



2007–2008 ANNUAL REPORT

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Center for Transportation
Research and Education

IOWA STATE
UNIVERSITY

About the 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 Center for Transportation Research and Education (CTRE), is the MTC's lead institution.

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The MTC at a Glance

In October 2007, Iowa State University's Midwest Transportation Consortium (MTC) entered its first year as a Tier I University Transportation Center (UTC) under the theme "Transportation Safety through Improvements in Management Information Systems." Because of the MTC's location in a largely rural region, the center has focused generally on intercity/rural traffic safety for motor vehicles.

The MTC's specific theme makes it easy for its partner universities to work with each other and with the Iowa Department of Transportation (Iowa DOT), the center's major funding match partner. The MTC is composed of the three Iowa Regents universities: Iowa State University (lead), the University of Iowa, and the University of Northern Iowa. All three universities have conducted and are currently conducting traffic safety research, each within a specific niche:

- Human factors to improve safety—University of Iowa
- Crash statistics and analysis to support safety design in the design and operations of roadways—Iowa State University
- Geographic information systems and statistical tools to conduct safety analysis—University of Northern Iowa

The focused theme also enables the three partner universities to integrate classes and student supervision among the universities. For example, Iowa State University students have taken safety-related courses to broaden their educational experience at the University of Iowa, and vice versa. In addition, an Iowa State University student has participated in University of Iowa research projects, and a member of the Iowa State University management team is a member of the University of Iowa graduate college and serves on Ph.D. committees at the University of Iowa.

In terms of research, having a narrow focus with a specific objective has been advantageous. With the emphasis on safety under the current federal transportation policy bill (SAFETEA-LU), the MTC has found that its focus on safety has been important and popular.

Director's Discussion

Fiscal year 2008 was a year of transition for the MTC. We simultaneously initiated the Tier 1 grant and wrapped up the final year of our regional center grant. One of the regional center's projects, the use of innovative designs to upgrade the expressway system, will be continued at the request of the Iowa DOT. Under the Tier 1 grant, our competitive research program has been slow to get up to speed, primarily because our researchers are already involved in other safety-related research funded by other sponsors. However, we anticipate receiving many new proposals as the Tier 1 center's momentum grows.

Our educational program continues to be a strong part of our center. In the spring and summer of 2008, five graduate students supported by the MTC completed their master's degrees. During fall 2008, 16 graduate students currently participate in the master's and doctoral degree programs at Iowa State University. This number of currently enrolled student is above our target. In addition, the University of Iowa supports 10 graduate students and the University of Northern Iowa supports 4 graduate students. All are pursuing degrees that will lead to careers in the field of transportation.

One of our strengths during the past year has been collaborating with other UTCs. Our greatest success has been to cooperate with the University of Wisconsin-Madison's Midwest Regional University Transportation Center to host the Mid-Continent Transportation Symposium in alternate years and locations. The most recent event was held in Madison, Wisconsin, on August 14–15, 2008.

In addition, we have continued to work with other UTCs on collaborative programs. One of our consortium partners, the University of Iowa, is also a member of the Mid-America Transportation Center's (MATC) consortium. Moreover, MTC Associate Director Linda Boyle serves on both the MTC and MATC executive boards. Although the two centers have not yet conducted any initiatives together, Dr. Boyle acts as a liaison and looks for opportunities to collaborate.



Opening session of the Mid-Continent Transportation Symposium in Madison, Wisconsin on August 14, 2008

Another way the MTC collaborates with other centers and agencies is through our advisory committee, which includes five highly knowledgeable safety experts for the Tier 1 center:

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

Associate Director Linda Boyle, University of Iowa, and Associate Director Tim Strauss, University of Northern Iowa, serve as ex-officio members, in addition to myself.

Tom Maze
MTC Director

Organizational Structure and Key Personnel

The MTC is housed within the Center for Transportation Research and Education (CTRE) at Iowa State University. CTRE has its own administrative, research, and communications staff. Consequently, all of the MTC's key personnel are on partial appointments to the MTC.

Tom Maze is the director of the MTC and is the principal investigator of the MTC's grant. He is responsible for all activities undertaken by the MTC and has been involved in the UTC program since its inception. Tom is also a professor of civil engineering at Iowa State University, with a specialization in transportation engineering, and is a prolific researcher.

Tom works with two associate directors. Linda Boyle, Associate Professor of Mechanical and Industrial Engineering at the University of Northern Iowa, is in charge of all activities at the University of Iowa. Tim Strauss, Associate Professor of Geography at the University of Iowa, is in charge of all activities at the University of Northern Iowa.

