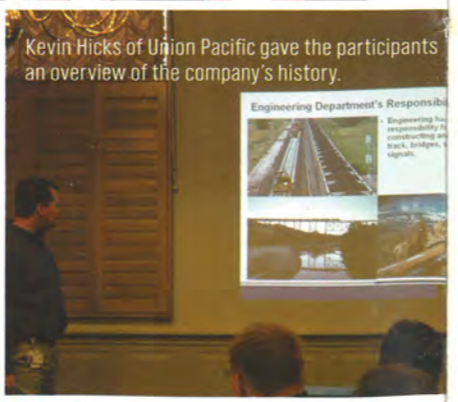
Nour Sino Kot and Miao Gao, two graduate students, on the tour.



Jay Farrar of Union Pacific explaining the track replacement process on site.



A component of the TRT.



Kevin Hicks of Union Pacific gave the participants an overview of the company's history.



Letter from the Director

As I take a moment to reflect on the progress of MATC, I find myself amazed at the progress we've made over the past two years. MATC researchers have committed themselves to finding innovative solutions to the challenges that face the transportation industry. To help illustrate some of these accomplishments we have decided to spotlight individual research projects conducted

under the auspices of MATC, which will give readers a more in-depth perspective on some of our initiatives as well as provide an overview of the diverse range of projects that define our ambitious research agenda. I am particularly proud of the fact that we have substantive and important research being conducted by leading researchers in all four states of Region VII, as you will see in the following pages. When this work is implemented, it is sure to have profoundly positive effects on the citizens of Iowa, Kansas, Missouri, Nebraska, and indeed the U.S. as a whole.

In addition to our research, we are also highlighting some of our education-related initiatives in this issue. We have continued to

provide outreach to middle and high school teachers and students through our annual summer institute. The attending middle and high school teachers are invited to bring their students to campus in order to learn more about transportation as a career option. This past year we had numerous groups visit our headquarters – one of these visits from McMillian Magnet Middle School in Omaha is highlighted in this edition. MATC also sponsors a number of undergraduate and graduate students from various consortium universities to attend the Transportation Research Board Annual Meeting in Washington, DC, and we have highlighted their experiences in this issue. Finally, MATC sponsored a technical tour of Union Pacific's TRT 909, which is part of a major track renewal project in eastern Nebraska. We are appreciative of the work put in by Union Pacific to make the tour a success for the transportation engineering students and faculty who attended.

I hope that in this issue you will find many reasons to join me in my enthusiasm for MATC's transportation research and education initiatives. I look forward to the coming months as we get ready for our next research selection process, and as always I welcome your feedback and suggestions. Thank you for your interest and continued support.

Sincerely,
Larry

MATC Graduate Students Collaborate on Cross-Campus Chapter Activities



On March 31, 2009, MATC-funded student members of ASCE and ITE chapters at UNL, KSU, and KU came together in Topeka, Kansas, to discuss future chapter activities and joint projects. The University of Nebraska-Lincoln was represented by several students attending the meeting, including M.S. student Miao Gao, and Ph.D. students CJ Hsu

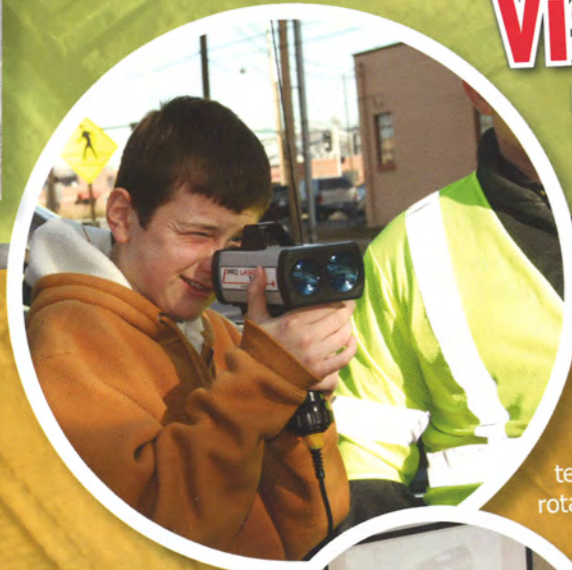
and Hang Yue. Robert Rescot, a Ph.D. student from the University of Kansas, was also present, as were Kansas State students Nathan Whitcomb, an undergraduate, and Brian Geiger, who is pursuing his M.S. It was an excellent evening full of fun, fellowship, and exciting ideas for future collaboration.



