

MTC

Midwest Transportation Consortium



2009-2010 Annual Report

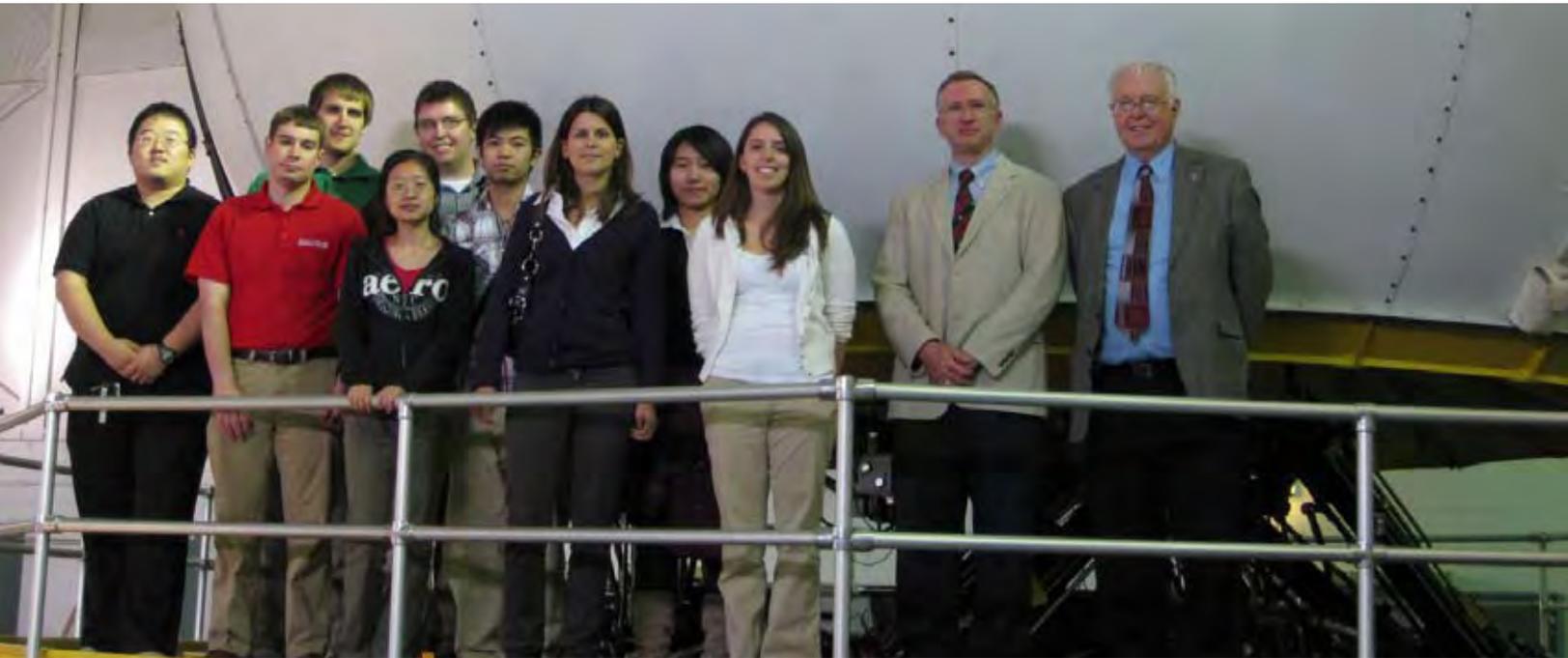
IOWA STATE UNIVERSITY
Institute for Transportation



The Midwest Transportation Consortium is one of 10 competitively awarded Tier 1 University Transportation Centers sponsored by the Research and Innovative Technology Administration (RITA) of the U.S. DOT

ABOUT MTC

The mission of the University Transportation Centers (UTC) program is to advance U.S. technology and expertise in the many disciplines comprising transportation through the mechanisms of education, research, and technology transfer at university-based centers of excellence. The Midwest Transportation Consortium (MTC) is a Tier 1 University Transportation Center that includes Iowa State University, the University of Iowa, and the University of Northern Iowa. Iowa State University, through its Institute for Transportation (InTrans), is the MTC's lead institution.



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TABLE OF CONTENTS

| | |
|---|-----------|
| ACKNOWLEDGMENTS | 3 |
| THE MTC AT A CLANCE | 5 |
| DIRECTOR'S MESSAGE..... | 7 |
| ORGANIZATIONAL STRUCTURE AND KEY PERSONNEL..... | 8 |
| RESEARCH..... | 10 |
| Recently Completed Sponsored Projects..... | 11 |
| Recently Completed Match Projects | 13 |
| Ongoing Sponsored Projects | 16 |
| Ongoing Match Projects | 18 |
| EDUCATION AND WORKFORCE DEVELOPMENT | 21 |
| Graduate and Undergraduate Education Activities..... | 22 |
| K-12 Education Activities..... | 26 |
| Collaborative Workforce Development Activities..... | 29 |
| OUTREACH AND TECHNOLOGY TRANSFER..... | 29 |
| Newsletter and Website..... | 31 |
| Sharing Research Results..... | 31 |
| Project Advisory Committees | 31 |
| Conferences and Webinars Supported..... | 31 |
| Journal Papers and Papers in Conference Proceedings | 33 |
| Presentations at Conferences/Workshops | 34 |
| Selected Outreach Activities | 35 |
| International Activities | 36 |
| FUNDING SOURCES AND EXPENDITURE..... | 38 |
| Sources..... | 38 |
| Expenditures | 38 |



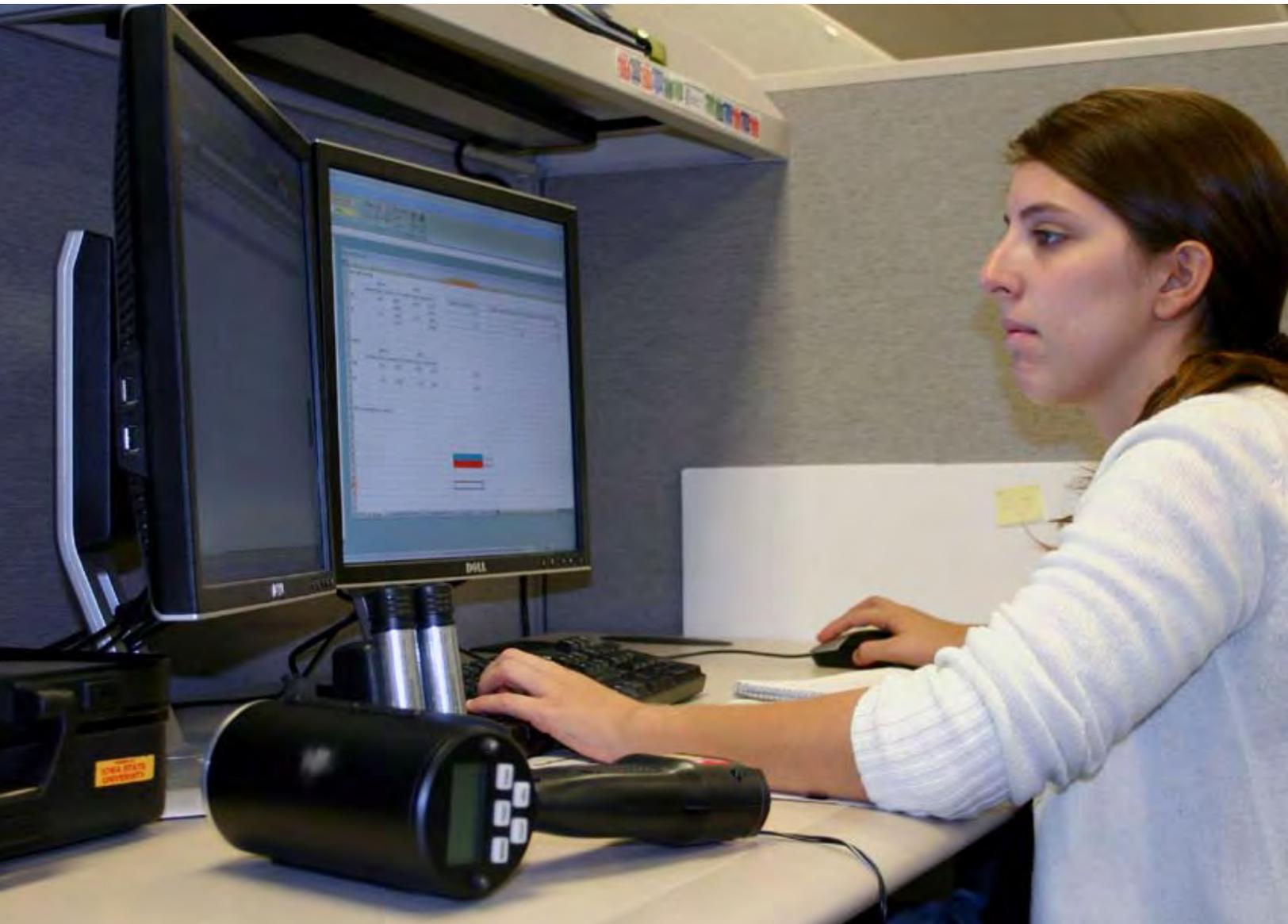
ACKNOWLEDGMENTS

We would like to thank the U.S. Department of Transportation's Research and Innovative Technology Administration (RITA) for funding the Midwest Transportation Consortium. We would also like to thank the Iowa Highway Research Board and the Iowa Department of Transportation (DOT). In particular, we would like to thank the Iowa DOT's Research and Technology Bureau Director Sandra Larson for her continued support of MTC and its mission.

The past year was a dynamic and important period for the MTC as we reached out to numerous transportation professionals to support our mission through events like the Midwest Transportation Workforce Development Summit, the spring-semester "Tom Maze Transportation Seminar" series, and other outreach activities. We would like to thank all the participants from these events for their time and energy.

Finally, we would like to extend a note of appreciation to our advisory board for their expertise and guidance:

- Tom Welch, State Transportation Safety Engineer, Iowa DOT
- Tom Granda, Team Leader, Human Centered Systems Laboratories, Turner-Fairbank Highway Research Center, Federal Highway Administration (FHWA)
- Peter Kissinger, President and CEO, AAA Foundation for Traffic Safety
- Barry Stephens, Senior Vice President Engineering, Energy Absorption Systems, Inc.
- Jerry Roche, Transportation Engineer, Iowa Division Office of the FHWA
- Shashi Nambisan, Director, Institute for Transportation



THE MTC AT A GLANCE

In October 2009, the Midwest Transportation Consortium (MTC) began its third year as a Tier I University Transportation Center (UTC). Its theme, “Transportation Safety through Improvements in Management Information Systems,” reflects our strong emphasis on safety.

The MTC is composed of Iowa’s three Regent universities: lead organization Iowa State University (ISU), the University of Iowa (Iowa), and the University of Northern Iowa (UNI). Located in a largely rural region, the MTC generally focuses its activities on intercity/rural traffic safety for motor vehicles.