The MTC management team at CTRE/Iowa State University underwent a major transformation during the spring of 2008. MTC Educational Coordinator and Co-Principal Investigator David Plazak left CTRE for a position with the Transportation Research Board. His duties have been distributed among several people:

- Chris Albrecht took over as coordinator of all MTC activities in June 2008. Chris collects performance measures, prepares solicitations, and handles other administrative details. He also recruits students and is their primary contact at the MTC.
- Shauna Hallmark, Associate Professor of Civil Engineering at Iowa State University, will serve as the education coordinator and be the professor-in-charge of the MTC's Transportation Scholars seminar.
- Reg Souleyrette, Professor of Civil Engineering at Iowa State University, is in charge of all crash statistics and crash location outreach activities.
- Neal Hawkins, CTRE's Associate Director for Traffic Operations, is responsible for organizing all safety-related research focus groups and forming a research agenda for other researchers.



**Tom Maze, Director
of the MTC**

Other MTC personnel include the following:

- Jan Graham, financial manager for the MTC. She has been involved in financial management over the entire course of the UTC program.
- Diane Love, account specialist. Her primary responsibility is administration and processing of bills and salaries for students, staff, and faculty.
- Judy Thomas, administrative assistant.
- Michele Regenold, CTRE's webmaster. She oversees the MTC website and publications.
- The CTRE communications group edits all reports and written material produced by the MTC.

Although a number of other CTRE staff are involved in administrative tasks, the MTC occupies a very small portion of their time, often 5 percent or less.

Research Overview

The MTC funds two types of research projects:

- 1) Competitively selected projects
- 2) Other sponsored projects to which an MTC student is added to enhance its quality and thoroughness

Competitively Selected Projects

Our process for competitively selecting projects is to first send out a call for pre-proposals. These are two-page documents describing the research problem statement but not necessarily identifying the source of matching funds or specifying information regarding staffing and other details. Pre-proposals are peer-reviewed by personnel both inside and outside the MTC to determine whether the topic has sufficient merit. If the project meets academic standards, the principal investigator is asked to develop the pre-proposal into a full proposal, including a written statement specifying the source of project's matching funds.

At this point, the MTC sends the proposal to select transportation practitioners to make sure that the research will result in useful findings. For example, if a proposed project relates safety to the geometric design of highways, we might send the proposal to geometric designers and safety engineers at state departments of transportation (DOTs) surrounding Iowa.

Projects selected competitively are expected to include an ample budget to pay the cost of graduate students' assistantships, researchers' salaries, and project expenses. The MTC also requires that each project have an advisory committee (this is often a requirement of the matching partner as well). Competitively selected projects are more highly monitored by the director of the MTC than other projects, and sometimes the MTC will appoint members to the project's advisory committee. These projects have budgets ranging from \$50,000 to \$200,000.

Other Sponsored Projects

Other sponsored projects, which include projects to which an MTC student is added, must relate to the MTC's theme. For example, the MTC is currently collaborating on a project with CH2M Hill, an international professional services firm, to write a white paper on the use of black spot analysis versus systematic approaches for directing highway safety improvements. Black spot analysis involves looking for high-crash locations, while systematic approaches involve implementing a safety improvement to an entire network of highways, regardless of whether a crash has occurred at any single location. An MTC student is working on this project, which is funded by the National Cooperative Highway Research Program (part of the Transportation Research Board). The MTC student is participating in this project because the project relates to the MTC's theme: improving management information systems to improve highway safety.

Information about specific research projects undertaken this year is listed under "Research Project Status Report" later in this report.

Education

Developing Human Capital

A primary focus of the MTC has always been on the development of human capital. Consequently, the majority of our funding is devoted to student assistantships for “transportation scholars.” Although scholars may be either undergraduate or graduate students, all MTC students for 2007–2008 are graduate students.

Having a large educational program is synergistic with the MTC’s research program because students on assistantship often work on projects related to the center’s theme. Regardless, all scholars are required to have matching funds, which may come from internal or external sources.