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McMillan Middle School Students Visit MATC on Engineering Field Trip

Forty seventh-grade students from McMillan Magnet Middle School (Omaha Public Schools) visited the Mid-America Transportation Center at the University of Nebraska-Lincoln on an engineering field trip designed to familiarize the students with important practical applications of engineering research and transportation technologies. On December 12, 2008, the students traveled to Lincoln and spent half a day visiting the RFID and Structures labs, viewing crash test presentations, and even trying their hand at operating traffic guns in 20-minute rotations. A group photo and quiz bowl with questions on transportation engineering, RFID technology, and structural engineering, in which the students demonstrated what they had learned during the day's events, completed the visit.



Dr. Anuj Sharma gave an introductory PowerPoint presentation to the McMillan students.



Craig Schiller, a Ph.D. student at UNL and 2007 MATC student of the year, showed the students video feeds from an Omaha traffic signal at the ITS lab.



McMillan students visited the Structures lab and viewed the steel girders and concrete forms used in the construction of bridges. They also learned to use traffic guns with the help of Zeng Luo, a Ph.D. student, and Tim Foss, an M.S. student.



Transportation Research Board Annual Meeting



I have never attended a conference as large as TRB; therefore, my first experience at TRB was exciting and at times overwhelming. Determining what session I wanted to attend was difficult at times, with so many options to choose from. I found the sessions I enjoyed most were spur-of-the-moment decisions. My favorite part of TRB was having the opportunity to learn about practical advances in engineering and research going on throughout the world. The best session, for me, was on the growth and infrastructure planned for the city of Abu Dhabi. According to the presenters, the city will be tripling its population within the next twenty years. The amount of infrastructure they were planning on building and that will be needed is remarkable. The other session I thoroughly enjoyed was on the new I-35W bridge in Minneapolis. In addition to attending sessions throughout the week, I had the opportunity for a little sightseeing. Donnie (Butler) and I went to the Holocaust Museum, as well as to the National Gallery of Art.

— Nate Burnett, M.S. student, UNL



Though this was not my first year attending the TRB conference in Washington, D.C., each year's conference brings new ideas covering the diverse field of transportation. In keeping with the focus of the conference, most presentations highlighted their significance to the greater energy and climate change challenge. After returning from the conference and struggling to remember the flurry of information acquired at the sessions, I found the e-sessions on the TRB website to be a great tool for revisiting and analyzing the finer points of the conference presentations. For select sessions, TRB has created webcasts of presentations for those who were unable to attend. This resource also allowed me to review sessions that I didn't attend due to a scheduling conflict with other important presentations. Since TRB began this practice in 2005, I also had the opportunity to review past presentations of published articles cited in my research. Though not a substitute for the TRB conference experience itself, the e-sessions present a superb resource, which some conference attendants, like me, may have previously overlooked.

— Donnie Butler, M.S. student, UNL

I liked the poster session at TRB more than any other session. I enjoyed talking with the paper author and asking questions without time constraints or other restrictions. In a normal presentation session, for instance, you might not want to keep asking questions because there are other audience members waiting. The most exciting thing can be seeing the authors of the papers themselves and listening to their presentations. When I read papers from TRB, I have a hard time imagining the author behind them, but after seeing them and talking to them in person, I can put a face to a name, and the meeting adds a personal dimension to the research I read about. TRB is a huge conference that you may feel lost at if you don't gather enough information and plan the things you want to do in advance. Depending on how many sessions you want to attend, your day can either get very busy or you can enjoy the experience at a more relaxed pace. Sometimes all of the most interesting sessions are at the same time, and you need to evaluate what the most important presentation is that you want to attend. One nice aspect of large conferences like TRB, though, is that you can both meet old friends that you haven't seen for a long time, for instance at some of the university reunion parties, and make the acquaintance of important researchers in your field that you have not met before.