All three universities conduct traffic safety research, each within a specific niche:

- ISU – Crash statistics and analysis to support safety in the design and operations of roadways
- Iowa – Human factors to improve safety
- UNI – Geographic information systems (GIS) and statistical tools to conduct safety analyses

The complementary nature of the member universities’ traffic safety–related specialties and their physical proximity to each other and to the Iowa DOT, the center’s major funding match partner, facilitate efficient and productive partnerships.

The three universities are also broadening students’ educational experiences by integrating courses and student activities. For example, the three universities alternately host and broadcast weekly seminars each spring semester. Staff and faculty from the three universities have collaborated on numerous research and outreach activities as well.

We continue to strengthen partnerships beyond the consortium member universities. The University of Iowa is also a member of the Mid-America Transportation Center (MATC) consortium, led by The University of Nebraska-Lincoln. The MTC’s associate director at the University of Iowa, Dr. Paul Hanley, serves on both MTC and MATC’s advisory boards and acts as liaison between them. In addition, ISU and the University of Wisconsin-Madison’s Midwest Regional UTC host the Mid-Continent Transportation Research Symposium in alternate years.

Finally, the MTC collaborates with other organizations through our advisory committee, which includes several highly knowledgeable and nationally prominent safety experts.



DIRECTOR'S MESSAGE



In uncertain economic times, here is one certainty: Strategic public investments in transportation—like the U.S. DOT's University Transportation Centers (UTC) Program—are critical to support economic recovery and provide a solid foundation for long-term prosperity. As the Midwest Transportation Consortium (MTC) concludes its third year as a Tier 1 UTC, I am pleased to provide this report outlining the MTC's contributions to the future of transportation.

During 2009–2010 the MTC has strategically leveraged UTC funding to support progressive, transportation safety–related research projects, as well as the recruitment and education of many bright and talented students who will be tomorrow's transportation professionals. In summary, during year 3 the MTC

- Awarded five new competitive research projects and completed 16 projects initiated in previous years.
- Distributed research results through presentations at many national and international events; papers published in a variety of refereed journals; and online, downloadable reports and technical summaries.
- Supported more than 20 graduate students, providing financial assistance, hands-on research experience, face-to-face time with nationally prominent transportation professionals, opportunities to present at the Transportation Research Board and other venues, and small-group workshops to help them get

the most out of their graduate-level program.

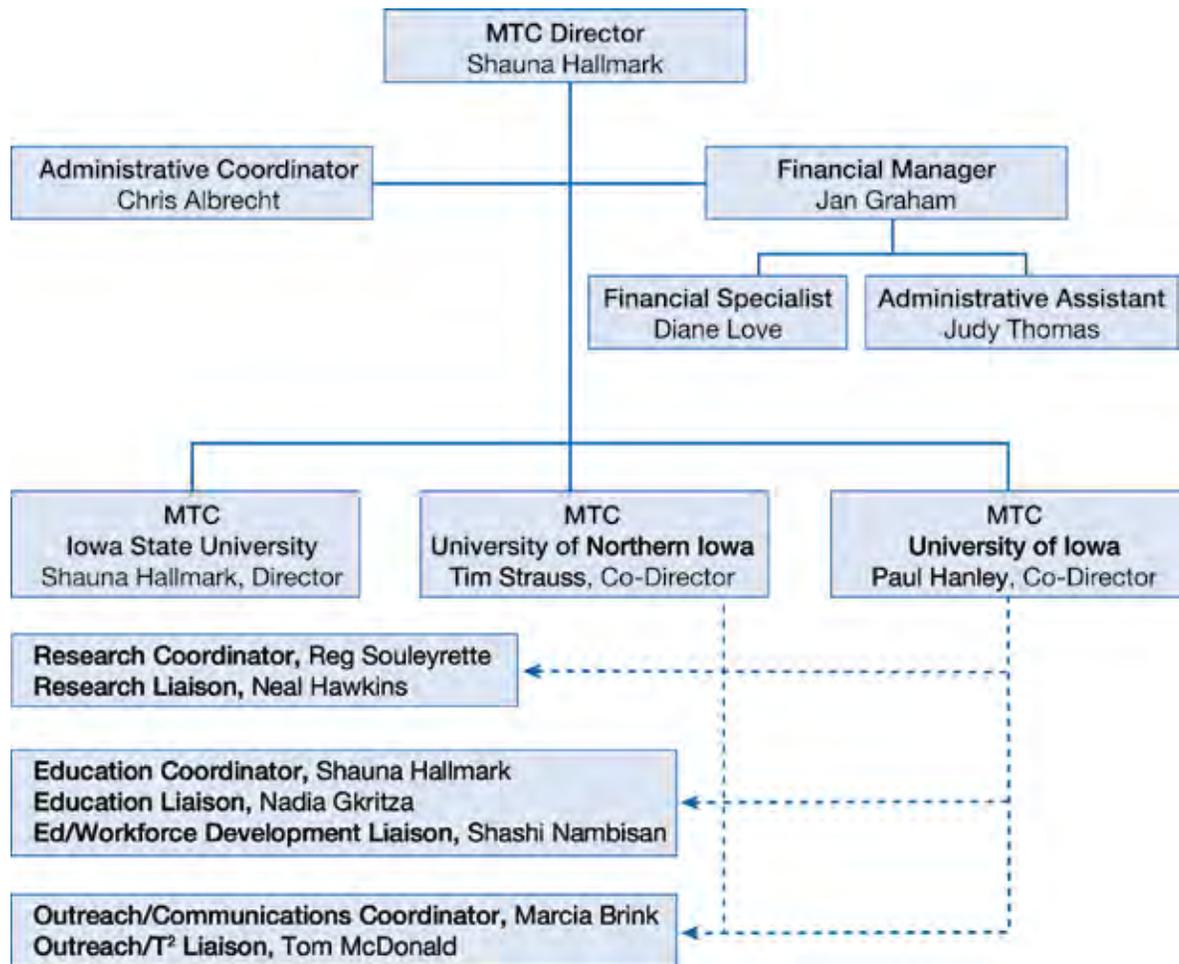
- Played a major role in a national transportation workforce development initiative, co-hosting Iowa's regional summit and helping to plan an upcoming national summit to establish a national workforce development agenda.
- Actively reached out to potential future transportation professionals through a unique online magazine for teenagers, *Go! / ¡Vamos!*; a one-day conference, the Road Less Traveled, exposing girls to careers in science, technology, engineering, and math; and advising a young LEGO® League team on a transportation-based project for a national competition.

It is professionally and personally satisfying to lead a program that is contributing transportation solutions that are critical to the country's economic well-being. On behalf of everyone at the MTC, I would like to thank Curt Tompkins, Lydia Mercado, and the rest of the team at the U.S. DOT's Research and Innovative Technology Administration for your guidance and support. And I want to thank Reg, Chris, Jan, Paul, Tim, Judy, Nadia, and Marcia who help me run the MTC, as well as the many gifted faculty, staff, and students who are the nuts-and-bolts of our research, education, and outreach activities.

Director
Midwest Transportation Consortium

KEY PERSONNEL

The MTC is housed in ISU's Institute for Transportation (InTrans). All MTC personnel are InTrans staff on partial appointment to the MTC. The MTC's organizational structure is illustrated in Figure A-1, followed by brief descriptions of key personnel and their roles.



Dr. Shauna Hallmark is the MTC director and principal investigator for the MTC's Tier 1 grant. She is also the MTC's education coordinator. In these roles, she is responsible for MTC's overall research, outreach, and educational activities and expenditures and directly leads its educational and student recruitment programming. She is also an associate professor of Civil, Construction, and Environmental Engineering at ISU, with a specialization in transportation engineering. In her role as a transportation engineer at InTrans, Dr. Hallmark is principal investigator or co-principal investigator on a large portfolio of projects.

Dr. Paul Hanley and Dr. Tim Strauss are co-directors of MTC, responsible for administering MTC activities at the University of Iowa and UNI, respectively. Dr. Hanley is the director of transportation policy research at the University of Iowa's Transportation Policy Center and associate professor of Urban and Regional Planning. Dr. Strauss is associate professor of Geography at UNI.

Chris Albrecht is the MTC's administrative coordinator. He administers MTC's annual research solicitation, tracks performance measures to meet UTC reporting requirements, helps recruit students and tracks their activities, oversees logistics of the MTC's spring seminar series, and handles several other administrative tasks. He is a transportation research specialist at InTrans.

Dr. Reginald Souleyrette is the MTC's research coordinator. He oversees the MTC's annual solicitation and award of research projects. He is professor of Civil, Construction, and Environmental Engineering at ISU and associate director of InTrans, leading the institute's research and outreach initiatives in geospatial safety information systems.

Ms. Marcia Brink serves as MTC's outreach coordinator. She is responsible for disseminating MTC-related information via its website and other media and for editing, publishing, and distributing electronic and paper MTC-funded research reports and technical summaries. She is the communications manager at InTrans.

RESEARCH

The MTC funds research in two ways:

- 1) Research projects selected through MTC's competitive proposal process ("sponsored projects"), which are monitored by the MTC director, administrative coordinator, and financial manager
- 2) Research projects related to the MTC's safety theme, selected on a case-by-case basis by the MTC director in consultation with the research and administrative coordinators, for which MTC provides some level of support, such as partial funding of a student or a partnering relationship ("match projects")

During year 3, the MTC awarded five new sponsored projects:

- "Horizontal Curve Identification and Evaluation"
- "Evaluating the Effectiveness of Red Light Running Camera Enforcement in Cedar Rapids and Developing Guidelines for Selection and Use of RLR Countermeasures"
- "Applicability of Road Assessment Program Methods to Metropolitan Safety Planning"
- "Safety and Mobility Impacts of Winter Weather - Phase 1"
- "The J-Turn intersection for Rural Expressways: Computer Simulation and Conflict Analysis"

Summaries of recently completed and ongoing projects, both sponsored and match, follow. Details of all MTC research can be found online, www.intrans.iastate.edu/mtc/projects/index.cfm.

Recently Completed Sponsored Projects

Spatial and Temporal Differences in Midwestern Crashes Relative to National Data: Public Policy Implications

Principal Investigator: Linda Boyle, University of Iowa

Match Funds: University of Iowa



This research explored the effects of driver characteristics and in-car and out-car conditions on the types of crashes that drivers are most likely to be involved in. It was hypothesized that personal and environmental characteristics surrounding a crash will affect the types of crashes. It was also hypothesized that differences in crash type patterns exist among four Midwestern states (Iowa, Kansas, Missouri, and Nebraska) and between the Midwest and the country as a whole. The results of this study confirmed that these differences do exist. Another goal of this study was to analyze the effect of different types of driver distractions on crash types. The results of this analysis showed that different sources of distraction lead to different types of crashes.