In 2008, five scholars completed their master’s degrees at Iowa State University, and two students left with their dissertations unfinished. These students include the following:

- Rebekah Bovenmyer. Rebekah graduated with an MA in English (specializing in creative writing). She worked as a graduate assistant for CTRE’s communications group, where she wrote articles for *Go!* magazine (explained in more detail below) and edited the MTC’s website and newsletter. Rebekah currently does freelance communications work and lives in Madison, Wisconsin.
- Xudong Chai. Xudong completed all the requirements for a Ph.D. in civil engineering (specializing in transportation engineering) except for the dissertation. He currently works for an international consulting firm in Philadelphia, Pennsylvania, where he plans to complete his dissertation.
- Josh Hinds. Josh completed an MS degree in civil engineering (specializing in transportation engineering). He currently works for an engineering consulting firm in Ankeny, Iowa (a suburb of Des Moines, Iowa).
- Hillary Isebrands. Hillary has finished all the requirements for a Ph.D. in civil engineering (specializing in transportation engineering) except for the dissertation. She currently lives in Colorado, where she is researching the safety performance of roundabouts. She has become nationally known for her expertise related to roundabouts.
- Greg Karsen. Greg completed an MS degree in civil engineering (specializing in transportation engineering). He currently works for an engineering consulting firm in Ankeny, Iowa.
- Caroline Kinzenbaw. Caroline completed an MS degree in civil engineering (specializing in transportation engineering). She currently works for an engineering consulting firm in Johnston, Iowa (a suburb of Des Moines, Iowa).
- Craig Mizera. Craig completed an MS degree in civil engineering (specializing in transportation engineering). He currently works for an engineering consulting firm in Ankeny, Iowa.

It is unusual that almost all our graduating/departing students are civil engineers and that so many went to work for consultants. Typically, more Iowa State University students receive degrees in either in community and regional planning or the interdisciplinary transportation master's degree program. Although many of our former students work for transportation consultants, many have also found their first jobs at other universities; shippers or carriers; and local, regional, or federal governments.

Neither the University of Iowa nor the University of Northern Iowa graduated MTC students during the 2007–2008 academic year. However, when students from those universities do graduate, they'll do so from a variety of disciplines, including civil engineering, geography, industrial engineering, planning, and public health.

Transportation Scholars Program

In the MTC's Transportation Scholars Program, students' educational curricula are enhanced by opportunities to conduct research, interact with transportation professionals, obtain special mentoring, and attend regional and national conferences.

All scholars enrolled in the program are required to take courses outside of their home department to achieve an interdisciplinary perspective. Each student's curriculum is unique, and the potential programs at each partner university are unique. However, all scholars are required to take a semester-long transportation seminar. Students are also offered the opportunity to attend at least one national research conference (usually the Annual Meeting of the Transportation Research Board).



Current MTC Scholar Eric Fitzsimmons (left) and former Scholar David Veneziano (currently at Montana State University) at the 2008 Annual TRB Meeting

Most scholars also make at least one presentation at the annual MTC Transportation Scholars Conference at Iowa State University. In addition, at the 2008 Annual Meeting of the Transportation Research Board, several MTC students participated in paper presentations and committees.

Transportation Seminar

Each spring semester, the MTC offers a weekly transportation seminar. The seminar provides students with a glimpse at a broad picture of regional, national, and international transportation issues. In 2008, seminar topics included the financial crisis faced by most transportation agencies, safety culture, federal safety initiatives, and other big-picture topics that are important but that may not be covered in students' courses.



Peter Kissenger, Executive Director of the AAA Foundation on Traffic Safety, delivered the last seminar in the spring semester of 2008

The full list of presentations is available at www.ctre.iastate.edu/educweb/scholars.htm.

In 2008, transportation practitioners and researchers delivered 12 presentations throughout the semester; 3 were cancelled due to bad weather and illness. All presentations were hosted at Iowa State University and broadcast live via streaming video by the University of Northern Iowa. Students at the University of Iowa and the University of Northern Iowa participated via the Internet. The Universities of Missouri-Columbia and Missouri-St. Louis also participated this year, even though they are no longer members of the consortium.

Workforce Development

The MTC works with a variety of Iowa organizations to develop interest among pre-college students in transportation-related careers. Our main partners have been the Iowa DOT and the FHWA, but several private associations work with the MTC on these activities, including the Iowa Asphalt and Concrete Paving Association, Associated General Contractors of Iowa, and the Iowa Concrete Paving Association. The two principal activities the MTC participates in, along with other sponsors, are a transportation career fair for high school students and *Go!* magazine.

Transportation Career Fair

The fifth annual transportation career fair was planned in conjunction with the partners mentioned above, as well as with new partners from several Iowa community colleges, two local high schools, and a few private industry partners. The event was planned during the spring and summer of 2008, and the fair was scheduled for a location in Des Moines, Iowa, on October 15. However, the fair was cancelled due to low registration numbers. The MTC is now reassessing the desirability and feasibility of this event for Iowans.