— Chung-Jen Hsu, Ph.d. student, UNL

At TRB I sought out topics which I do not typically encounter in my research and studies, such as pavements, railroads, law, arts and music (in transportation, of course!), etc. Though in-depth knowledge of my area of specialization is vital to my preparation as a grad student, I also want to learn about the important questions in other areas of research. That way, if someone asks me about a topic or problem outside of my area of expertise, I can at least say that I have heard of it and direct him or her to someone who can better address it. For now, exposure to new problems and solutions provides inspiration for my work.

— Craig Schiller, Ph.d. student, UNL

The 2009 TRB annual meeting was my fourth to attend as a student and was marked by several highlights. The hallmark event for me was attending the Council of University Transportation Centers annual banquet to receive the Student of the Year award presented by FHWA upon being selected by MATC. This honor was both humbling and inspiring. The annual meeting also provided numerous thought-provoking experiences in sessions, seminars and poster presentations. While I personally did not present this year, it was exciting to see several colleagues of mine, both past and present, present their work. KU also used TRB as an opportunity to showcase the wide array of transportation research opportunities to several undergraduates who were selected as part of the MATC-funded KU Undergraduate Transportation Scholars Program. When I was not busy attending committee meetings and networking, I spent the majority of my time helping our undergraduate scholars navigate the conference hotels, receptions, and the city.

— Robert A. Rescot, Ph.d. student, KU



2009 MATC Student of the Year, Robert Rescot, meets former U.S. Secretary of Transportation, Norman Mineta.

TRB was an amazing experience for me as a developing professional. I had never before realized how my research related to the transportation industry, and how expansive the transportation field was worldwide. Through my co-workers at MwRSF, I met many people at TRB, both national and international researchers working on transportation safety. The hospitality suites I visited were from various companies that I had heard about, especially with regards to their safety equipment, but never really knew much about. Meeting new people there was a big advantage for me, since I found many of the presentations even more interesting after meeting some of the speakers in person. I attended committee meetings and also had the opportunity to join one of the committees. This made me realize that, even though I was still a graduate student, my research could play a big part in transportation safety and could be presented at a conference like this someday. While in D.C., I also had the opportunity to visit some of the monuments. I had been to D.C. before, but this time I found it especially interesting because of the set-up and preparations for the presidential inauguration ceremony, which was a week later.

— Jennifer Schmidt, M.S. student, UNL

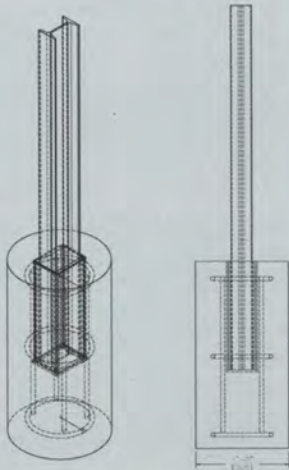
I really enjoyed attending TRB this winter. I was able to interact with many of the transportation research professionals with whom I had corresponded by email, and the transportation community was very open and accepting of newcomers, welcoming us to the transportation safety group. The part I enjoyed the most about TRB was learning about the different transportation safety projects that were ongoing throughout the nation. Since I am working with a cable modeling study, I enjoyed seeing how others in the field, both at the Texas Transportation Institute (TTI) and the National Crash Analysis Center (NCAC), conducted their experiments with cable barriers. I was able to evaluate their experiences and research against my own, to make comparisons and compare modeling and testing methodology. Also, I really enjoyed the finite element section in the development of new models. While it is true that some research labs used TRB as a platform to advertise to state departments of transportation, it was nonetheless very interesting to see how new technology and developing areas of transportation safety are being expanded and advanced by other transportation agencies.



It became clear, due to the comments of the attendees, that the costs associated with travel and the conventions kept many of the transportation officials from other state departments of transportation away from TRB this year. Many officials were not able to attend because of the reduced budgets of transportation agencies. The impact of financial constraints was further reflected in the research of many of the presenters at the convention, as they considered many of the cost-effectiveness options for safety treatments in order to maximize the use of transportation safety dollars.

I had a great experience at TRB, and I hope that if I pursue a career in transportation, I will be able to attend future TRB conventions. I am very thankful to MATC for allowing me to attend.

— Cody Stolle, M.S. student, UNL



Design of the new post base.