Managing Decisions Regarding Rural Expressway Routes and Associated Highway Bypasses

Principal Investigator: Reg Souleyrette, Iowa State University

Match Funds: Iowa DOT



Iowa has constructed bypasses along rural expressways over many years, which has led local residents and business people to raise concerns about the loss of business activity. In order to develop policies to help to alleviate negative impacts and create a better, more cost-effective system; it is essential to better understand the impacts of bypasses. Results of statistical safety analysis indicate that, at least when crashes are separated by severity, bypasses with at-grade accesses appear to perform more poorly than either the bypasses with fully separated accesses or with a mix of at-grade and fully separated accesses. However, the benefit in terms of improved safety of bypasses with fully separated accesses relative to bypasses with a mixed type of accesses is not statistically conclusive.

Roadway Alignments as Assets: Evaluating Alternatives for Valuing Major Highway Corridor Rights of Way

Principal Investigators: Reg Souleyrette and Dave Plazak, Iowa State University

Match Funds: Iowa DOT

The objective of this project was to explore alternative means of valuing right-of-way assets in terms of the benefit streams resulting from access management improvements. The research found that the main travel-time benefit streams appear to vary with changes in access features, suggesting that the operational benefits of access management may not be large, at least in the cases examined for this research. On the other hand, negative changes in the safety

benefit stream resulting from the addition of more commercial driveway accesses and traffic signals were several times larger. This implies that, in a setting such as the expressway corridors in this case study, the most compelling economic reason for managing highway access is safety.

Management of Rural Expressways for Improved Safety and Operational Performance

Principal Investigator: Reg Souleyrette, Iowa State University

Match Funds: Iowa DOT

Rural expressways are intended to provide many of the mobility and safety benefits of a freeway at far lower cost. The objectives of this research included developing a database and process for pro-actively identifying problem locations on expressways, developing a “toolbox” to account for safety when designing or improving expressway corridors, developing guidelines for varying access control on rural expressway corridors, and developing guidelines for Intergovernmental Corridor Management Agreements. This research also examined the geometric design features of J-Turn Intersections and how traffic operations and safety are influenced by those features. This project provided input to the task force and will ultimately result in changes in the design and operation of Iowa’s expressway system.

Iowa Pavement Marking and Sign Management System

Principal Investigator: Neal Hawkins, Iowa State University

Match Funds: Iowa DOT



The objective of this research was to develop a sign and pavement marking management system that improves the quality of signs and pavement markings on the roadway network and improves the ability to budget for these key assets. This work will help the DOT with the development of their pavement marking and sign management systems and provide a tool to do asset-related scenario planning regarding funding needs, life cycle, quality, and material selection.

Bridge Vulnerability Assessment and Mitigation against Explosions

Principal Investigator: Sam Kiger, University of Missouri - Columbia

Match Funds: California DOT and University of Missouri - Columbia

Following September 11, 2001, the FHWA and the American Association of State Highway and Transportation Officials (AASHTO) assembled a panel of experts to develop strategies and provide guidance to improve the safety and security of bridge and tunnel infrastructure. The goals of this project were to develop procedures to assist professionals and bridge owners identify critical bridges and to develop procedures to assess their vulnerability to explosions. The literature review indicated a need to establish a design criterion for prestressed box girder bridges subjected to blast loads, based on numerical and analytical results. This design criterion would predict the relation between the charge size and the damage type (no damage, spall, and breach). For these needs, numerical models based on nonlinear explicit finite element method were developed to predict the damage type.

Pavement Markings and Safety

Principal Investigator: Omar Smadi, Iowa State University

Match Funds: Iowa Highway Research Board

Using Iowa DOT data under nighttime conditions, this research effort is focused on capitalizing on current

research efforts and developing a systematic method to compare pavement marking and crash data for a given roadway segment. In addition, the research investigated the impact that varying levels of pavement marking retroreflectivity have on crash performance. The research findings can be used by agencies to develop strategies for determining the level of investment needed in pavement markings.

Recently Completed Match Projects

Development of Analytical Tools to Evaluate Road Departure Crashes / SHRP2 SO1

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: National Academy of Sciences

The main goal of this research was to develop analytical relationships among roadway, environmental, vehicle, and human factors and road departure risk and outcome. The focus was to map the sequence of events leading to road departure incidents and crashes and quantify how roadway, environmental, vehicle, and human factors influence whether an incident occurs in the first place, and how those factors affect subsequent events and final outcome. To accomplish this, analytical tools were created to develop exposure-based risk measures using surrogate crash measures with driver, vehicle, roadway, and environmental factors as characteristics as the response variables. The final report is available through the SHRP 2 program.

Evaluation of Electronic Speed Limit Signs for United Community Consolidated School

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Iowa DOT

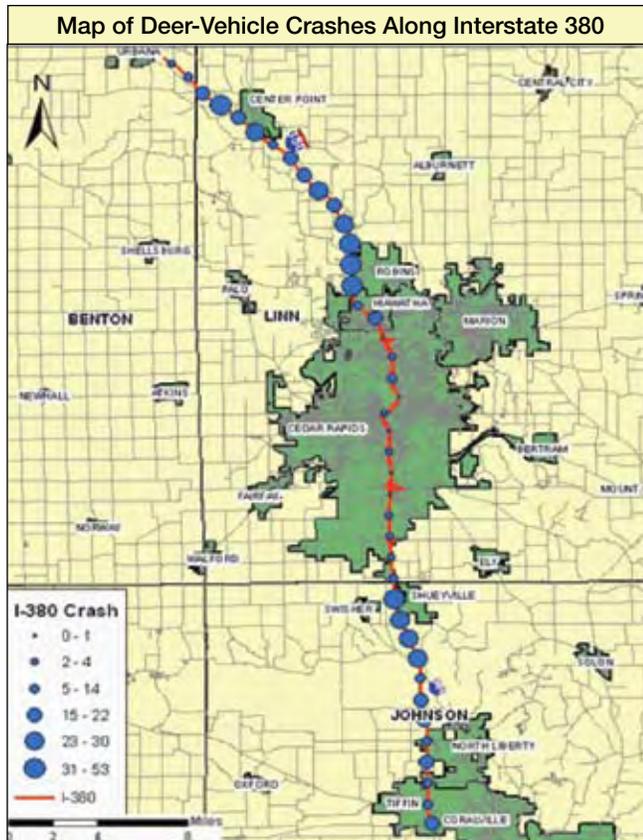


The objective of this project was to evaluate the effectiveness of an electronic speed sign at the United Community Consolidated School in reducing speeds near the school. The school is located on a four-lane expressway, and the school and Iowa DOT had expressed concerns about the interaction of high speeds and high volume of turning movements at the school. The evaluation provided information about the effectiveness of different types of signing in the unique situation where schools are located along expressways. A before and after speed study found the electronic speed limit sign, which only displayed the school zone speed limit during the hours in which it was enforced, to be more effective in getting drivers to follow the school zone speed limit than a traditional static speed limit sign. These results held true at both one and seven months after installation. Additionally the signs appeared to be more effective for the westbound traffic, where drivers were able to see the school when they encountered the speed zone signs.

Effectiveness of Special Deer Management Hunts on Deer-Vehicle Crashes

Principal Investigator: Konstantina Gkritza, Iowa State University

Match Funds: Iowa DOT



Many states strive to keep their deer population under control while maximizing public safety. In Iowa, measures to control deer populations include annual deer hunts and special deer herd management plans in urban areas. While these plans may reduce the deer population, their effect on traffic safety in these areas has not been fully assessed. This research examined the relationship between deer-vehicle collisions, deer density, and land use. The study found differences in the number of deer carcasses removed on roads and the number of reported deer-vehicle crashes. These differences can be attributed to a number of reasons, including variability in data reporting and data collection practices. Also, high rates of under-reporting of crashes were found on major routes that carry high volumes of traffic. This study also showed that multiple factors affect deer-vehicle crashes and corresponding injury outcomes in urban management zones. The identified factors could be useful for identifying locations that significantly impact deer species

and safety and for determining appropriate countermeasures. The research recommended reducing deer density adjacent to roads and developed land, providing wider shoulders on undivided roads, and improving the consistency and accuracy of deer carcass and deer-vehicle collision data collection methods and practices.

Integration of Analysis Methods and Development of Analysis Plan / SHRP2 SO2

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: National Academy of Sciences and University of Iowa

ISU was a subcontractor to the University of Iowa under this research project. This project summarized and prioritized research questions which will be included in the analysis portion of the full-scale instrumented driving study that is being conducted by the Strategic Highway Research Program (SHRP 2). Prioritization included understanding which research questions were the most appropriate to be answered using naturalistic driving study data and which questions would have the most value to public agencies in addressing road safety. The final report is available through the SHRP 2 program.

Update of "Roundabouts: An Informational Guide"

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: National Cooperative Highway Research Program

The Center for Transportation Research and Education (CTRE) at InTrans subcontracted with Kittelson & Associates for NCHRP 3-65: Roundabouts: An Informational Guide. Under this effort, the CTRE team conducted a portion of the literature review and organized and held three focus groups around the United States to obtain input from a range of users (from engineers to planners). Users were recruited and asked to provide input on what could be changed in the existing roundabout guide to address their needs.

Evaluation of Iowa's Drivers Improvement Program

Principal Investigator: Konstantina Gkritza, Iowa State University

Match Funds: Iowa DOT



This study examined the effectiveness of Iowa's Driver Improvement Program (DIP), measured as the reduction in the number of driver convictions subsequent to the DIP. The evaluation showed evidence of effectiveness in terms of reducing driver convictions subsequent to attending the DIP. Among the drivers who completed the course satisfactorily, 73% had no actions and 93% were not involved in a crash during the probation period. Statistical tests confirmed these numbers. However, the positive effect of satisfactory completion of DIP on survival time was not statistically significant 13 months after the DIP date. Econometric model estimation results showed that, regardless of the DIP outcome, the likelihood of conviction occurrence and frequency of subsequent convictions depends on other factors, such as age, driver history, and DIP location, and interaction effects among these factors. Low-cost, early intervention measures were suggested to enhance the effectiveness of Iowa's DIP. Given the large number of suspended drivers who continued to drive, consideration should also be given to measures to reduce driving while suspended offenses.

Improving Transportation for Large Scale Events within the State of Iowa

Principal Investigator: Neal Hawkins, Iowa State University

Match Funds: Iowa DOT

This project focused on improving travel safety and efficiency to and from Iowa's largest traffic generating events including the Iowa State Fair, college football games in Iowa City and Ames, high school sports tournaments at the Wells Fargo Events Center in Des Moines, and racing at the Iowa Speedway in Newton.

Hybrid Electric School Bus Deployment and Evaluation

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Iowa Energy Center



Two hybrid-electric school buses were purchased and used by Iowa school districts. Data were collected on fuel use, odometer readings, maintenance issues, and electricity use for the hybrid and non-hybrid control buses. The hybrid buses overall were 30 percent more fuel efficient than the control buses. The research found that the deployment of hybrid electric school buses in Iowa has the potential to produce significant impacts on the air quality, petroleum usage, and economic strength of the state while providing substantial health benefits to Iowans. The team used the project as the basis for an exercise at the "Road Less Traveled," a program to interest girls in middle and high school in careers in math and science. In addition, this research was widely reported in the news media around Iowa and was recently featured on National Public Radio.