Go! Magazine

Go!, an online magazine published by CTRE (www.go-explore-trans.org), was developed to draw teens and young adults to transportation careers and to appropriate educational paths. During fiscal year 2008, four issues were published, featuring the following themes:

- Freight (November–December 2007)
- Future (February–March 2008)
- Concrete (April–May 2008)
- Fuel (September–October 2008)

Also during this period, the number of email subscribers increased from 295 to 509, and more than 27,000 people bookmarked the site.

An online reader survey in June 2008 revealed some interesting results, though from an extremely small sample. Fifty-one people responded, about 10% of the total number of subscribers. About 40% were female, and one-fourth of the respondents were under age 21.

The survey asked readers to identify which feature articles and departments they recalled reading and then to rate the content overall in terms of how interesting it was. Out of three possible ratings, 57% of respondents rated the content as “very interesting” and 43% rated it “sort of interesting.” No one said it was “boring.” The survey also found the following:

Other feedback about <i>Go!</i>	Response
Respondents interested in learning about other transportation-related careers	86%
Respondents who agreed that they had learned something new about transportation and/or careers in transportation	89%
Respondents who indicated that <i>Go!</i> has had an influence on their consideration of a career in transportation (or on recommending one to others)	69%

The screenshot shows the Go! Magazine website for the April-May 2008 issue. At the top, there are navigation links: [Subscribe](#), [About Go!](#), [Sponsors](#), [Back issues](#), [Events](#), and [Contact Go!](#). Below this is a large banner image of a road under construction with the 'Go!' logo overlaid. The main content area is divided into two columns: 'Feature Articles' and 'Departments'. The 'Feature Articles' column includes:

- Hot enough to fry an egg:** Pavement gets hot to the touch, but can you really fry an egg on it? (with a sun icon)
- On (not completely) solid ground:** Rain-friendly concrete Good-bye parking lot puddles, hello cleaner water. (with a concrete pouring icon)
- Hard core:** The secret inner life of concrete Think that sidewalk outside is just an inert slab of dried out cement? Think again. (with a concrete cross-section icon)
- A concrete road, step by step:** A quick look at the basic construction process. (with a construction truck icon)

 The 'Departments' column includes:

- Historically speaking:** Getting out of the mud. Road building in the early days of automobiles. (with a vintage car icon)
- Behind the wheel!** Driving drunk without the drink. Teen driver safety competition. (with a car icon)
- School spotlight:** A concrete education in a high school industrial technology class. (with a school building icon)
- Tech trends:** How satellites, GPS, and paving machines keep roads on track. (with a satellite icon)
- Green scene:** That annoying tire whine. How builders are trying to make roads quieter. (with a tire icon)
- Mystery photo:** Guess the image, win a prize. (with a blurred image icon)

 On the left side, there is a 'Subscribe' form with fields for 'Email:' and 'Age:' (radio buttons for '13 or under', '14 to 20', and '21 or older'), and a 'Subscribe' button. Below the form, it says 'Subscriptions are free. See our [privacy policy](#).' At the bottom of the page, there is a 'What you get if you subscribe' section with a t-shirt icon and two bullet points:

- A chance to win a Go! t-shirt (for subscribers under 21).
- An email every other month that tells you when each issue goes online. The email will include the table of contents with links. The actual articles will be on the web.

 The footer contains the same navigation links and a copyright notice: 'Copyright © 2008, Iowa State University. All rights reserved.'

Table of contents for *Go!* issue on concrete

Finding funding for *Go!* is an ongoing challenge. However, two issues received full sponsorships (\$7,500) in 2008:

- The freight issue (November–December 2007) was sponsored by the University of Wisconsin-Madison’s National Center for Freight and Infrastructure Research and Education.
- The concrete issue (April–May 2008) was co-sponsored by Iowa State University’s National Concrete Pavement Technology Center and the Iowa Concrete Paving Association.

Additional funding came from the FHWA beginning September 1, 2008, in the form of an Eisenhower fellowship for a half-time graduate student writer.

Technology Transfer

The MTC conducts technology transfer, both formally and informally, in several ways. For example, as mentioned in “Research Overview” in this report, each competitively selected project must have an advisory committee, which facilitates informal technology transfer. Informal technology transfer occurs because committee members are often practitioners, and by participating in the committee they have the benefit of learning about the project and the MTC.