High-tension cable and guardrails.



An old post base damaged by severe environmental conditions.



Detail view of the damage.

Research Spotlight: University of Nebraska–Lincoln Design of High-Tension Cable Guardrail Line Post Bases

Thousands of miles of high-tension cable guardrail are being installed on divided highways across the nation to prevent median cross-over accidents, but evaluation of its in-service performance has generated increasing concern over the current system's post base foundation designs.



Ling Zhu, a UNL graduate student, is developing the computer model for this project.

The new generation of high-tension cable systems incorporates concrete post base foundations with steel sleeves to accommodate various proprietary posts. These sleeve/post systems are intended to provide the user with a system requiring minimal maintenance after an impact, allowing for a new post to be placed afterward, but many have significant structural inadequacies during impact, resulting in considerable maintenance

costs. Additionally, shallow designs in certain areas of the country are subject to significant frost heave, potentially affecting the height of the system and its ability to redirect low-profile vehicles. Therefore, there is a pressing need to develop a structurally adequate post base design that allows it to perform in a variety of in-situ soil conditions and under severe environmental conditions, including those induced from frost heave movements and freeze-thaw cycles.

For this study, a new post base has been designed based on the worst practical impact scenario. To determine the worst impact case, a complete study was conducted on the existing high-tension cable systems, which determined the properties of each proprietary post option and evaluated the reinforcement of current post base designs. Based on these analyses, an initial design of the new post base was determined.

To preclude frost heave of foundation displacement, soil and climatic conditions must be considered when developing an optimal post base design. Testing of the existing foundations has only occurred under controlled impact conditions, as specified by NCHRP Report No. 350. Thus, the structural adequacies in weak and moderately strong soils as well as environmental effects have not been adequately considered in the design of post base foundations to date. Based on these concerns, the new post base design must: 1) sustain the impact load without significant damage; 2) perform with limited rotation/displacement of the foundation and without requiring re-positioning after impact; and 3) be resistant to frost heave.

In the next several months, a series of bogie tests will be conducted to verify the structural capacity of the new design and to determine its rotation/deflection in two extreme soil types. The results from the bogie tests will assist in determining necessary base depth for various in-situ soils. Subsequently, a rational design methodology based on in-situ soil conditions for cable post bases in high-tension cable systems will be developed based on this required capacity as well as potential for frost heave at various geographical locations.

Principal Investigator: Dr. John Rohde.

Research Spotlight: Kansas State University Assessing the Damage Potential in Pretensioned Bridges Caused by Increased Truck Loads Due to Freight Movements (Phase 1)

This research is aimed at determining the existing stresses in a concrete bridge. The first step is to get a base strain reading of the concrete in its current stressed condition at a desired location, and then cut around this area using a diamond core bit to a depth of approximately one inch. The result is a "re-bounding" of most of the elastic strain carried by the concrete member at that point. By taking strain readings after penetration by the core drill, the change in surface strain can be determined, and thus also an estimate of the existing internal stress.

Initial work in the laboratory has centered on developing the specifics of the technique using traditional strain gages. Parallel work is simultaneously being conducted which will enable the strain measurements to be made by a non-contact technique using laser-speckle imaging in the future.

The initial laboratory phase has focused on members that were 40 inches long and had a cross section five inches wide and five inches tall. The specimens were then loaded axially in a universal hydraulic testing frame which could easily produce varying levels of internal stress. To capture the surface strain readings and correlate them to the internally applied stresses, the process of surface strain relief was refined. Strain gages were placed along the centerline of the beam, measuring strain parallel to the direction of load, and covered with microcrystalline wax for protection.

