

MIDWEST TRANSPORTATION CONSORTIUM



ANNUAL PROGRESS REPORT October 2001

Submitted to:

Office of Innovation, Research & Education (DIR-1)
U.S. Department of Transportation
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Submitted by:

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From the Director

Transportation assets are tremendously important from the perspective the performance of our national, state, and regional economies. Few people comprehend the great impact it has on the overall economy. Literally trillions of dollars in transportation assets have been put in place throughout the United States. They one of the key means by which the economy functions and is tied into the global economy. American households spend over \$6,000 each every year on transportation, or about 18 cents of every dollar they spend. This is more than they spend on food utilities, health care, apparel, and education. The only thing Americans spend more on than transportation is housing, and the two are very close in magnitude. What this means is that anything that improves the productivity of resources we spend on transportation will have enormous potential to provide economic benefits to Americans. Improving productivity is what asset management systems are intended to do by helping us to make better-informed decisions about what to build, rehabilitate, maintain, and operate.

2002 appears to be the year that asset management systems and related techniques will gain widespread acceptance and use. There are several reasons for this.

- Because of the slowdown in the national economy, state and local government transportation agencies are under tremendous budgetary pressure. Agencies that manage transportation infrastructure must do more with less. The public demand for efficient transportation remains high. Asset management systems and related systems (e.g. pavement management and bridge management systems) are helping agencies make the best possible use of their limited resources and make better decisions and tradeoffs.
- The tragic events of last September 11 have placed an additional burden on the transportation sector to provide improved security for transportation users and critical assets. Asset management inventories have turned out to be exceedingly valuable in terms of developing security plans. Knowing what the most critical infrastructure assets are is the first step in providing a more secure and sure transportation system.
- Implementation of the provisions of Government Accounting Standards Board Statement 34 (“GASB 34”) begins in 2002. The largest government agencies (e.g. states and large cities and counties) must begin prospective financial reporting of their infrastructure assets this year. Development of an asset management system is an approach that a number of state DOTs and local governments have selected to meet the GASB mandate.

The Midwest Transportation Consortium (MTC) is supporting the development of asset management systems in transportation on a number of fronts. The MTC’s main education and human capital goal involves the development of new leaders for the transportation industry, particularly in our four-state region. Asset management concepts have been incorporated into a number of courses at the six MTC consortium member schools. For example, the Spring Transportation Seminar offered within the region via Internet-based videoconferencing technology has been focused on asset management topics for the past several years. A new focus on transportation security (unfortunately needed after September 11) is planned for future years. More than 30 graduate students each year in five academic disciplines will complete their academic programs with an excellent understanding of the state of the practice of transportation asset management. They will become new leaders in transportation, whether in government, consulting, or academia.

The MTC’s research program is ending its second year of operation and will be issuing its third request for research proposals in January 2002. One project, involving the integration of data collected with the

assistance of global positioning systems (GPS) into asset management databases, has been published. Seven other projects, which mainly focus on developing tools and techniques that can assist in the adoption of asset management by state and local government highway and public transportation agencies, are in progress. About \$400,000 in new research (including \$200,000 in MTC funds and \$200,000 in matching funds) will be approved during the first half of 2002. The MTC's long-term research goal is to build a portfolio of projects involving several million dollars in Federal and matching funding that will make it easier for agencies and companies to implement asset management systems. One special area of emphasis at Iowa State University is the use of remote sensing and other spatial data for asset management. This effort effectively leverages Iowa State University's roles as a University Transportation Center (UTC) and as a member of the National Consortium on Remote Sensing in Transportation Infrastructure. The latter consortium is an effort to commercialize developments from the space program and defense activities.

The MTC also plays a role in terms of outreach and technology transfer activities related to asset management and GASB34 in our region. During 2001, the MTC sponsored or co-sponsored several workshops related to access management and GASB34. One of these was the 4th Annual National Transportation Asset Management Workshop in Madison, Wisconsin. This workshop brought together several hundred participants from the federal, state, local, private, and academic sectors to share information on asset management policy, goals, techniques, and data. MTC faculty, staff, and students from Iowa State University, the University of Missouri-Columbia, and the University of Missouri-Kansas City played key roles in planning, financing, and conducting the workshop. The strong attendance at the event was a testament to interest in transportation asset management in that it was held immediately after September 11 and during a period when many states and the Federal government faced tight restrictions on travel. The program of the National Workshop had a strong MTC flavor, something that we are proud of as we end our second year of operation and begin our third.