Enhancing Motorcycle Conspicuity Awareness in Iowa

Principal Investigator: Konstantina Gkritza, Iowa State University

Match Funds: Iowa DOT



Previous studies suggest that low motorcycle conspicuity, or the inability of the motorcyclist to be seen by other road users, is thought to be an important factor in risk of motorcycle crashes. This research revisits the motorcycle conspicuity problem by analysis of helmet-use and motorcycle crash data. This study reviewed previous studies on motorcycle conspicuity and major trends in motorcycle helmet use. This research also compared single-and two-vehicle motorcycle crashes and examined the distribution of conspicuity related factors in light and dark conditions in two-vehicle crashes that could potentially relate to a collision between a motorcycle and another vehicle. The limitations of examining motorcycle conspicuity by analysis of crash data are also discussed. Finally, this report outlines recommendations based on the key findings of the study.

Ongoing Sponsored Projects

The J-Turn Intersection for Rural Expressways: Computer Simulation and Conflict Analysis

Principal Investigator: Reg Souleyrette, Iowa State University

Match Funds: Iowa DOT

The primary objective of this research is to provide improved design guidance for JTIs by learning more about the safety and operational consequences of including or excluding certain geometric design features under various traffic volume conditions. The proposed methodology to accomplish this research objective is to use the VISSIM micro-simulation software package in conjunction with FHWA's Surrogate Safety Assessment Model (SSAM).

Low-Cost Strategies to Reduce Speed and Crashes on Curves

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Iowa DOT

The main goal of this research is to evaluate the effectiveness of dynamic speed feedback signs and other low-cost strategies to reduce speeds and crashes on horizontal curves. Ultimately, the results of this research will provide traffic safety practitioners, county engineers, and other professionals with additional tools to more effectively manage speeds and decrease crashes on horizontal curves on rural roadways.

Safety and Mobility Impacts of Winter Weather – Phase 1

Principal Investigator: Zach Hans, Iowa State University

Match Funds: Iowa DOT



The primary objective of this research is to investigate opportunities for improving traffic safety on state-maintained roads in Iowa during winter weather conditions. Highway agencies spend millions of dollars to ensure safe and efficient winter travel. However, the effectiveness of winter weather maintenance practices on safety and mobility are somewhat difficult to quantify. Phase I of this project will investigate opportunities for improving traffic safety on state-maintained roads in Iowa during winter weather conditions.

Asset Management and Safety: A Performance Perspective

Principal Investigator: Omar Smadi, Iowa State University

Match Funds: Iowa DOT and Iowa Highway Research Board

The primary objective of this research is to develop a relationship between operational asset performance (roadway lighting, signage, pavement marking, and pavement condition expressed in roughness and rutting) on safety performance. As a secondary objective, the research team is investigating the feasibility of developing a methodology to prioritize safety improvements based on a benefit-cost analysis relating to individual assets condition (investing in signs versus marking or lighting, for example).

Use of Crash Surrogate Measures to Assess the Impact of Systematic Improvements and Other Countermeasures on Rural Roadway Safety

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Iowa DOT and Iowa Highway Research Board

The goal of this research is to provide better information about the effectiveness of rural roadway safety countermeasures, with a specific focus on lane departures. The project has three major emphasis areas: summarizing known information about rural lane departure safety countermeasures, evaluating effectiveness of edge line rumble stripes in reducing lane deviations, and evaluating the effectiveness of horizontal curve treatments in reducing lane deviations.

Applicability of Road Assessment Program Methods to Metropolitan Safety Planning

Principal Investigator: Reg Souleyrette, Iowa State University

Match Funds: Iowa DOT

The primary objective of this research is to investigate road assessment program and risk mapping strategies that may be applicable to small area metropolitan safety planning. The consideration of safety in metropolitan planning is a requirement of federal legislation (SAFETEA-LU). No specific guidance has yet been provided to MPOs on how safety should be considered, or where or at what level it should be considered (project, corridor or region-wide). The lack of guidance is particularly challenging to small planning agencies. In recent years, several safety analysis techniques have been developed that may be applicable to explicitly incorporate safety objectives in the planning process.

Evaluating the Effectiveness of Red Light Running Camera Enforcement in Cedar Rapids and Developing Guidelines for Selection and Use of RLR Countermeasures

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Iowa DOT

This research provides an opportunity to evaluate the effectiveness of cameras being installed in Cedar Rapids, Iowa. Cedar Rapids will also install speed enforcement cameras at select approaches where red light running cameras are installed since they felt that speed reduction at those locations is also important in improving safety. This will provide a somewhat unique opportunity to evaluate the two countermeasures together. The first goal is to conduct a before and after speed and violation study in Cedar Rapids during their deployment of red light running cameras. The second goal is to provide guidance to Iowa communities on the selection of effective red light running countermeasures.

Horizontal Curve Identification and Evaluation

Principal Investigator: Zach Hans, Iowa State University

Match Funds: Iowa DOT

The primary objective of this research is to expand the Iowa DOT effort to systematically identify high-crash and potentially problematic horizontal curves.

Behavior Study of Merge Practices of Drivers in Work Zone Closures

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Smart Work Zone Deployment Initiative

The purpose of this project is to determine which specific driver behaviors result in the greatest reduction of capacity with an impact on safety. The specific objectives are to identify the driver behaviors that are the most detrimental to work zone traffic flow/safety, to document the frequency of such behaviors, to determine the impact on capacity reduction, to develop strategies to modify to aberrant driver behavior, and to identify behaviors that have a direct negative impact on safety.

Ongoing Match Projects

Work Zone Forecasting Service

Principal Investigator: Zach Hans, Iowa State University
Match Funds: Smart Work Zone Deployment Initiative

The objective of this project is to promote and facilitate analysis and evaluation of the impacts of road construction activities in Smart Work Zone Deployment Initiative (SWZDI) states. The service may provide assistance in technical matters regarding application of software commonly used to investigate the impacts of construction activities; as well as develop models to estimate queue length, delay, travel behavior, and cost associated with specific road construction activities and traffic control.

Improving Traffic Safety Culture in Iowa

Principal Investigators: Konstantina Gkritza and Chris Albrecht, Iowa State University
Match Funds: Iowa DOT

This study will summarize the best practices and effective laws in improving safety culture in the United States and abroad. It will also assess the traffic safety culture initiatives in Iowa compared to other states and make recommendations to the Iowa Department of Transportation towards improving traffic safety culture in Iowa.

A Transportation Safety Planning Tool for the City of Ames

Principal Investigator: Konstantina Gkritza, Iowa State University

Match Funds: Iowa DOT and City of Ames

Transportation planning software helps evaluate safety alternatives for specific corridor segments. Nonetheless, it cannot be applied for screening a network to identify and rank sites for safety improvements or be used by metropolitan planning authorities to assess safety impacts of future changes in population and school density. Therefore, there is need for a systematic process and framework to explicitly consider road safety issues and establish future safety performance targets at the city level. The objectives of this research include developing safety performance functions and making recommendations to the City of Ames regarding the use of the developed screening and safety planning tools. Such a tool can provide decision support for planners to establish future safety goals and performance targets and could provide guidance to other communities.

Safety Analysis of Low Volume Rural Roads in Iowa

Principal Investigator: Reg Souleyrette, Iowa State University

Match Funds: Iowa DOT

Objectives of this project include identifying common site characteristics that may impact safety performance and creating a system-level generalized linear model for secondary, low-volume road crashes that will attempt to isolate crash, driver, and/or roadway variables that are the best predictors of low-volume road crashes.

Promotion of the Safety Edge

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Iowa DOT and FHWA

Pavement edge drop-off poses a particular hazard when vehicles leave the paved roadway surface and

attempt an immediate return to the roadway. The Safety Edge is a design feature which creates a fillet along the outside edge of the paved section of a roadway. The Safety Edge is placed during asphalt overlay using a device which extrudes and shapes the asphalt at the pavement edge into an approximately 30° fillet shape. The treatment allows vehicles which have left the paved roadway surface to the gravel shoulder to safely remount the pavement. Since use of the Safety Edge is relatively new to Iowa, the Iowa DOT and the Federal Highway Administration (FHWA), Iowa Division, commissioned this project to develop educational materials and market the Safety Edge to Iowa counties. The team identified resurfacing projects during the 2010 construction year, held open houses at select locations so that nearby agencies could attend and obtain information about the Safety Edge, and assisted agencies with questions about the application.

Pontis Implementation and Operation

Principal Investigator: Omar Smadi, Iowa State University

Match Funds: Iowa DOT

The objective of this project is to provide support to the Iowa Department of Transportation to implement and operate AASHTO's PONTIS bridge management software.

Evaluation of Rumble Stripes on Low-Vol-ume Rural Roads in Iowa

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Iowa DOT

The objectives of this research were to install and evaluate the performance of edgeline rumble stripes at six high-crash test locations in Iowa. The first phase of the project found that, in general, the wear of paint markings in the rumble stripes' grooves was similar to the wear on regular surfaces. The rumble stripes did not appear to improve the longevity of the painted edge line. In addition, research found that design of the milling machine should be modified

to allow for use on horizontal curves and to ensure predictable alignment and mill depth. This project includes a long-term assessment of pavement marking performance, preliminary crash assessments, and an evaluation of lane keeping. A second phase is expected to be complete in 2011.

Redevelopment of SAVER

Principal Investigator: Michael Pawlovich, Iowa DOT

Match Funds: Iowa DOT

SAVER is the acronym for Iowa's primary Safety Analysis, Visualization, and Exploration Resource.

SAVER was developed to serve Iowa's safety community by enabling them to access, visualize, and explore Iowa's crash dataset via a GIS interface. In addition to providing a mapping interface and user-friendly GUI, SAVER generates output map displays, a wide variety of reports, and collision diagrams. Users can specify a location and/or query the dataset via the GUI prior to requesting the aforementioned output. Redevelopment of SAVER within a freely distributable, open source GIS is ongoing, with periodic distribution of the current version to established SAVER users. In the past year, SAVER was greatly enhanced and improved, especially with regard to speed.

EDUCATION AND WORKFORCE DEVELOPMENT

The MTC focuses a significant share of its resources and energy on developing “human capital”—strategic educational activities for graduate and undergraduate students and on workforce development activities for K–12 students.



Graduate and Undergraduate Education Activities

A cornerstone of the MTC for many years has been its support of graduate and undergraduate students' academic preparation for professional careers in transportation. Toward this end, the MTC funds graduate student research assistantships plus a variety of educational, research, and professional enrichment activities for undergraduate and graduate students.

Participating MTC students are studying in an exciting variety of transportation-related disciplines. These include civil, construction, and environmental engineering; the interdisciplinary transportation degree program; community and regional planning; statistics; technical communications; and geography.

Research Assistantships

The majority of MTC funding is devoted to graduate student research assistantships. This funding advances both the MTC's educational mission and its research mission. Qualifying students receive assistantships to work on safety-related research projects (either MTC sponsored projects or MTC match projects).