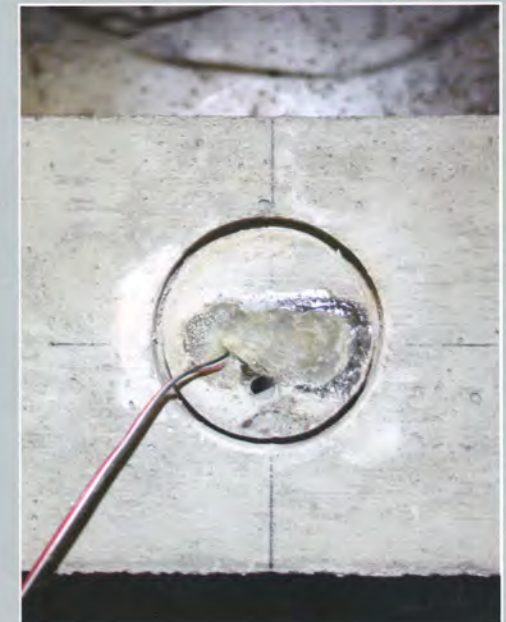
A quarter-inch hole was drilled through the beam an inch from the gage. The wires soldered to the gages were run through the drilled hole and out the backside of the member (note: this step will be eliminated when the non-contact measurement procedure is used). The beams were axially loaded and the strain readings were recorded. The load was held constant on the member while a concrete coring bit was placed around the gage and drilled to varying depths to release the surface strain. A wood jig was clamped to the beam to hold the coring bit in place.

During the batching and casting of the beams, concrete cylinders were made to test the compressive strength and modulus of elasticity of the mortar mix. The compressive strength results were used to calculate the loads placed on the axially loaded beams. The modulus of elasticity results were used to convert the surface strain reading to stress and compare to the average normal compressive stress on the gross cross section. The initial work has shown that a 2 1/2"-diameter core bit and a 1"-deep core depth produces reasonable results. In Phase 2, the work will be extended to use the technique on full-scale beams.

Principal Investigator: Dr. Robert Peterman.



Steve Hammerschmidt, a KSU student currently working on the project, preparing a concrete beam for testing.



Wires soldered to strain gages within the beam run through the drilled hole.



A collection trailer taking video and air quality data in Gardner, KS.



Detail view of a traffic data collection unit.



A rail crossing with an intermodal container train passing through, resulting in traffic congestion.



A KU student preparing to set up traffic counters in Gardner.

Research Spotlight: University of Kansas Evaluating Impacts of Rail-Truck Intermodal Facilities

In early 2006 the small town of Gardner, Kansas, a suburb of Kansas City, was selected by a major Class I railroad as the ideal location for a rail-truck intermodal facility and logistics park. Currently the town's infrastructure and economy is mostly based on non-industrial occupations and serves as a suburban escape for families from the hustle and bustle of Kansas City. When the railroad's plan became public in 2006, the town was sharply divided between those in favor of the development (and the jobs that would come with it), and those who feared the facility would ruin the status quo of the city, bringing with it the loud, busy, and fast-paced lifestyle characteristic of larger places like Kansas City, which many residents had tried to escape from by moving to Gardner. The city responded by assembling an Intermodal Review Committee to make recommendations to the city council, and on November 7, 2006 the city let voters decide over the annexation of the parcel of land in question. Voters responded by an almost 3:1 margin in favor of the city annexing the property. Originally the facility was slated to open in the fall of 2009, however due to various permission issues the opening date has been pushed back indefinitely.



A traffic data collection unit is used to determine the amount of truck traffic passing through Gardner before and after the opening of the intermodal facility.

The Kansas Department of Transportation has also been involved in this project, recognizing that in order for such a facility to operate trucks must have access to it, and the chosen location must lie strategically close to two state maintained highways, US-56 and I-35. For both the city and residents of Gardner, one concern is that US-56 becomes Main Street through downtown Gardner, and an influx of trucks headed eastbound toward Kansas City and I-35

would create congestion and reduce safety, which the city has said that would be "not acceptable."

Because of its neutrality as a non-partisan agency not subject to voter demands and without regulatory authority, the University of Kansas was approached with a request for an independent evaluation of evolving traffic patterns and railroad operations. The railroad has now completed a traffic study, and the residents and local governments have expressed their interest in following up on this study to quantify exactly what changes could be attributed to the forthcoming facility. Using MATC funding the university has developed a comprehensive strategic research project that will be able to monitor and quantify these changes, including both vehicular and rail traffic patterns, and related safety statistics. The research team will work with various transportation agencies to establish appropriate extents for the greater Gardner study region. It will catalog at-grade rail crossings in regions of Kansas affected by the intermodal facility including Gardner, and develop and implement a strategic work plan to capture traffic and railroad data on an alternating monthly basis. After collecting accident reports from the various jurisdictions, researchers will analyze the traffic and railroad data for evolving patterns and develop a methodology to compare impacts to a no-build (all truck) alternative.