As transportation asset management moves into "production mode", the Midwest Transportation Consortium strives to be of assistance at a regional and national level.

A. Year Two Annual Report

Consortium Theme

The Midwest Transportation Consortium (MTC) is the University Transportation Center Program for Federal Region 7, which includes Iowa, Kansas, Missouri, and Nebraska. Iowa State University, through its Center for Transportation Research and Education (CTRE), is the MTC's lead institution. ISU is partnering with the University of Missouri-Columbia through UMC's Transportation Infrastructure Center (TIC).

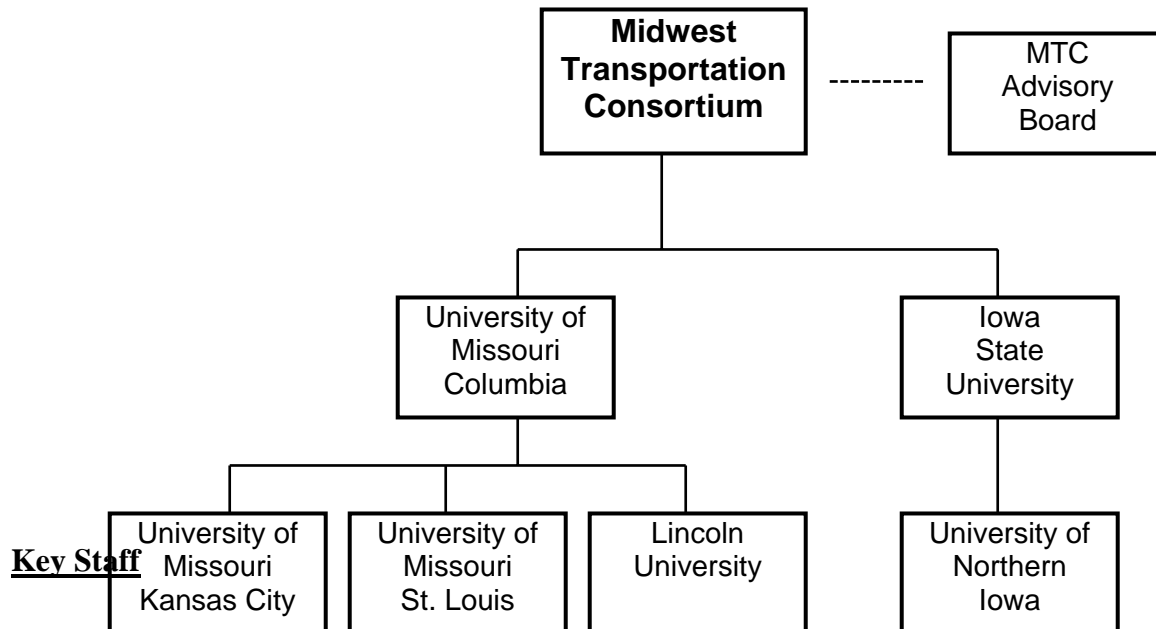
Four junior partner institutions are programmatically linked to the MTC. These are the:

- University of Northern Iowa in Cedar Falls, Iowa
- University of Missouri-Kansas City
- University of Missouri-St. Louis
- Lincoln University in Jefferson, Missouri, an Historically Black University (HBU)

The theme of the MTC is *Sustainable Transportation Asset Management Principles and Techniques*. This theme is in concert with the US DOT's strategic goals and is of significant importance to transportation professionals in the next century. The MTC is committed to building transportation research and education programs at the junior partner universities and to assuring region-wide participation in its research and technology transfer activities.

Center Organization Chart

The MTC is organized to some extent by geography. The Center Director and associated staff at Iowa State University handles most administrative duties and handles meetings and correspondence with the MTC Advisory Board and research grant principal investigators. The Center Associate Director coordinates all activities of partner institutions in the state of Missouri. An organizational chart is shown below.