In addition to successfully conducting their research, students receiving MTC assistantships are expected to participate in the Tom Maze Transportation Seminar and the Transportation Poster Competition, as well as submit quarterly progress reports on their research to MTC.

Educational and Professional Development Activities

The MTC organizes educational and technology transfer events and provides student funding for conference attendance, student meetings, and other professional development activities.

Tom Maze Transportation Seminar. Each spring semester, the MTC sponsors a weekly transportation seminar and hosts speakers from around the country. The seminar provides students with a broad picture

of regional, national, and international transportation issues with a focus on transportation safety. Students and faculty at former region 7 UTC consortium member university, the University of Missouri-Columbia, also participated this year, even though they are no longer members of the consortium. In addition, researchers and professional staff from Iowa DOT and FHWA, Iowa Division, regularly attend the seminar series. In spring 2010, 14 presentations were made, as listed in the table.

Spring 2010 MTC Seminar Series Speakers

| Date | Speaker | Topic |
|-------------|---|---|
| January 2 | Jon Luer Burns and McDonnell | Alternate Intersection and Interchange Design |
| January 29 | Paul Hanley University of Iowa | Mileage Charges as a Way to Pay for our Transportation System |
| February 5 | Tim Brown University of Iowa | Adaptive Cruise Control Research |
| February 12 | Ted Curtis City of Columbia, MO | Implementation of Non-Motorized Transportation |
| February 19 | Jerry Roche FHWA, Iowa Division | Safety Edge Pavement Treatments |
| February 26 | Corinne Peek-Asa University of Iowa | Injury Prevention in Transportation |
| March 5 | Tim Matisziw University of Missouri | Access to Air Transportation in the United States |
| March 12 | Doug Couto Citrix | Information Systems and Emerging Technologies |
| March 26 | Pete Rahn Missouri DOT | Making Highways Safer: Innovations and Solutions |
| April 2 | Butch Wlaschin FHWA | A Federal Perspective on Asset Management |
| April 9 | Don Hillis Missouri DOT | Traffic and Safety Programs in Missouri |
| April 16 | Chris Monsere Portland State University | Portland's Bike Boxes at Signalized Intersections |
| April 23 | Tim Klein U.S. DOT-RITA | How Research Results Affect Policy |
| April 30 | Howard Preston CH2MHill | Safety Planning on the County Road System in Minnesota |

Student of the Year. Every year one student is selected as MTC Student of the Year based on his or her overall record in terms of research, presentations, publications, student activities, and course grades. Michael Baird was chosen to represent MTC in this role in late 2009 and received a fully paid trip to the Transportation Research Board (TRB) annual meeting in Washington, D.C. in January 2010. Michael graduated in May 2010 with a master's degree in civil engineering. He is continuing his education by pursuing a PhD at Virginia Tech.

Student Mentoring Program and Stewardship Initiative. During year 3, all MTC-sponsored students followed new reporting requirements demonstrating their stewardship of MTC funding. A new mentoring activity, initiated in fall 2010, is a series of short workshops, or "group coaching sessions," to help students improve their communications skills. The workshops are taught by Dr. Christianna White, who has significant experience mentoring graduate students who are writing theses and doctoral dissertations. She is focusing the sessions on general topics relevant to report and thesis writing, such as planning and organizing a research document; conducting a literature review; revision as an engineering process; and the six C's of good writing: consistency, clarity, coherence, correctness, completeness, and conciseness.

Transportation Poster Competition. During the fall semester, the MTC sponsors a poster competition in conjunction with the Iowa DOT's annual Iowa Traffic and Safety Engineering Forum. Student poster presentations are evaluated by a panel of judges. In 2009, awards were given for both technical and presentation quality. Winners of the competition were the following:

- Catherine Rentziou – First Place (Technical)
- Evan Vencil – First Place (Presentation)
- Nicole Oneyear – Second Place (Technical)
- Elizabeth Westlake – Second Place (Presentation)

Attendance at TRB. As has been a tradition for many years, several students received partial funding from MTC to attend the 2010 annual meeting of the Transportation Research Board in Washington, D.C. Students attended numerous sessions, poster events, and committee meetings. Each student prepares a report when they return from TRB documenting the activities that they participated in.

MTC Students

During Year 3 of the Tier 1 grant, MTC supported dozens of students. The MTC sees this support as one of its most important investments. Many of these students have received special recognition for their research and studies.

During the past year alone, two MTC students received Dwight David Eisenhower Graduate Fellowships through FHWA:

- Nicole Oneyear received a 2010 fellowship that will help fund her thesis research on evaluating the Cedar Rapids red light camera program. It will also allow her to attend the 2011 TRB Annual meeting, where she will present her research in a poster session.
- Bennett Stone received a 2010 fellowship that funds his work for the Go! magazine, including stipend and travel to conferences.

In addition, two MTC graduate students received significant honors during Year 3:

- Catherine Rentziou won a travel grant to attend Transportation Finance: Forging a Sustainable Future - NOW! in New Orleans, Louisiana on May 19-21, 2010
- Teng Wang won an honorarium for preparation of the paper "A Transportation Safety Planning Tool for the City of Ames", to be part of the 12th National Conference on Transportation Planning for Small and Medium-Sized Communities held in Williamsburg, Virginia on September 22-24, 2010.

Over the years, numerous MTC students have gone on to successful careers in transportation. In the past year, 7 students completed their master's degrees at MTC member universities, while 1 student finished a PhD during the reporting period. The recent graduates are:

Michael Baird

BS, 2009, Civil Engineering, ISU, Ames, Iowa

MS, 2010, Civil Engineering (Transportation), Iowa State University (ISU), Ames, Iowa

David Dickie

BS, Scotland

MS, 2010, Industrial Engineering, University of Iowa, Iowa City, Iowa

Katie Greenwood

BA, 2008, English, Mount Mercy College, Cedar Rapids, Iowa

BA, 2008, Art, Mount Mercy College, Cedar Rapids, Iowa

MA, 2010, English Literature, ISU, Ames, Iowa

Anna Pestereva

BA, 2007, Geography, St. Petersburg State University, St. Petersburg, Russia

MA, 2009, Geography, University of Northern Iowa (UNI), Cedar Falls, Iowa

Catherine Rentziou

BS, 2008, Civil Engineering, National Technical University of Athens, Athens, Greece

MS, 2010, Civil Engineering (Transportation), ISU, Ames, Iowa

Bobbie Seppelt

BS, University of Illinois, Champagne, Illinois

PhD, 2009, Industrial Engineering, University of Iowa, Iowa City, Iowa

Naga Bhagvanth Ram Vattumalli

BTech, 2007, Electronics and Computer Engineering, Jawaharlal Nehru Technological University, Andhra Pradesh, India

MS, 2010, Computer Science, ISU, Ames, Iowa

Wei Zhang

BS, 2008, Civil Engineering, Beijing University of Technology, Beijing, China

MS, 2010, Civil Engineering (Transportation), ISU, Ames, Iowa

MTC-funded students continuing their research and pursuing their educations beyond Year 3 are:

Basak Aldemir-Bektas

BS, 2002, Civil Engineering, Middle East Technical University (METU), Ankara, Turkey

MS, 2006, Industrial Engineering, METU, Ankara, Turkey

PhD, expected in December 2010, Civil Engineering (Transportation), ISU, Ames, Iowa

Corey Bogenreif

BS, 2009, Civil Engineering, ISU, Ames, Iowa

MS, expected in May 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

Jeff Brown

BS, 2004, Transportation & Logistics, ISU, Ames Iowa

MS, expected in December 2011, Transportation, ISU, Ames Iowa

Brad Bybee

BA, 2009, Political Communication, UNI, Cedar Falls, Iowa

MA, expected in May 2011, Public Policy, UNI, Cedar Falls, Iowa

Saravana Chellappan

BE, 2007, Industrial Engineering, Anna University, Chennai, India

MS, expected in May 2011, Computer Science, ISU, Ames, Iowa

Dan Cook

BS, 2009, Civil Engineering, ISU, Ames, Iowa

MS, expected in December 2010, Civil Engineering (Transportation), ISU, Ames, Iowa

Ben Dow

BS, 2009, Industrial Engineering, University of Iowa, Iowa City, Iowa

MS, expected in May 2011, CAD-Research Engineering, University of Iowa, Iowa City, Iowa

Huishan Duan

BS, 2009, Civil Engineering, ISU, Ames, Iowa

MS, expected in May 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

Jian Gao

BS, 2010, Civil Engineering, ISU, Ames, Iowa

BS, 2010, Civil Engineering, Lanzhou Jiaotong University, Lanzhou, China

MS, expected in May 2014, Civil Engineering (Transportation), ISU, Ames, Iowa

DeVeon Harris

BA, 2009, Criminology, UNI, Cedar Falls, Iowa

MA, expected in May 2011, Geography, UNI, Cedar Falls, Iowa

Joshua Hochstein

BS, 2001, Civil Engineering, University of Nebraska, Lincoln, Nebraska

MS, 2009, Civil Engineering (Transportation), ISU, Ames, Iowa

PhD, expected in August 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

Nicole Hollopeter

MS, expected in May 2011, Industrial Engineering, University of Iowa, Iowa City, Iowa

Yu-Yi Hsu

BS, 1999, Statistics, National Central University, Jhongli City, Taiwan

PhD, expected in May 2011, Statistics, ISU, Ames, Iowa

Asha Khokale

BE, 2008, Information Science and Engineering, Sreenivasaiah College of Engineering, Bangalore, India

MS, expected in August 2011, Computer Science, ISU, Ames, Iowa

Justina Kotek

BA, 2009, Psychology and Spanish, UNI, Cedar Falls, Iowa

MA, expected in May 2011, Psychology, UNI, Cedar Falls, Iowa

Steve Lavrenz

BS, 2010, Civil Engineering, ISU, Ames, Iowa

MS, expected in December 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

Maria Silvina Lopez-Barrera

BArch, 2008, Architecture, University of the Republic, Montevideo, Uruguay

MArch, expected in December 2010, Architecture, ISU, Ames, Iowa

Mike Martello

BS, 1984, Civil Engineering, University of Florida, Gainesville, Florida

MS, 1989, Civil Engineering (Transportation), University of California, Berkeley, California

PhD, expected in May 2014, Civil Engineering (Transportation), Iowa State University, Ames, Iowa

Stewart McCoy

BA, 2008, Art & Design and Journalism & Mass Communication, ISU, Ames, Iowa

MA, expected in May 2011, Rhetoric, Composition & Professional Communication, ISU, Ames, Iowa