Principal Investigator: Dr. Steven Schrock.

Research Spotlight: Missouri University of Science & Technology A Framework for Nationwide Multimodal Transportation Demand Analysis

In the year 2007, it is estimated that about 1.1 billion U.S. citizens made intercity trips longer than 100 miles for their business and leisure purposes, and that the U.S. industry transported approximately 19 billion tons of natural resources and manufactured products to serve markets. These facts indicate that the U.S. transportation system plays a key role in the country's economic activities, suggesting that an efficient transportation system is vital for the economic development of the country.

As a first step for devising the future U.S. transportation system, the nationwide transportation demand needs to be forecast in a systematic way. Several nationwide multimodal transportation demand models are available, but it is hard to find a comprehensive framework that simultaneously analyzes both traveler trips and freight flow. Thus, the primary intent of this research is to develop a modeling framework that estimates the nationwide multi-modal transportation demand for the U.S. transportation system, one that considers both intercity passenger flow and truck flow on the multimodal transportation system including the national highway system and the air transportation network.

By working closely with other research teams at Virginia Tech and Battelle, project leaders Hojong Baik and Yuepeng Cui from Missouri University of Science and Technology are able to integrate existing intercity transportation demand models that have been developed in different areas, such as the Transportation System Analysis Model (TSAM), which analyzes intermodal intercity traveler demand, and the Freight Analysis Framework (FAF), a nationwide freight demand model developed by FHWA. Selected models are then proposed for integration into a single framework using TransCAD, a transportation demand analysis tool. The information we expect to gain from working with this framework includes, for instance, congestion delays and level of service on the national highway system, total time traveled, and total distance traveled, as well as figures for fuel consumption and emissions caused by traffic.

As part of the economic stimulus plan, President Obama and new leaders in more than 30 states are considering constructing a high-speed rail system that would connect major cities in the U.S. This proposal has raised a couple of fundamental questions that need to be answered, such as: how many people will use the new rail system? And what impact will the new system have on the exiting highway and aviation traffic? The proposed methodology developed from this research project is expected to answer these and similar questions by providing an analytical tool to estimate the multimodal transportation demand and to assess the impact of proposed multimodal transportation improvement plans. By providing a consistent and comprehensive planning tool, the developed framework will assist in the improvement of linkages among all modes of the transportation system, which is one of the focus areas of the Mid-America Transportation Center.

Principal Investigator: Dr. Hojong Baik.

¹ TSAM has been co-developed by Missouri University of Science and Technology and Virginia Tech.



Yuepeng Cui is working on the computer modeling for this project.



Map of the proposed high-speed rail corridor (source: www.fra.dot.gov).



Map showing the traffic on the U.S. highway network in TransCAD.

Pictured below: WMA products evaluated for this research



Sasobit®



Cecabase RT®



Aspha-min®



Advera WMA



Seven WMA Products



Evotherm J1



Rediset WMX

Research Spotlight: University of Iowa Performance Measures of Warm-Mix Asphalt (WMA) for Safe and Reliable Freight Transportation

Warm-mix asphalt (WMA) is an emerging technology that can allow asphalt to flow at a lower temperature for mixing, placing and compaction. The advantages of WMA include reduced fuel consumption, less carbon dioxide emission, longer paving season, longer hauling distance, reduced oxidation of asphalt, early opening to traffic and a better working environment in the field. However, it is difficult for pavement engineers to select a proper WMA product or equipment because there are a large number of them marked without a guarantee for an equal or better performance compared to the Hot Mix Asphalt (HMA). To provide a safe and reliable highway for truck traffic, WMA mixtures must meet requirements for wear and frictional characteristics, as well as rutting and moisture resistance. Therefore, it is critical to evaluate WMA for its long-term frictional and wear characteristics, and for its rutting and moisture susceptibility.



A postdoctoral researcher and several graduate and undergraduate assistants working together at the asphalt laboratory.



Simple performance testing equipment used to measure the dynamic modulus and flow number of WMA mixtures.