Formal technology transfer in 2008 included two printed newsletters about the MTC’s activities. The summer 2008 issue featured a new name, *MTC Bulletin*, and a redesigned layout.

Since this grant is just over a year old, we have not yet published any research reports or technology transfer summaries (two- to four-page summaries of research prepared for easy reading).

However, as described in the “Director’s Discussion” above, the MTC co-sponsored the Mid-Continent Transportation Symposium, held on August 14–15, 2008, in Madison, Wisconsin. The MTC is also co-sponsoring an ongoing project with the AAA Foundation for Traffic Safety, which mostly lends transportation analysis tools to other states to assess the safety of their roadways.

The MTC engaged in other specific technology transfer activities, described in the following sections.

Specialty Conference on Access Management

Hands-on Workshop Using Crash Data

Over the last 15 years, the MTC has sponsored several projects on access management, and former educational coordinator David Plazak has become nationally known for his research related to this topic.

Leveraging this asset, the MTC sponsored “Use and Abuse of Crash Data,” a three-hour workshop at the 8th National Access Management Conference, held at the Inner Harbor in Baltimore, Maryland. The workshop was held on July 13, 2008, and was taught by Plazak and fellow CTRE researcher Zach Hans. They were assisted by MTC Scholars Eric Fitzsimmons and James Sun and Iowa State University Professor of Civil Engineering Reg Souleyrette. About 20 people attended and actively participated.



Workshop participants worked on real-life access management problem corridors.

The workshop stressed how crash data can be used to help develop effective access management strategies on arterial corridors. Access management can have significant benefits in terms of both safety and traffic flow, and the workshop especially emphasized the typical shortcomings of crash data, including such things as positional inaccuracy and reporting errors. Key concepts, such as the need for multiple years of crash data and regression to the mean, were presented.

Workshop participants were able to work on improving two real-life access management problem corridors from Ames and Ankeny, Iowa. Participants worked in groups, and some of the groups were purposefully given incomplete data so that participants could see the impact of having too little data from which to draw valid conclusions. The workshop received very positive evaluations from the attendees.



Aerial view of an access management configuration

Runner-up, National Student Poster Competition

Also at the 8th National Access Management Conference, MTC Scholar Fitzsimmons was named a runner-up in a national student poster competition whose theme was access management. His poster dealt with the environmental (air quality) benefits of good access management. For this research, Eric developed a before and after simulation of a suburban arterial corridor in Ankeny, Iowa, that currently has poor access management characteristics. The emissions performance of the before simulation was then compared to the results of the after simulation, in which several access management treatments were applied to the corridor. The difference in emissions was found to be minimal in this case, probably because the corridor does not currently experience significant congestion and delay. However, access management has been proposed mainly for safety reasons along this corridor.

Paper Presentation

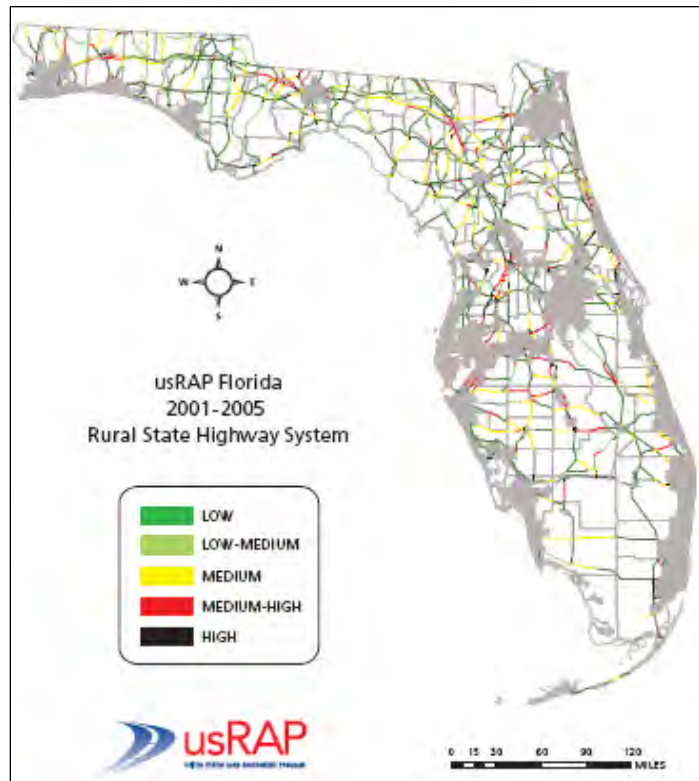
Also at the 8th National Access Management Conference, David Plazak presented a paper that he had written with Chris Albrecht about a successful stakeholder involvement process that was used to promote access management solutions along a portion of Trunk Highway 10 in Anoka County, Minnesota. This project was performed in cooperation with SRF, Inc., Anoka County, the City of Anoka, and the Minnesota Department of Transportation.