(Consortium Director, Associate Director and Educational Coordinators at each partner institutions)

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Center Goals

Within the theme area of transportation asset management, the MTC has established a number of major goals. These are to build expertise, develop a national reputation, to increase the number and diversity of professionals, and to become a regional and national resource. Specific MTC goals are:

Education

- Establish Transportation Scholars Programs at all member institutions, based on a successful program at ISU and UMC and working especially closely with Lincoln University. Have 40 students participate annually in multidisciplinary curriculum, "learning community" activities, research assistantships, seminars, and two conferences.
- Establish Virtual Transportation University to organize and promote synchronous (real-time) and asynchronous (non real-time) distance learning programs for all of Region 7.
- Increase diversity by working closely with Lincoln University and by partnering with university offices of minority student affairs.

Research

- Develop a body of research in the theme area performed by researchers at all universities in Region 7 in a variety of disciplines.
- Assure region-wide, quality research through a solicitation for research prospectuses from all universities in Region 7 and a two-tiered, unbiased peer review of prospectuses.
- Coordinate research with Region 7 universities and with other UTC's, particularly those with similar themes.

Technology Transfer and Outreach (T²)

- Provide project-level reports, manuals, software, and other research projects.
- Provide program-level, regional/national workshops, conferences, and seminars.
- Establish regional Virtual Transportation Community to provide online research briefs, threaded electronic forums, etc., to serve all universities in Region 7. (This goal is encompassed in the TREXPO web site discussed later in this report.)

Major Accomplishments During Year Two

The MTC has realized early successes in both education and outreach/technology transfer. In the area of education, the MTC has augmented the ability of existing transportation programs at Iowa State University and the University of Missouri-Columbia to develop high-quality students who will become high quality transportation professionals. The MTC is allowing the University of Northern Iowa, Lincoln University and the other MTC consortium partners to develop new transportation programs from the ground up. Northern Iowa was able in Years One and Two to begin offering transportation courses for its students. Lincoln University began to offer new programming related to asset management during Year Two of the MTC grant.

Several important outreach activities related to Asset Management were also initiated this year and last. These include several workshops that have already been held or will be held in the region and specialized World Wide Web content. These activities will be expanded during Year Three. The MTC is already a significant player in discussions of Asset Management and the implementation of provisions of Government Accounting Standards Board Statement 34 (GASB 34) in the region and is beginning to become recognized for its expertise in the field at the national level.

The MTC's third major component, research, is well underway. A portfolio of projects involving principal investigators at a number of universities in three of the four MTC states have been approved and are now under contract. These projects are providing work and learning opportunities for students and build a critical mass of knowledge on asset management within Region 7. Additional research project competitions will occur in grant years three through five subject to availability of funding.

Success stories and information for each major programmatic component of the MTC are provided below. These are categorized by the MTC's main goals as described in its strategic plan:

- Education and Human Capital Development
- Outreach and Technology Transfer
- Research

Education and Human Capital Development Activities

The Transportation Faculty Expands at UM-C

The University of Missouri-Columbia added two new faculty members in Transportation beginning with the 2001 fall semester. They are: Dr. Cindy Wilson Orndoff (Asset Management) and Dr. Carlos Sun (ITS/Traffic). (At the same time UM-C's Dr. Kristen Sanford Bernhardt, who was very active in MTC programs and asset management research, accepted a faculty position in Transportation at Lafayette College in Pennsylvania.) Faculty from three other colleges at UM-C as well as the Truman School of Public Affairs are now involved in transportation research and studies. The MTC's visibility and funding resources have served as a catalyst for this expansion.

A similar broadening of transportation-involved faculty is now occurring at both Iowa State University and the University of Northern Iowa. Structural and Construction Engineering faculty and students at

Iowa State are becoming much more active in MTC programs as are faculty, staff, and students from the Business School at Northern Iowa.