Upon completion of this research, we will identify reliable WMA technology that would contribute to the road safety by minimizing the accident risk caused by unsafe road surface conditions for increasing freight movements on the U.S. surface transportation system.

Principal Investigator: Dr. Hosin "David" Lee.

The main objective of this research is to evaluate various WMA products with respect to their fundamental engineering properties and performance-related characteristics. As shown in Figure 1, seven commercially available WMA products were evaluated in the laboratory: Advera WMA, Aspha-min®, CECABASE RT®, Evotherm J1, Kumho KW, Rediset WMX and Sasobit®. These seven WMA mixtures, along with a WMA mixture and an HMA mixture, were evaluated for their fundamental engineering properties by performing the indirect tensile strength test and the moisture sensitivity test. To ensure a reliable long-term WMA mixture performance over a wide range of traffic and climatic conditions, the dynamic modulus and the repeated load test were conducted using the simple performance testing equipment shown in Figure 2. Figure 3 shows a post-doctoral scholar, two graduate students and three undergraduate students who have actively participated in this research.

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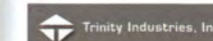
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MATC Funded Research Projects

University of Nebraska Projects	Fiscal Yr	PI
Assessing the Risk of Crash for Trucks on Onset Yellow	2009	Dr. Anuj Sharma
Computational Design Tool for Bridge Hydrodynamic Loading in Inundated Flows of Midwest Rivers	2009	Dr. Junke Guo
Design of High Tension Cable Post Bases	2009	Dr. John Rohde
Material Model Development for Wire Rope used in Safety Cable Barriers to Contain Passenger and Commercial Vehicles	2009	Dr. John Reid
Impact of Truck Loading on Design and Analysis of Asphaltic Pavement Structures	2009	Dr. Yong-Rak Kim
Risk Mitigation for Highway and Railway Bridges	2009	Dr. Andrzej Nowak
Truck Safety at Railroad Crossings	2009	Dr. Aemal Khattak
Study of RF Propagation Characteristics for Wireless Sensor Networks in Railroad Environments	2009	Dr. Hamid Sharif
Safety Investigation and Guidance for Work-Zone Devices in Freight Transportation Systems Subjected to Passenger Car and Truck Impacts with New Crash Standards	2008	Dr. Ronald Faller
Foundation Design for High Tension Cable Guardrails	2008	Dr. John Rhode
Investigating RFID for Roadside Identification Involving Freight Commercial Vehicle Operators (CVO) *Conducted at Prairie View A&M University	2008	Dr. Erick Jones
Impact of Trucks on Signalized Intersections	2008	Dr. Elizabeth Jones
Investigation of Factors Associated with Truck Crashes Related to Skid Resistance in Region VII	2008	Dr. Aemal Khattak
Kansas State University Projects		
Improving Safety of the Surface Transportation System by Addressing the Issues of Vulnerable Road Users: Case of the Motorcyclists	2009	Dr. Sunanda Dissanayake
Assessing the Damage Potential in Pretensioned Bridges Caused by Increased Truck Loads Due to Freight Movements (Phase 2)	2009	Dr. Robert Peterman
Extending Asphalt Pavement Life Using Thin Whitetopping	2009	Dr. Mustaque Hossain
Assessing the Damage Potential in Pretensioned Bridges Caused by Increased Truck Loads Due to Freight Movements (Phase 1)	2008	Dr. Robert Peterman
Characteristics and Contributory Causes Related to Large Truck Crashes (Phase I)	2008	Dr. Sunanda Dissanayake
Extending Pavement Life Using Thin Surfacing to Counter the Effect of Increased Truck Traffic Due to Freight Movements on Highways	2008	Dr. Mustaque Hossain
University of Kansas Projects		
Closed Course Testing of Portable Rumble Strips to Improve Truck Safety at Work Zones	2009	Dr. Steven Schrock
Estimating Highway Pavement Damage Costs Attributed to Truck Traffic	2009	Dr. Yong Bai
Mitigating Wind-Induced Truck Crashes	2009	Dr. Thomas Mulinazzi
A Preliminary Appraisal of the Safety and Operational Effects on the Regional Transportation System Created by New Rail-Truck Intermodal Facilities	2008	Dr. Thomas Mulinazzi
Feasibility of Using Cellular Telephone Data to Determine the Truckshed of Rail-Truck Intermodal Facilities	2008	Dr. Steven Schrock
Missouri University of Science & Technology Projects		
Validation on the Mechanical Models of Asphalt Pavement Structures with Field Measured Data Associated with Increasing Freight Movements	2009	Dr. Yu-Ning Ge
Pilot Study on Rugged Fiber Optic Brillouin Sensors for Large Strain Measurements to Ensure the Safety of Transportation Structures	2008	Dr. Genda Chen
Impact of Trucks in the Development of Work Zone Capacity Guidelines	2008	Dr. Ghulam Bham
Safer Work Zones for Heavy and Light Weight Vehicles: Speed Limit Up or Speed Limit Down	2008	Dr. Ghulam Bham
Improving Work Zone Safety for Freight Vehicles: Effective Design Patterns for Vehicle-Mounted Attenuators	2008	Dr. Ghulam Bham
A Framework for the Nationwide Multimodal Transportation Demand Analysis	2008	Dr. Hojong Baik
University of Iowa Projects		
Improving Freight Fire Safety: Analysis and Testing of Real Engine Conditions to Progress Development of Mist-Controlling Additives for Fire Mitigation	2009	Dr. Albert Ratner
Improving Freight Fire Safety: Assessment of the Effectiveness of Mist-controlling Additives in Mitigating Crash-induced Diesel Fires	2008	Dr. Albert Ratner
Performance Measures of Warm Asphalt Mixtures for Safe and Reliable Freight Transportation	2008	Dr. Hosin Lee
Safety Climate of Commercial Vehicle Operation	2008	Dr. Linda Boyle