Britta Mennecke

BFA, 2010, Integrated Studio Arts, ISU, Ames, Iowa

MA, expected in May 2012, Graphic Design, ISU, Ames, Iowa

Luke Miller

BS, 2009, Community and Regional Planning, ISU, Ames, Iowa

MA, expected in December 2011, Geography, UNI, Cedar Falls, Iowa

Abhisek Mudgal

BTech, 2007, Civil Engineering, Indian Institute of Technology, Delhi, India

MS, 2009, Civil Engineering (Transportation), ISU, Ames, Iowa

PhD, expected in May 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

David Neyens

BS, 2005, Industrial Engineering, University of Iowa, Iowa City, Iowa

MS, 2006, Industrial Engineering, University of Iowa, Iowa City, Iowa

PhD, expected in December 2010, Industrial Engineering, University of Iowa, Iowa City, Iowa

Nicole Oneyear

BS, 2009, Civil Engineering, ISU, Ames, Iowa

MS, expected in May 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

Massiel Orellana

BS, 1998, Agronomy Engineering, University of Chile, Santiago, Chile

MS, 2001, Statistics, Pontifical Catholic University of Chile, Santiago, Chile

MS, 2008, Statistics, ISU, Ames, Iowa

PhD, expected in May 2011, Plant Breeding, ISU, Ames, Iowa

Archit Saraf

BTech, 2008, Information Technology, Heritage Institute of Technology, Kolkata, India

MS, expected in December 2011, Computer Science, ISU, Ames, Iowa

Bennett Stone

BS, 2010, Marketing, ISU, Ames Iowa

MS, expected in May 2012, Human Computer Interaction, ISU, Ames, Iowa

Evan Vencil

BS, 2009, Civil Engineering, ISU, Ames, Iowa

MS, expected in May 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

Bo Wang

BS, 2010, Civil Engineering, ISU, Ames, Iowa

MS, expected in May 2012, Civil Engineering (Transportation), ISU, Ames, Iowa

Teng Wang

BS, 2009, Civil Engineering, ISU, Ames, Iowa

MS, expected in May 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

Elizabeth Westlake

BSE, 2007, Industrial Engineering, University of Iowa, Iowa City, Iowa

MS, 2009, Industrial Engineering, University of Iowa, Iowa City, Iowa

MS, expected in December 2010, Urban and Regional Planning, University of Iowa, Iowa City, Iowa

K-12 Education Activities

In addition to supporting university-level education, the MTC funds several activities focused on guiding younger people into transportation education and careers. Following is a list of a few of these activities:

Go! Magazine

MTC is the major sponsor of *Go!*, an innovative online magazine designed to attract teens to careers in transportation. *Go!*, a workforce development project of InTrans, has been making steady headway since its inception in 2007. During *Go!*'s third year, the MTC significantly stepped up its support, funding an additional graduate student and activities like staff presentations at career fairs and conferences. With the support of the MTC and its other major sponsor, the FHWA, *Go!* accomplished the following in year 3:

- Published six issues, five featuring the themes of safety, sustainability, transit, space, and rail, respectively, and one featuring winners of a transportation-related fiction and nonfiction contest.
- Translated and published five issues of *¡Vamos!*, the Spanish version of *Go!*
- Developed and published Curriculum Connections, short articles that made explicit connections

between *Go!* feature articles and STEM (science, technology, engineering, and mathematics) content taught in the classroom.

- Presented at the 2010 TRB conference, the summer 2010 meeting of the Council of University Transportation Centers (CUTC) in Texas, an April 2010 FHWA-sponsored industry meeting focused

on workforce development, the August 2010 Mid-Continent Transportation Research Symposium in Wisconsin, and at the Iowa Math and Science Education Partnership Summit in summer 2010. At the summit, then Eisenhower Fellow Stewart McCoy shared *Go!*'s mission and activities with Iowa Governor Chet Culver and the attending teachers and teacher educators.



- Sponsored a transportation-related writing contest in June 2010. Almost 50 entries were received from several states and other countries.
- Implemented systematic tracking of website traffic data. Since its launch in 2007, *Go!* has gained new subscribers, and caught the attention of federal organizations such as FHWA's Research and Innovative Technologies Administration (RITA) and other units within U.S. DOT. It has about 41,400 unique annual visitors. The new tracking system will help staff better understand how visitors are using the site and implement planned improvements.



"The goal is to expand Go!'s impact by getting more and more young people across the country active in its development and content."
— Rema Nilakanta, Go! program coordinator

- Initiated social network sites on Facebook and Twitter, each with between 100 and 200 followers.
- Hired three new staff members: a full-time program coordinator, Dr. Rema Nilakanta, with experience in designing and using technology for learning in schools and colleges; and two graduate assistants, new Eisenhower Fellow Bennett Stone, from ISU's Human Computer Interaction program, and Britta Mennecke, from ISU's Graphic Design Department.

In its first three years, Go! has established a base of support. Now staff are preparing the ground for some exciting improvements based on user feedback and taking advantage of the technology savvy of our young audience. These improvements will kick off with an energetic new website design, which will premier with the first issue in December 2010. The new design is the first step in transforming Go! from a basic website to an engaging experience—dynamic, interactive, collaborative, and organic. The goal is to expand Go!'s impact by getting more and more young people across the country active in its development and content, with the potential to be a cornerstone tool in the national transportation workforce development effort.

Road Less Traveled

Every year the Program for Women in Science and Engineering at ISU sponsors one-day conferences—the Road Less Traveled—to expose girls in grades six through twelve to career paths in science, technology, engineering, and math (STEM). About 2,500 girls from Iowa participate each year. MTC Director Shauna Hallmark and graduate student, Nicole Oneyear, led a career track in civil engineering at the October 2009 and April 2010 events. They participated in four sessions which reached approximately 60 girls.

LEGO® League

Tom McDonald, MTC Outreach Liaison, served as an advisor for a LEGO® League team. The team of fifth and sixth grade students was from the Des Moines, Iowa, area, and their project was sponsored by LEGO®, Rockwell Collins, and ISU. The theme for 2009 was transportation. The goal of the league is to encourage innovative thinking and problem solving by younger students. The MTC hosted the students' practice presentations to faculty and students in December, 2009.



Collaborative Workforce Development Activities

The MTC partners with a variety of organizations to develop the transportation workforce of tomorrow, working diligently to develop interest among pre-college students in transportation-related careers. Over the years, MTC's primary partners have been the Iowa DOT and the FHWA, but several private associations work with the MTC on these activities as well. During year 3 of the UTC Tier 1 grant, MTC's main workforce development activities were as follow:

Workforce Development Summit

In April 2010, a two-day regional transportation workforce development summit was hosted by the MTC and InTrans at ISU. The purpose was to assess the educational and training needs of the future transportation workforce in the upper Midwest and identify strategies and best practices to address those needs across the various transportation career paths.

The approximately 70 summit attendees included college and university-level educators, state agency

human resources personnel, undergraduate and graduate college students, adult education experts, various transportation-related industry association representatives, and staff from public transportation agencies at all levels. Attendees could select among several presentations in two tracks, one focused on pre-college education and one focused on practitioners and college education.

This event was one of several regional summits sponsored by the U.S. DOT's Research and Innovative Technology Administration (RITA) UTC Program and the FHWA.

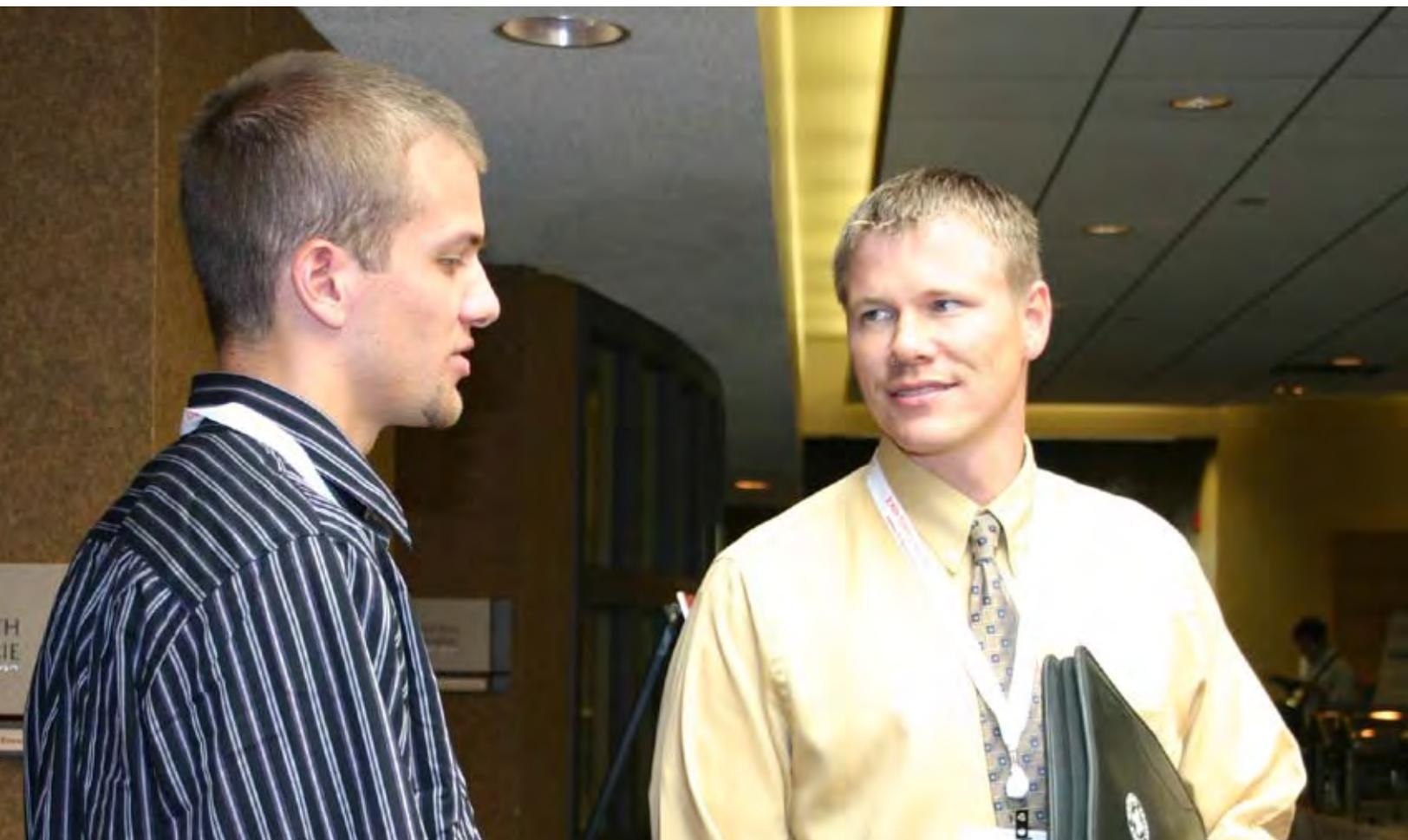
National Workforce Development Efforts

The MTC is also part of the planning team for a final, national summit in 2011 that will bring findings from the various events together into a national workforce development plan of action. Shashi Nambisan, director of InTrans and ex officio member of MTC's advisory board, and Chris Albrecht, MTC program coordinator, have both participated in the planning activities surrounding this larger effort.