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Expanding Educational Opportunities for Students

Developing the human capital needed by transportation organizations located in and around Region 7 remains *the* major emphasis area for the MTC. As such, MTC continues to stress improving educational opportunities for its students including work opportunities on research projects, job placement efforts, and travel to national conferences. In terms of travel a large contingent of students from three MTC member universities was able to attend the annual meeting of the Transportation Research Board (TRB) in Washington, DC in January 2001. These Universities included Iowa State, Northern Iowa, and the University of Missouri-Columbia. Over 20 students from MTC partner schools attended TRB in 2001.

Plans are being made to once again have a large number of students from at least two of the MTC member schools (Iowa State and Missouri-Columbia) attend the TRB Annual Meeting in Washington, DC in January 2002. Iowa State is planning to send over 15 students and UM-C six, giving the MTC schools and their students tremendous exposure and learning opportunities. In addition, Iowa State will be making an effort to send a much larger contingent of faculty members to the TRB Annual Meeting than in previous years.

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Expanding Distance Learning Offerings in the Region: Spring Transportation Seminar

Iowa State University has offered a Spring Seminar in Transportation (Transportation 691) for a number of years. The course, a 15 lecture series presented by outside speakers, is designed to bring together transportation students from a variety of disciplines and to introduce them to a variety of topics that they might not cover in other coursework. The aim of the seminar is to enrich and diversify the educational opportunities of students (and others) in the MTC region by presenting a variety of topics. Planning for the seminar gets more ambitious each year and more national level speakers are being attracted. As was the case last year, this course was offered simultaneously at multiple universities in the MTC's four-state region through the use of H.323 Internet-based videoconferencing technology.

In Spring 2001, the following topics were covered by speakers:

- The Modern Trucking Industry
- ITS In St.Louis And The Four State MTC Region
- Changes At Minneapolis-St. Paul International Airport
- How Wall Street Views Transportation

- Regional Airport Management
- Des Moines I-235 Reconstruction Project
- Asset Management Software
- Rapid Transit: The Rubber-Tired, Dual Mode Version
- Bus, Light Rail And Economic Development
- Remote Sensing and Transportation
- Transit Niche Marketing: Transit Demand In A Transportation-Independent Environment
- Federal Transportation Legislation Reauthorization
- Preparing For The Winter Olympics in Salt Lake City
- Local Roads And Asset Mgmt./GASB#34
- NTSB And Transportation Safety

Speakers represented a number of organizations, including Barr-Nunn Trucking, the Missouri DOT, The Metropolitan Airports Commission of the Twin Cities, A.G. Edwards and Sons, the Waterloo Municipal Airport, Sverdrup Consultants, the Des Moines Area Metropolitan Planning Organization, Intergraph Corporation, DMJM Consultants, the University of California at Santa Barbara, MET Transit of Waterloo, the American Road and Transportation Builders Association, Utah Department of Transportation, the National Association of Counties, and the National Transportation Safety Board. Although there were many excellent presentations, the final presentation by George Black of the National Transportation Safety Board was clearly the high point of the semester.

For 2002, four universities (ISU, UM-Columbia, UM-St. Louis, and UNI) are again involved in planning the seminar and arranging for speakers. ISU and Missouri-Columbia are, as senior partners in the MTC, arranging for most of the speakers. The main focus areas for 2002 are transportation security after September 11, transportation asset management, aviation, and transportation energy and the gasoline tax. Although all the speakers have not been arranged at this time, the topics will include:

- Information Assurance and Security and its Relationship to Transportation
- FEMA First Response: Report from "Ground Zero" in New York City at the WTC
- Terrorism and Design of the Built Environment
- General Aviation is Big Business
- Aviation Security: Past, Present, and Future
- Transportation and Economic Development: Site Selection
- Security Activities at the Texas DOT Related to Bridges
- Economics and Engineering: Asset Management Fundamentals
- Implementing Asset Management in a State DOT (Michigan)
- Urban Transportation Operations and Asset Management
- The Future of Energy and Transportation
- The Air Charter Business
- Security and Transportation After September 11
- The Regional Trucking Industry
- Re-Inventing Highway Taxes and Finance

Speakers will tentatively be provided by the Iowa Department of Information Technology, University of Missouri-Columbia, American Concrete Paving Association, Joplin Missouri Airport, Des Moines International Airport, Cedar Valley Development Corporation, Texas Department of Transportation, Federal Highway Administration, Michigan Department of Transportation, Bi-State Development

Authority, Iowa Energy Center, Livingston Aviation Corporation, Iowa Office of Homeland Security, Lanter Trucking Company, and the University of Iowa Public Policy Center.