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

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Pictured left to right: Jordan Mueller, Bethany Carlson, Jordan Pokorny, Geoffrey Priester, Paul Klopping.

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**Upcoming 2009
MATC Events:**

May 18-Aug. 14 - MATC Summer Intern Program

June 17-19 - Math and Science Professional Development Summer Institute for Teachers

July 1 - FY10 MATC Research Projects Announced

July 15-17 - Engineering Excellence Experience Days for Junior High and High School Students

Oct. 28-29 - MATC Freight Summit



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

MID-AMERICA
TRANSPORTATION CENTER

Associate Directors



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

Dr. Elizabeth "Libby" Jones is an associate professor in the Department of Civil Engineering at the University of Nebraska-Lincoln (Omaha campus). She directs and oversees the MATC Intelligent Transportation Systems Lab at the University of Nebraska's Peter Kiewit Institute. Dr. Jones has been a principal



investigator or co-principal investigator on more than 15 research projects. She has authored or co-authored 18 journal papers and served as committee chair for 18 masters' students. Currently she is supervising five masters' students and one Ph.D. student. Dr. Jones will serve as the MATC Associate Director for UNL.



Dr. Mustaque Hossain
Professor, Civil Engineering
Associate Director, Mid-America
Transportation Center, Kansas State
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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 four patents related to his research. Dr. Hossain will serve as the MATC Associate Director for Kansas State University.



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

Dr. Genda Chen is a professor in the Department of Civil, Architectural, and Environmental Engineering at the Missouri University of Science & Technology (formerly, University of Missouri-Rolla) and the interim director of the Center for Infrastructure Engineering Studies (CIES). He is a registered professional engineer in the state of California. Dr. Chen has been



principal investigator and co-principal investigator on over 40 research projects, totaling more than \$6 million for his teams and approximately \$2 million for his share. He has supervised 13 doctoral students and 11 masters' students, and has published over 35 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 & Technology.



Dr. Paul Hanley
Assistant Professor, Civil and
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Associate Director, Mid-America
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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 the MATC associate director for the University of Iowa.



Dr. Linda Boyle
Assistant Professor, Department of
Mechanical and Industrial Engineering
and Public Policy Center;
Associate Director, Mid-America
Transportation Center, University of
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Dr. Linda Boyle is an assistant professor in the Department of Mechanical and Industrial Engineering at the University of Iowa. She holds a Ph.D. in civil and environmental engineering



and a M.S. in inter-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 the MATC associate director for the University of Iowa.



Dr. Tom Mulinazzi
Professor, Civil, Environmental and
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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.