OUTREACH AND TECHNOLOGY TRANSFER

Outreach activities during year 3 were numerous and diverse, including traditional dissemination of MTC research through our website and newsletter, sponsorship of conferences and workshops, dissemination of research reports and technical briefs, and subject area experts working directly with communities locally and internationally. Also during this year, the MTC began working more closely with Iowa Local Technical Assistance Program (LTAP) staff to identify partnering opportunities for translating safety-focused research findings into practice for Iowa's local communities.



Newsletter and Website

Two issues of the *MTC Bulletin* covering major MTC activities and accomplishments were printed and distributed during Year 3. They can be found online at www.intrans.iastate.edu/mtc.

In summer and fall 2010, MTC staff initiated a major update and reorganization of the website to better showcase the variety of activities that the MTC sponsors directly and indirectly. Initial revisions to the homepage have been made. The entire site will be completed by early 2011.



Sharing Research Results

Abstracts of current projects are provided on the MTC website. When a research project is completed, a full final report and a two-page technical summary, plus any related articles or guidelines, are published online for downloading and/or printing.

Project Advisory Committees

Every MTC sponsored (competitively selected) research project must have an advisory committee. Practitioners who participate in these committees learn about the project and the MTC and often become champions in implementing project results.

Conferences and Webinars Supported

MTC has long supported research conferences and participation by its staff and students. In 2010, MTC was a driver behind several successful events:

Preparing Tomorrow's Transportation Workforce: A Midwest Summit

As noted in the previous chapter, MTC and the Institute for Transportation (InTrans) at Iowa State University hosted a two-day regional transportation workforce development summit in April 2010. Part of an overall national workforce development effort, this event was held to assess the educational and training needs of the future transportation workforce in the upper Midwest and identify strategies and best practices to address those needs across the various transportation career paths.

Attendees included college and university-level educators, state agency human resources personnel, undergraduate and graduate college students, adult education experts, various transportation-related industry association representatives, and staff from public transportation agencies at all levels. The report is online, www.intrans.iastate.edu/mtc/documents/2010MidwestSummitReport.pdf.

Mid-Continent Transportation Research Symposium

As part of InTrans, MTC partners with the University of Wisconsin-Madison's Midwest Regional UTC to host the Mid-Continent Transportation Research Symposium in alternate years. The symposium provides a Midwestern venue for formally presenting research updates in a TRB-like track format.

With a theme of "Meeting Tomorrow's Transportation Challenges," the ninth annual event was hosted by the Wisconsin Transportation Center in Madison on August 19–20, 2010. Several ISU researchers and students presented, including Go! program coordinator Rema Nilakanta and MTC staffers Chris Albrecht and Neal Hawkins. The MTC and InTrans were among the sponsors of this event. The proceedings and all presentations are online, www.intrans.iastate.edu/pubs/midcon2009/index.htm, www.intrans.iastate.edu/pubs/midcon2009/index_presentations.htm.

InTrans will host the symposium in Ames, Iowa, in 2011. The event, slated for August 18–19, will cover issues ranging from infrastructure design to transportation policy and more. Expectations for this event are high, following 2009's record attendance of more than 400 participants.

Smart Work Zone Deployment Initiative (SWZDI) Pooled Fund Study 2010 Webinar

In July 2010, MTC Outreach Liaison helped the FHWA, Iowa Division, organize and host a national webinar for the Smart Work Zone Deployment Initiative pooled fund study. Replacing the conferences previously held every few years, the webinar format was used to facilitate the participation of as many agencies in the pooled fund study as possible.

While being considerably less costly than a conference, the webinar also made it possible for a broad national audience to learn about the work accomplished under the smart work zone pooled fund study. Approximately 110 participants from many agencies in several different states observed the low-cost webinar.

2009 Human Factors and Roadway Safety Workshop

This Iowa DOT workshop, hosted by the University of Iowa and co-sponsored by the MTC and its administrative home, InTrans, was indeed a working event to identify and prioritize needed research in human factors and safety. Attendees from the Iowa DOT, FHWA, the three Iowa regent universities, local governments,



professional associations, driver education associations, and neighboring state departments of transportation actively participated in focus groups. The top 25 research concepts can be found on the Iowa DOT's website, www.iowadot.gov/research/human_factors.htm.

TRB's 2010 Joint Summer Meeting

The MTC was one of several sponsors of TRB's 2010 Joint Summer Meeting— Planning and Performance Measurement for all Modes—held in Minneapolis, Minnesota.

Journal Papers and Papers in Conference Proceedings

Refereed journal papers and papers published in conference proceedings during year 3 included the following:

- Beyerlein, S., A. Bill, I. Van Schalkwyk, K. Sanford-Bernhardt, R. Young, S. Nambisan, and R. Turochy, "Need to Develop Core Concepts and Learning Outcomes for Introductory Transportation Engineering Course." *Proceedings of the 89th Annual Meeting of the Transportation Research Board, National Academy of Sciences*. Washington, D.C. January 10-14, 2010.
- Boeckenstedt, R., K. Gkritza, R. Souleyrette, and S. Nambisan, "Implications of Bioeconomy-Based Fuel Production to the Transportation Infrastructure in Iowa." *Proceedings of the 89th Annual Meeting of the Transportation Research Board, National Academy of Sciences*. Washington, D.C. January 10-14, 2010.
- Fitzsimmons, E., S. Hallmark, M. Orellana, T. McDonald, and D. Matulac. "An Investigation of Violation Reduction at Intersection Approaches with Automated Right Light Running Enforcement Cameras in Clive, Iowa Using a Cross-Sectional Analysis." *ASCE Journal of Transportation Engineering*, Vol. 135, No. 12, 2009, pp. 984-989.
- Fitzsimmons, E., S. Hallmark, D. Plazak, and K. Giese. "Evaluating the Change in Corridor Operations Based on Access Management Strategies Using VISSIM Along US Highway 69 Through Ankeny, Iowa." *Proceedings of the 89th Annual Meeting of the Transportation Research Board, National Academy of Sciences*. Washington, D.C. January 10-14, 2010.
- Gkritza, K. "Modeling Motorcycle Helmet Use in Iowa: Evidence from Six Roadside Observational Studies." *Accident Analysis and Prevention*. Volume 41 (3). pp. 479-484. 2009.
- Gkritza, K., C. Kinzenbaw, S. Hallmark, N. Hawkins, "An empirical analysis of farm vehicle crash injury severities on Iowa's public road system." *Accident Analysis and Prevention*, Vol. 42, No 4. 2010. pp. 1392-1397.
- Gkritza, K., M. Baird, Z. Hans. "Deer-vehicle Collisions, Deer Density and Land Use in Iowa's Urban Deer Herd Management Zones." *Accident Analysis and Prevention*, 42(6), 1916-1925. 2010.
- Hallmark, S., R. Sperry, and A. Mudgal. "In-Use Fuel Economy Benefits of Hybrid Electric School Buses in Iowa." *Proceedings of the 103rd Annual Conference and Exhibition of the Air and Waste Management Association*. Calgary, Canada, June 2010.
- Harding, C. and R. Souleyrette, "Investigating the use of 3D graphics, haptics (touch) and sound for highway location planning." *Journal of Computer-Aided Civil and Infrastructure Engineering*. 24 (2009) pp. 1-19.
- Harwood, D., K. Bauer, D. Gilmore, R. Souleyrette, and Z. Hans, "Validation of the usRAP Star Rating Protocol for Application to Safety Management of U.S. Roads." *TRR* No. 2147, 2010, pp. 33-41.
- Nambisan, S. and G. Karkee, "Do Pedestrian Countdown Signals Influence Vehicle Speeds?" *Proceedings of the 89th Annual Meeting of the Transportation Research Board, National Academy of Sciences*. Washington, D.C. January 10-14, 2010.

- Pulugurtha, S., S. Nambisan, M. Dangeti, and V. Vasudevan. "Evaluation of the Effectiveness of Traffic Signs to Enhance Pedestrian Safety." *Proceedings of the 89th Annual Meeting of the Transportation Research Board, National Academy of Sciences*. Washington, D.C. January 10-14, 2010.
- Vasudevan, V., S. Nambisan, and P. Kachroo. "Tiered System Based on Vehicle Miles Traveled for Highway Financing." Paper Number 10-0736, *Proceedings of the 89th Annual Meeting of the Transportation Research Board, National Academy of Sciences*. Washington, D.C. January 10-14, 2010.

Presentations at Conferences/ Workshops

During Year 3, several MTC staff and students presented research sponsored by or related to MTC's theme. Selected presentations include the following:

- Albrecht, C., K. Gkritza, and M. Baird. "Evaluation of the Safety Culture in Iowa." Mid-Continent Transportation Research Forum. Madison, Wisconsin, August 2010.
- Baird, M. "Land Use and Deer-Vehicle Crashes." Poster at the 14th Annual Iowa Traffic and Safety Engineering Forum. Des Moines, Iowa, November 2009.
- Beyerlein, S., A. Bill, I. Van Schalkwyk, K. Sanford-Bernhardt, R. Young, S. Nambisan, and R. Turochy. "Need to Develop Core Concepts and Learning Outcomes for Introductory Transportation Engineering Course." 2010 Annual Meeting of the Transportation Research Board. Washington, D.C., January 2010.
- Boeckenstedt, R., K. Gkritza, R. Souleyrette, and S. Nambisan, "Implications of Bioeconomy-Based Fuel Production to the Transportation Infrastructure in Iowa." 2010 Annual Meeting of the Transportation Research Board. Washington, D.C., January 2010.
- Dangeti, M., S. Pulugurtha, V. Vasudevan, S. Nambisan, and O. White. "Evaluating the Effectiveness of ITS-Based Countermeasures: How Effective Are They in Enhancing Pedestrian Safety." 2010 Annual Meeting of the Transportation Research Board. Washington, D.C., January 2010.
- Fitzsimmons, E., S. Hallmark, D. Plazak, and K. Giese. "Evaluating the Change in Corridor Operations Based on Access Management Strategies Using VISSIM along US Highway 69 through Ankeny, Iowa." 2010 Annual Meeting of the Transportation Research Board. Washington, D.C., January 2010.
- Hallmark, S., E. Fitzsimmons, H. Isebrands, and K. Giese. "Evaluating the Traffic Flow Impacts of Roundabouts in a Signalized Corridor." 2010 Annual Meeting of the Transportation Research Board. Washington, D.C., January 2010.
- Hallmark, S., M. Orellana, E. Fitzsimmons, T. McDonald, and D. Matulac. "Evaluating the Effectiveness of an Automated Red Light Running Enforcement Program in Reducing Crashes using a Bayesian Analysis." 2010 Annual Meeting of the Transportation Research Board. Washington, D.C., January 2010.
- Hallmark, S., R. Sperry, and A. Mudgal. "Fuel Economy Benefits of Hybrid Electric School Buses in Iowa." 51st Annual Transportation Research Forum. Arlington, Virginia, March 2010.
- Hochstein, J. "Bringing the J-Turn Intersection for High-Speed Rural Expressways to Iowa." 14th Annual Iowa Traffic and Safety Engineering Forum. Des Moines, Iowa, November 2009.
- Hochstein, J. "Rural Expressway Intersection Design Guidance: Suggestions for the AASHTO Green Book and the MUTCD." 2010 Annual Meeting of the Transportation Research Board. Washington, D.C., January 2010.
- McCoy S., M. Brink, S. Nambisan, and S. Hallmark. "Go! and CUTC: Working Together to Attract Teens to Careers in Transportation." Council of University Transportation Centers Summer Meeting. College Station, Texas, June 2010.