Discussions have been held with academic programs at other institutions in the MTC region about participating in the seminar. At least one university outside Region 7 has also requested information about participating in the seminar series.

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Expanding the Use of Videoconferencing Technologies in Region 7

A videoconferencing classroom at CTRE/ISU is now being used on a regular basis to provide distance learning opportunities throughout Iowa, the MTC region, and even nationally.

An ultimate goal of the MTC is to share many more educational resources through videoconferencing technology in a “Virtual Transportation University”.

The CTRE videoconferencing facility was financed through a combination of sources, including Iowa State University, the Iowa State University Research Park, and the Iowa DOT. The facility:

- Broadcasts via H.320 compressed videoconferencing protocol, the accepted standard for global videoconferencing. (Also will connect via H.323 Internet conferencing standards.)
- Broadcasts at up to 15 frames per second, generally giving the impression of full-motion video.
- Can be connected to:
 - ✓ The Iowa Communications Network (ICN) and Missouri Research and Education Network (MORENET) through networking bridges.
 - ✓ More than 745 facilities in Iowa alone, at least one in every county, including:

➤ 11 Hospitals	➤ 57 Iowa National Guard Armories
➤ 102 Community Colleges	➤ 47 State Agencies
➤ 31 Regents University Sites	➤ 17 Federal Agencies
➤ 20 Independent Colleges/Universities	➤ 11 Hospitals
➤ 16 Area Education Agencies	➤ 50 Public Libraries

- ✓ The Iowa Department of Transportation's video network.
- ✓ Sites around the world via private videoconferencing networks such as Sprint and AT&T.
- Accommodates up to 49 people, with movable tables for flexible teaching/meeting arrangements.
- Includes the following special-use technologies and equipment:
 - Two video cameras and three large monitors
 - Document camera and overhead projector
 - Input for IBM-compatible personal computer
 - Ethernet/local area network jack
 - Video special effects console to produce picture in picture effects
 - Room audio and microphone for stand-alone use
 - Audio conferencing (full-duplex speakerphone) and fax services
 - Large marker boards and projector screen
 - A video distribution amplifier that allows computer output to be seen on video monitors, over a videoconference, and on a large projection screen all at the same time
 - “Smart” whiteboard capabilities that allow for capture of writing on a marker board to electronic formats.

Since the CTRE/ISU's videoconferencing equipment was installed in March of 2000, it has been used for a total of over 450 calls/sessions totaling almost 148 hours (almost 9000 minutes). The typical class or workshop session lasts two hours, but many other meetings and test sessions are much shorter.

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Results of the MTC Annual Regional Student Paper Competition

The MTC holds an annual student paper competition in the Fall of each year. The Year 2000 paper competition winner was David Veneziano, a Master's Student at Iowa State University in Transportation. His paper was entitled: "Intersection Inventory and Remote Sensing", which incorporated concepts from both remote sensing and infrastructure asset management. David presented this paper to the new Community and Regional Planning class in Transportation Policy Planning so that other students at ISU could benefit from the information contained in it.

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The MTC Student of the Year For 2000-2001

The MTC Student of the Year Competition is run each year and is open to students at any MTC consortium school who participate in one of the schools' Transportation Scholars Programs. The Scholars Program provides partial financial support for graduate students (and a few, selected undergraduates) as well as seminar and conference travel opportunities.

Jerry K. Shadewald was named the Outstanding Student Of The Year – 2000/2001 for the Midwest Transportation Consortium. Shadewald received a master's degree in civil engineering from Iowa State University in December 2000. He has a bachelor's degree in civil engineering from the University of Wisconsin – Platteville. During the year for which he received the award, Mr. Shadewald has worked on adding advanced analysis and quality assurance modules to a GIS-transportation modeling interface for the Iowa Department of Transportation. The tools also incorporated a transportation economic analysis program. Other research that he worked on included a preliminary exchange of data between a GIS system and a traffic simulation program and an investigation into the differences among traffic assignment algorithms used for travel demand modeling.