Proceedings from the 2008 National Access Management, including this paper, may be found online at www.accessmanagement.info/AM08/ListMenu.html. This includes papers and some sessions where either video or audio are available.

Mapping for U.S. Road Assessment Program

The MTC provided matching funds for the U.S. Road Assessment Program's (usRAP's) mapping efforts. These efforts are conducted at CTRE in partnership with the Midwest Research Institute and funded by the AAA Foundation for Traffic Safety. This program develops standardized crash risk maps for state DOTs and selected counties.

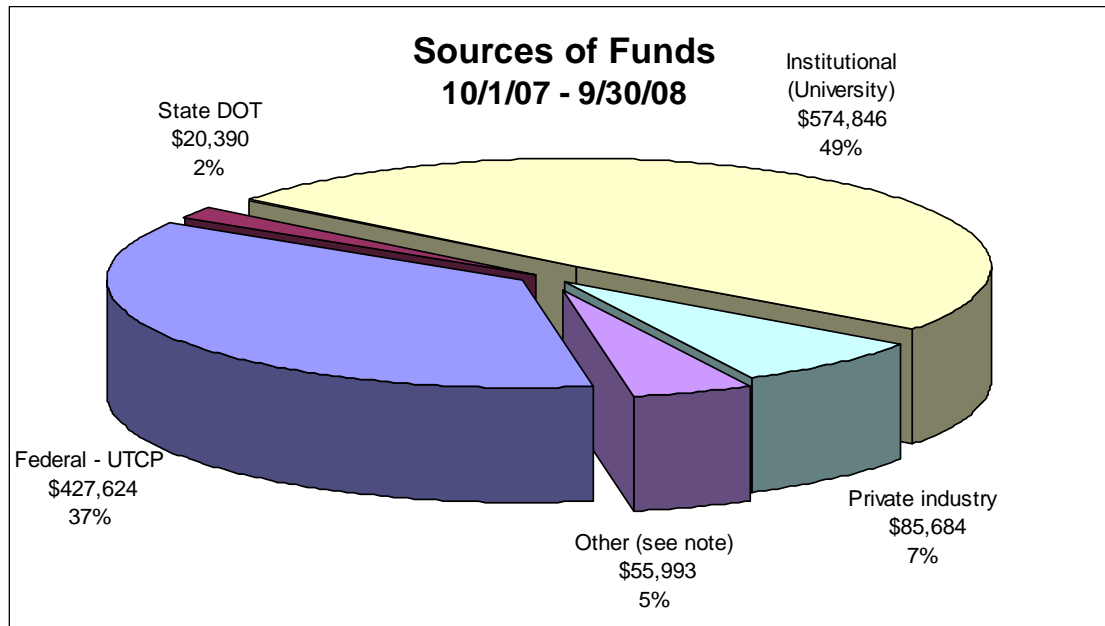
To date, the usRAP program has piloted efforts in eight states: Iowa, Michigan, Florida, New Jersey, Kentucky, New Mexico, Utah, and Illinois. The CTRE usRAP team is conducting international outreach activities by mapping data for Latin American, African, and Asian countries through the International Road assessment Program, though this international outreach is not specifically funded through the MTC. More information about the usRAP program may be found at www.usrap.us.