- Nambisan, S., “Opportunities, Partnerships, and Rewards in Transportation Education and Research.” Oklahoma DOT-Oklahoma Transportation Center Transportation Research Day, Oklahoma City, Oklahoma, October 2009.
- Nambisan, S. “Key Findings from a Scanning Tour to India,” 2010 Annual Meeting of the Transportation Research Board. Washington, D.C., January 2010.
- Nambisan, S. and G. Karkee, “Do Pedestrian Countdown Signals Influence Vehicle Speeds?” 2010 Annual Meeting of the Transportation Research Board. Washington, D.C., January 2010.
- Oneyar, N. “Evaluation of Electronic Speed Limit Signs for Unified Consolidated School on US 30, Eastbound and Westbound.” 14th Annual Iowa Traffic and Safety Engineering Forum. Des Moines, Iowa, November 2009.
- Oneyar, N. “United Community School District Electronic Speed Limit Sign.” 2010 MOVITE Spring Meeting. Kansas City, Missouri, April 2010.
- Pulugurtha, S., S. Nambisan, M. Dangeti, and V. Vasudevan. “Evaluation of the Effectiveness of Traffic Signs to Enhance Pedestrian Safety.” 2010 Annual Meeting of the Transportation Research Board. Washington, D.C., January 2010.
- Vasudevan, V., S. Nambisan, and P. Kachroo. “Tiered System Based on Vehicle Miles Traveled for Highway Financing.” 2010 Annual Meeting of the Transportation Research Board. Washington, D.C., January 2010.
- Wang, T. “Incorporating Safety into Transportation Planning for Small and Medium-Sized Communities.” 14th Annual Iowa Traffic and Safety Engineering Forum. Des Moines, Iowa, November 2009.
- Wang, T. “A Transportation Safety Planning Tool for the City of Ames.” TRB 8th National Conference on Transportation Asset Management. Portland, Oregon, October 2009.
- Wang, T. “Incorporating Safety into Transportation Planning for the City of Ames.” Mid-Continent

Transportation Research Forum. Madison, Wisconsin, August 2010.

- Wang, T. “Incorporating Safety into Transportation Planning for the City of Ames.” 12th National Conference on Transportation Planning for Small and Medium-Sized Communities. Williamsburg, Virginia, September 2010.

Selected Outreach Activities

MTC actively seeks opportunities to provide technology transfer and other outreach services. Following are examples:

Iowa Traffic Safety Data Service (ITSDS)

ITSDS provides agencies with the most readily available crash data analysis resources in Iowa. It was created to fill the gap between the safety data users can gather for themselves and the data they can obtain from experts. ITSDS uses the latest in geographic information systems technology developed by the Iowa DOT.

The service provides free crash data analyses and mapping services for anyone who needs to examine crash data to make decisions about funding, improving roads, implementing enforcement, writing reports, designing presentations, or increasing traffic safety awareness. It is jointly sponsored by InTrans, the MTC, the Iowa DOT, and the Iowa Governor’s Traffic Safety Bureau.

Heartland Highway Corridor Management Agreement

Chris Albrecht, MTC program coordinator, continues to serve as one of Iowa’s resources for access management-related research. In addition to serving in an advisory role to Iowa DOT personnel, Chris provides access management expertise to stakeholders along southeast Iowa’s Heartland Highway Corridor.

Specifically, during the past year, he has produced educational materials, given numerous informational presentations, and helped solidify a corridor management agreement among the many jurisdictions along this corridor.

Mapping Services for U.S. Road Assessment Program

Raising public awareness about traffic safety and enabling safety stakeholders to make risk-based decisions are two primary objectives of the usRAP pilot program. Initiated in 2004 by the AAA Foundation for Traffic Safety (AAAFTS), the program assesses crash risk on U.S. roads and provides the risk information to highway agencies in accessible formats. The MTC is a technical partner to Midwest Research Institute (MRI). MRI acts as liaison to eight participating highway agencies, including Iowa, while MTC focuses on mapping crash and other safety data from the pilot states.

When state or local-jurisdiction crash data are not available or adequate for creating risk maps, MTC students trained as usRAP technicians use video logs to populate a database of roadway design and traffic control features, then correlate the features with crash risk and assign ratings to various road segments. Agencies can use the results to develop safety improvement programs. In addition, MTC students have been instrumental in creating star ratings maps for countries in Latin America through the International Road Assessment Program (iRAP).

A partnership with a multinational navigation mapping corporation has been initiated to explore automation of the video reduction process. In the past year, usRAP has demonstrated a positive relationship between star ratings and risk maps. This has resulted in one journal publication and several conference presentations.

An article about usRAP appeared in the November 2009 UTC *Spotlight*. More information about the project can be found on the usRAP website, www.usrap.us/home.

Guidance for Lighting on Roadways in Iowa

The MTC was involved in developing good lighting practices for rural intersections aimed at reducing the number and severity of night-time crashes and provided information to decision-makers to select other

strategies to reduce night-time crashes. The guidance is aimed at resource-strapped local agencies in Iowa.

The information that resulted from the project is being incorporated into an updated chapter on street lighting in the Iowa Statewide Urban Design and Specifications (SUDAS). This program is the only one of its kind in the United States, and offers two manuals: the *SUDAS Design Manual* and *SUDAS Standard Specifications*, which contain all of the design standards and specifications for urban public improvements for the state of Iowa.

The street lighting chapter provides information about the benefits of street lighting based on the research so that agencies can determine the cost effectiveness of implementing lighting. The chapter updates also provide additional guidance on design and selection of lighting.

International Activities

Several MTC personnel are involved in international research and technology transfer activities. Following are some examples:

In fall 2009, Neal Hawkins, MTC research liaison, and Omar Smadi, principal investigator on several MTC projects, presented at the CBR&C 09/BRASVIAS Conference in Florianópolis, Brazil. Their presentation, based on MTC-sponsored research, addressed pavement marking technologies with a focus on applied strategies and solutions.



In December 2009, Hawkins and Smadi presented at the 2009 Gulf Traffic Exposition in Dubai, United Arab Emirates. Their presentation on infrastructure management, with a focus on asset management principles, drew heavily from projects sponsored by the MTC.

As part of a November 2009 TRB delegation, Shashi Nambisan, director of InTrans and ex officio member of MTC's advisory board, participated in a scanning tour of India to foster bilateral collaboration and cooperation with various transportation-related ministries in New Delhi and Patna.

In April 2010, Dan Gieseeman, a prolific safety data systems developer at InTrans who works closely with MTC faculty, traveled to the Second International Conference on Urban Traffic Safety in Edmonton, Alberta, Canada, where he taught a workshop and made a presentation about spatial analysis and visualization of traffic safety data.

In summer 2010, Reg Souleyrette, MTC research coordinator, explored potential research collaborations related to rail transportation in Germany, Switzerland, Italy, Taiwan, and China. He is now using his first-hand knowledge of state-of-the-art European and Asian high-speed and conventional rail systems in his undergraduate course on railroad planning and design.

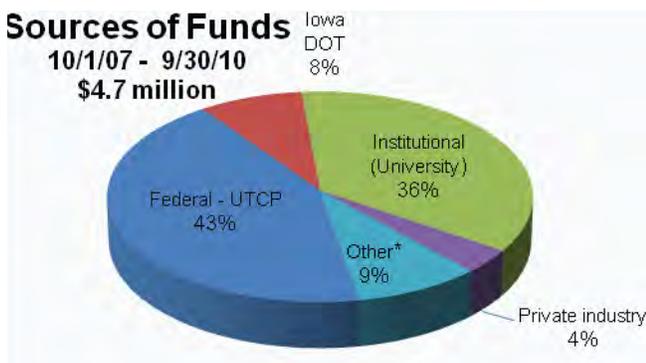


FUNDING SOURCES AND EXPENDITURE

Sources

As illustrated, the U.S. DOT's UTC program has funded 43 percent of the MTC's Tier 1, \$4.7 million program to date, and the following match partners have funded 57 percent to date:

- 36 percent institutional (ISU)
- 8 percent Iowa DOT
- 4 percent private industry (Midwest Research Institute and AAFTS support of usRAP activities)
- 9 percent FHWA (included cooperative agreement with FHWA, "Evaluation of Speed Activated Displays on Curves," and registration fees and sponsorship for 2009 Mid-Centent Transportation Research Symposium)



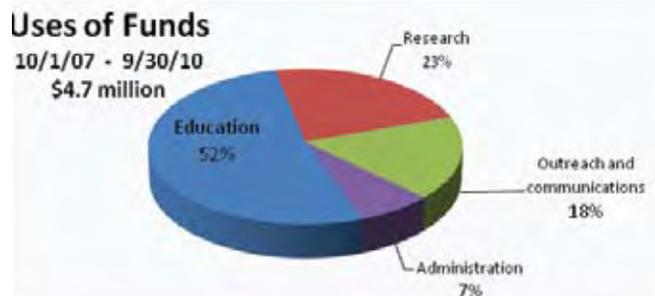
* "Other" is research funding from U.S. DOT DTFH61-07-H-00022 (Legislative Authority for funding: Section 5203 (c) Technology Deployment Program – Section 503 (c) of title 23, US Code of SAFETEA-LU), an allowable source per UTC General Provisions.

Expenditures

The three universities that comprise the MTC have expended approximately \$4.7 million in federal and match funding since the start of its Tier 1 grant. The expenditures originated at the partner universities as follows:

- 80 percent at ISU, the lead university (only 70 percent of UTC funds were expended at ISU, indicating that a greater portion of matching funds originated at ISU)
- 15 percent at University of Iowa
- 5 percent at UNI

As shown in the figure, more than half of all expenditures to date were for the educational component of the program. However, since all MTC-supported students are expected to participate in research and work on projects, approximately a third of the educational expenditures could also be considered to be part of the research component.



The general breakdown of expenditures is as follows:

- 52 percent direct educational support for students, including
 - stipends, fringe benefits, tuition, registrations and professional development, travel and student events

- faculty and staff coordinating the educational program, mentoring and advising students
- hosting the spring semester seminar (internet bridge, speaker support, luncheon meetings with visiting speakers and professionals)
- partial support of Go! online magazine
- 23 percent MTC sponsored research and MTC match projects
- 18 percent technology transfer/outreach, including MTC newsletters and other publications, web development and maintenance, project reporting, conference and webinar sponsorship and participation, etc., in addition to the usRAP outreach activity
- 7 percent computer support, event coordination, and departmental administration