Mr. Shadewald made presentations of his research at the University of California – Davis for the National Science Foundation (NSF) Integrative Graduate Education and Research Training Program and at the Mid-Continent Transportation Symposium in Spring 2000. He was also heavily involved in student-related transportation activities at Iowa State University and served as president of the ISU Transportation Student Association (TSA). He accepted his award at the Transportation Research Board Annual Meeting in Washington, DC during January 2001. He recently took a position with HNTB Consulting Engineers in Kansas City and has immediately begun to have an impact on the transportation system in the MTC's four-state region.

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Four New Asset Management-Related Courses Offered

As a result of their membership in the Midwest Transportation Consortium, Iowa State University, Northern Iowa, Lincoln University and the University of Missouri-St. Louis have each added new Transportation Asset Management-related courses to their curriculum. Each course is described below.

- Iowa State University—MTC Director and Adjunct Assistant Professor David Plazak. Several hours of asset management concepts were incorporated into Community and Regional Planning 445/545, “Transportation Policy Planning.” This course was offered for the first time at Iowa State in the Fall of 2001 and attracted a much larger than anticipated enrollment—12 graduate students and 16 upper-level undergraduate students. Student reviews for the course were well above the average for the Department, ensuring that it will be offered every year.
- Lincoln University -- Assistant Professor Sherrie Koechling-Andrae. During the Spring 2001 semester, a new public sector accounting course was offered as part of the Public Administration Curriculum. The course incorporated information on fund accounting, asset valuation and depreciation, GASB-required statements and related topics.
- University of Missouri-St .Louis -- Dr. Ray Mundy, Director, Center for Transportation Studies. During the Spring 2001 semester, a Marketing course “Domestic Transportation” was offered covering issues in transportation. Dr. Mundy included the MTC Spring Seminars topics as the basis for special studies by students.
- University of Northern Iowa—Assistant Professor Tim Strauss. “Transportation Geography”, a new course was offered by the Department of Geography, and was taught for the first time in the Fall 2000 semester. Development of this course was partially funded by a mini-grant from the University of Northern Iowa.

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Outreach and Technology Transfer Activities

MTC's 2000-2001 activities in outreach and technology transfer have centered around a series of workshops and web sites that are helping transportation agencies in the region cope with the complexities of asset management and related accounting requirements.

Helping Guide the Implementation of GASB 34's Infrastructure Asset Requirements in Iowa

As a result of asset management and GASB 34 workshops held last year, CTRE and the MTC were asked to assist the Iowa County Finance Committee in the development of guidelines for counties to use in complying with GASB 34. Other partners in this effort will include the State Auditor's Office, several county auditors, several county engineers, and the Iowa County Engineers' Service Bureau (ICESB). The ICESB took the lead in putting together a web-based system that allows counties (and potentially cities as well) to comply with GASB 34 reporting requirements in a structured manner. The system provides a great deal of help to the users and also is beneficial in that counties in Iowa will all be using the same depreciation-based approach in complying with GASB 34 reporting requirements. CTRE and the MTC provided input into the design of the system and has offered to assist the ICESB in providing training for users.

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Maintaining a GASB 34 Web Site

Iowa State University created a small, informational web site on GASB 34 during 2000, primarily aimed at the local governments that must comply with its infrastructure accounting provisions. The web site continues to be maintained and expanded and contains links to useful information plus a number of articles on asset management and GAS 34 prepared at MTC-member universities. It also includes an on-line training needs survey. Content from this web site has already found its way onto the official Government Accounting Standards Board (GASB) Web site.

The URL for this web site is:
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Helping to Organize and Sponsoring the Fourth Annual National Asset Management Workshop

The MTC worked with the Midwestern Regional University Transportation Center at the University of Wisconsin-Madison to co-host the Fourth Annual National Asset Management Workshop held in Madison on September 23-25, 2001. Even though the workshop was held two weeks following the tragic events of September 11, attendance was high. About 250 persons from around the United States and Canada participated in the workshop, which was aimed at helping organizations to take the next steps toward implementing asset management. Both David Plazak from ISU and Charlie Nemmers from UM-C served on the planning committee for the conference; both also moderated sessions. Faculty, staff, and

students from four of the MTC schools (ISU, UM-C, UMKC, and UNI) attended or presented at the conference. MTC participants played important and visible roles throughout the three day workshop.