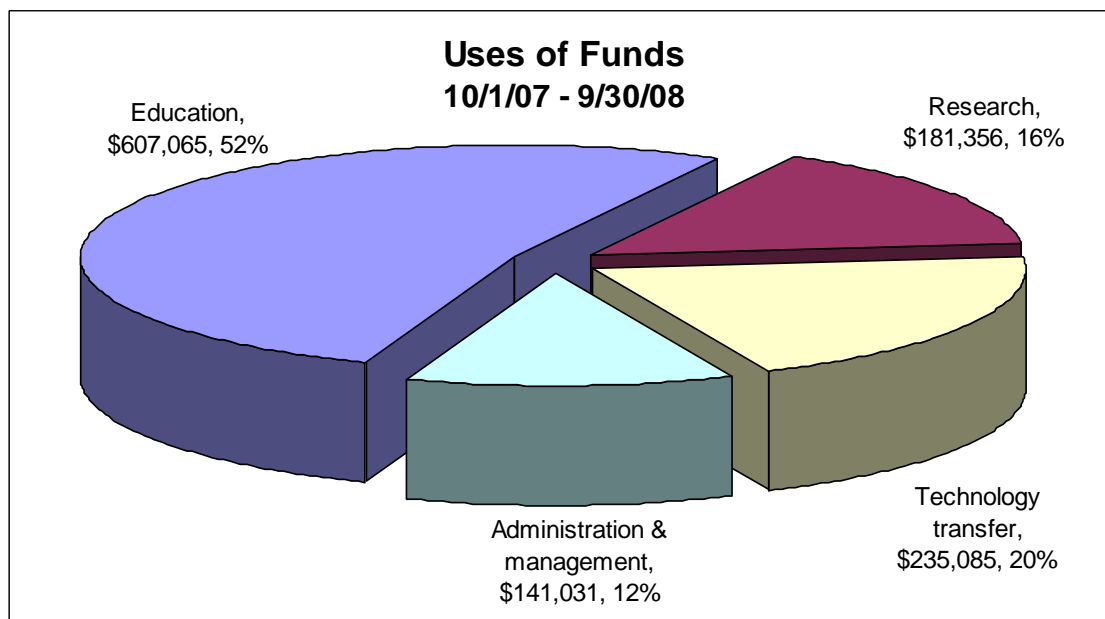
Crash risk assessment map of Florida's rural roadways.

Funding Sources

The following charts illustrate the funding amounts reported as spent by the MTC's departments, but the amounts may not have been certified by the institutional accountants in time for the 4th quarter financial report.



Note: "Other" indicates research funding from USDOT 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.



Research Project Status Report

In our first year of operation as a Tier I center, the MTC received very few research prospectuses. This limited draw was partly because of the newness of the program and the shift in theme. We did, however, select four projects for research funding. Because one of these projects was not funded when the co-sponsor decided not to match the MTC funds, the MTC ultimately sponsored three new projects in 2008:

1. *Low-cost Strategies to Reduce Speed and Crashes on Curves*
Shauna Hallmark, Iowa State University
2. *Pavement Marking and Safety*
Omar Smadi, Iowa State University
3. *Construction Project Administration and Management for Mitigating Work Zone Crashes and Fatalities: An Integrated Risk Management Model*
Jennifer Shane, Iowa State University

These three projects are described in more detail in the following sections.

Low-cost Strategies to Reduce Speed and Crashes on Curves

This project is evaluating the effectiveness of dynamic speed feedback signs and other low-cost strategies for reducing speeds and crash rates on curves. Crash rates on horizontal curves are often higher than crash rates on tangent sections and are often a result of speed. One task of the project is to evaluate two different dynamic speed feedback signs (shown below) on curves in seven states.



The two dynamic speed feedback signs being evaluated in this study.

The project is also evaluating low-cost curve treatments in Iowa, where 12% of fatal crashes and 15% of major injury crashes occur on curves. Before and after speed and crash studies will be conducted to evaluate the effectiveness of the different treatments.

Research results will give traffic safety and county engineers and other professionals additional tools to more effectively manage speeds and decrease crashes on horizontal curves on rural roadways. The project is sponsored by the MTC, the FHWA, the Iowa DOT, the Iowa Highway Research Board, and the Texas Department of Transportation.

Pavement Marking and Safety

Every spring and fall since 2004, the Iowa DOT has sampled pavement marking retroreflectivity levels for all DOT roadways and has recorded its summer pavement marking painting activities. This information has provided a detailed record of pavement marking conditions that is unsurpassed nationwide. This research project will use the Iowa DOT's pavement marking database and detailed crash record system to analyze the relationship between pavement marking retroreflectivity levels and crash rates.

CTRE and MTC researchers have conducted a preliminary investigation into this issue by analyzing three years of pavement marking, crash, and traffic data on all state primary roads. This analysis found that examining roadways with low retroreflectivity values reveals a statistically significant relationship between marking condition and safety. However, this relationship is small and should be tested further.