Some of the MTC faculty, staff, and student presentations and duties at the workshop included:

- Moderator for GASB 34 and Valuation Issues Session, David Plazak, ISU
- “Evaluating Remotely Sensed Images for Use in Inventorying Roadway Features”, Shauna Hallmark, ISU
- “Building and Asset Management Mindset”, Charles Nemmers, UM-C
- “Knowledge Discovery and Data Mining to Expand the Use of Pavement Management Data”, poster by Vanessa Amado Gonzalez, UM-C
- Moderator for Integrating and Using Data Session, Cynthia Wilson Orndorf, UM-C
- “Automated Asset Data Collection and Integration”, Omar Smadi, ISU
- Moderator for Planning and Implementing an Asset Management Program Session, Charles Nemmers, UM-C
- “Jackson County Asset Management: A Success Story”, Ali Roohanirad, UM-KC
- “Educating Students to Manage Civil Infrastructure Assets”, Kristen Sanford-Bernhardt, formerly with UM-C and now with Lafayette College

Other sponsors of the Workshop included the American Association of State Highway and Transportation Officials, the American Public Transit Association, the American Public Works Association, the Federal Highway Administration, the National Association of County Engineers, the Transportation Research Board, the University of Wisconsin-Madison, the University of Illinois-Chicago, and the Wisconsin Department of Transportation.

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Maintaining and Expanding a Transportation Research Expo (TREXPO) Web Site

The virtual transportation research community web site outlined in the MTC’s strategic plan is now operational in pilot form and is being tested by faculty at Iowa State University. This web site allows faculty to enter their areas of expertise and past research efforts. It also allows consumers of research (e.g. at State DOTs) to search for expertise or past research. The goal of the web site is to facilitate better dissemination and sharing of research in Region 7 through the use of on-line database technologies, in this case Cold Fusion. This web site (which we have given a unique identity and Internet address) may be found at: <http://www.trexpo.org>

The MTC will be expanding the scope of the site to other campuses in future months and then marketing it to research consumers in the region. A focus group is being held in November to identify the most pressing needs and interests of research consumers. Following the rollout, we will be adding new functions to the site such as the ability of agencies to post research RFPs and for communities of interest to have discussions on-line.

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Organizing the First Ever National Bridge Live Load Testing and Rating Workshop

The Midwest Transportation Consortium, under the leadership of Associate Director Charles Nemmers, developed and hosted this workshop for bridge owners and managers at all levels of government. The Federal Highway Administration partially funded the workshop. The FHWA approached the MTC and asked for assistance in developing a workshop to bring together practitioners who were looking to improve the management of their bridge assets by using live load testing as part of the condition evaluation process. A videoconference involving FHWA, MTC-affiliated faculty, and State DOT engineers was held to set the objectives, time frame and location for the workshop. The University of Missouri-Columbia took the lead and arranged for the speakers, advertisement, registration and the administrative details. E-mail was used to keep everyone in the loop. The Workshop was held on March 20th and 21st in Kansas City, Missouri. About 90 people attended and actively participated. The University of Missouri-Columbia brought its field bridge load testing vehicle to the workshop and showcased its state of the art technology. Presenters were from:

- Turner-Fairbank Highway Research Center in Washington DC.
- The FHWA Midwest Recourse Center in Olympia Fields, Illinois
- State DOTs from Alabama, Iowa, Missouri, New York, and Wisconsin
- Universities, including Missouri-Columbia, Iowa State and Wyoming
- The BDI consulting group from Colorado.

Information about state of the art technology was shared. Everyone came away from the workshop with a better sense of how they could utilize live load testing as a regular part of a bridge asset management system.