This project, partly funded by the Iowa Highway Research Board, provides an opportunity to build upon these preliminary research efforts. Using Iowa DOT data under nighttime conditions, this research effort will do the following:

- Investigate the impact that varying levels of pavement marking retroreflectivity have on crash performance
- Use these findings to develop strategies that agencies can use to determine the level of investment needed for pavement markings

Construction Project Administration and Management for Mitigating Work Zone Crashes and Fatalities: An Integrated Risk Management Model

The goal of this research project is to mitigate the risk of highway crashes and fatalities in work zones. A formal risk management model will be created that is usable during all stages of the project life-cycle and that can be used for the construction management and administration of highway projects. A standard risk management model, like the one developed in this research, has three components:

1. Risk identification: the factors that contribute to work zone crashes
2. Risk analysis: the tendency of a hazard to influence the frequency or severity of a loss
3. Risk response: the appropriate countermeasures to the factors that contribute to work zone crashes

The results of this research will be a formal step-by-step methodology that managers and decision makers can use. Each stage of the project life-cycle (or project development process) will have a checklist of hazards and mitigation strategies. This research will also provide a qualitative method to assess the likelihood and severity of a hazard or multiple hazards on a roadway work zone.

Performance Indicators Report

The following information has been reported for the 2007-2008 grant year as noted in the University Transportation Centers Reporting Requirements, dated March 2006.

Research Selection

This section details performance measures related to selection of the MTC research program for 2007-2008.

1. Number of transportation research projects selected for funding using your UTC grant funding:

Three (3) research projects were selected for funding under the 2007-2008 grant year, the first year as Tier I University Transportation Center. These projects are listed below.

Project Title	Principal Investigator, University
<u>Low Cost Strategies to Reduce Speed and Crashes on Curves</u>	Shauna Hallmark, Iowa State University
<u>Construction Project Administration and Management for Mitigating Work Zone Accidents and Fatalities</u>	Jennifer Shane, Iowa State University
<u>Pavement Markings and Safety</u>	Omar Smadi, Iowa State University

1a. Number of those projects that you consider to be basic research, advanced research, and applied research:

Basic Research: 0
Advanced Research: 2
Applied Research: 3

While all three of the projects are considered applied research, the projects being conducted by Dr. Smadi and Dr. Hallmark are considered advanced research.

2. Total budgeted costs for the project reported in Question 1 above:

The combined budgeted costs for the three research projects listed above is \$621,902, which includes the matching funds. The MTC research funds makes up \$155,128 of this total. The project budgets are listed below.

Project Title	Budget
<u>Low Cost Strategies to Reduce Speed and Crashes on Curves</u>	\$450,000
<u>Construction Project Administration and Management for Mitigating Work Zone Accidents and Fatalities</u>	\$75,789
<u>Pavement Markings and Safety</u>	\$96,113

Research Performance

This section details performance of the MTC research program for 2007-2008.

3. **Number of reports issued that resulted from transportation research projects funded by the UTC grant:**

Zero (0) final reports have been issued for the three 2007-2008 research projects. All three projects are still in progress.

4. **Number of transportation research papers presented at academic/professional meetings that resulted from projects funded by the UTC grant:**

Although various presentations on these projects have been made to different groups concerning the status and future direction of these research efforts, no formal papers resulting from the three 2007-2008 projects have been presented to date.

Education

This section details performance of the MTC education efforts for 2007-2008.

5. **Cumulative number of transportation-related courses that have been added since the beginning of the grant to the number of courses you reported in Baseline Measure 1 in your UTC Strategic Plan.**

Undergraduate: 0
Graduate: 1

A new graduate course in transportation data analysis was created at Iowa State University during 2007-2008.

6. **Number of students participating in transportation research projects. Count individual students.**

Undergraduate: 2
Graduate: 35

Human Resources

This section details performance of the MTC human resources for 2007-2008.

7. **Cumulative number of transportation-related advanced degree programs that have been added since the beginning of the grant to the number of degree programs you reported in your UTC Strategic Plan.**

Master's Level: 0
Doctoral Level: 0

8. Number of students enrolled in transportation-related advanced degree programs (the baseline programs and any added since the beginning of the grant.

Master's Level: 84

Doctoral Level: 11

9. Number of students who received degrees through the baseline and any added transportation-related advanced degree programs.

Master's Level: 37

Doctoral Level: 0

Technology Transfer

This section details performance of the MTC technology transfer activities for 2007-2008.

10. Number of transportation seminars, symposia, distance learning classes, etc. conducted by your UTC for transportation professionals.

15 technology transfer events were held during the 2007-2008 reporting period.

11. Number of transportation professionals participating in those events.

Approximately 655 public and private-sector professionals attended the above events during the 2007-2008 reporting period.