Contact: Charles Nemmers, University of Missouri-Columbia
Phone: 573-882-0071, email: nemmersc@missouri-edu

Planning GASB 34 Short Courses for Local Officials

Lincoln University and University of Missouri-Columbia joined to respond to a request from the Missouri LTAP center and the Missouri Division of the FHWA to develop a one-day short course centered on “getting started” with GASB 34. Following preliminary meetings and discussions, Dr. Sherrie Koechling-Andrae from Lincoln University has taken the lead in developing the program. Dr. Cindy Wilson Orndoff, Charles Nemmers, and Dr. Dana Baker from UM-C have joined her in developing and teaching the course. Five presentations are being planned across Missouri. This will be the first major transportation related event sponsored by Lincoln University as a result of their involvement in the MTC. Funding for the course comes from FHWA, MoDOT, the Missouri LTAP Center, and the MTC.

Contact: Charles Nemmers, University of Missouri-Columbia
Phone: 573-882-0071, email: nemmersc@missouri-edu

Improving Access to Transportation Technology Information

The Missouri DOT desired assistance in improving the management of the documents in their Transportation Library so as to be able to be of better service both internally and externally. As part of the MTC's mission to extend the transportation umbrella to cover many related disciplines, the Engineering School at UM-C joined with the School of Information Science and together developed a research proposal for MoDOT to marry digital and library technology. The US Bureau of Transportation Statistics has expressed an interest in this initiative. (ISU/CTRE has a smaller version of this concept in place to serve their LTAP clients.) In this case UM-C/MTC is treating information as an institutional asset, and is looking to improve the management of this asset using a multi-disciplined approach. Graduate students in the College of Information Science are becoming Transportation Scholars through the MTC as a result of this initiative.

Contact: Charles Nemmers, University of Missouri-Columbia
Phone: 573-882-0071, email: nemmersc@missouri-edu

Building a National Reputation in Transportation Asset Management Through Outreach

Over the past 12 months, MTC-affiliated faculty and staff have become more and more involved in national-level and regional-level asset management outreach activities. For instance, the University of Missouri at Columbia has been invited to make presentations on asset management and GASB 34 to a wide range of audiences across the country. These included:

- A feature article by MTC Associate Director Charles Nemmers on GASB 34 in the National Association of County Engineers newsletter
- A presentation by Mr. Nemmers on Asset Management to Southeastern Public Works Officials at their annual workshop in Athens, Georgia.
- A presentation on Asset Management and GASB 34 by Dr. Cindy Wilson Orndoff at the annual meeting of the Missouri Chapter of the American Public Works Association (APWA)
A presentation by Charles Nemmers on Asset Management to the annual meeting of the Missouri Society of Professional Engineers.
- A presentation on Asset Management and GASB34 by Dr. Kristen Sanford Barnhardt to the annual meeting of the Missouri Highway Engineers' Association.
- An article on GASB 34 by Charles Nemmers in the Missouri Municipal Review

During the coming year, MTC Associate Director Charles Nemmers is scheduled to make presentations on Asset Management and GASB 34, at the Midwest Local Roads Conference in Columbus, Ohio; at the Transportation Highway Engineers (THE) Conference in Champaign, Illinois; and at the Purdue Roads School in West Lafayette, Indiana. Together with MTC Director David Plazak, Nemmers is planning a workshop on Asset Management and GASB 34 for a joint meeting of the Missouri and Iowa associations of regional planning agencies.

MTC representatives Omar Smadi (ISU) and Charles Nemmers (UM-C) have participated extensively in the activities of the AASHTO Asset Management Task Force and the TRB Asset Management Task Force. These activities have led directly to opportunities for the MTC schools to join teams to respond to several National Cooperative Highway Research Program requests for proposals on transportation asset management tools and techniques and on GASB 34 implementation.

Contact: Charles Nemmers, University of Missouri-Columbia

Research Projects

The MTC is in the early stages of its research program. For the second year of the research effort, projects were sought throughout the region through a Request for Proposal process that took place in the late winter and early spring of 2001. In the end, three new projects were approved and funded, subject to availability of adequate and eligible matching funds. All of the three new projects selected projects focus tightly on asset management and closely related subjects.

Approximately \$450,000 in research projects (including matching funds) has been approved during Years One and Two of the UTC grant. Emphasis has been on funding relatively small number of focused projects. Most of them involve the development of tools and techniques for transportation asset management, which is a particular strength of the MTC member schools and faculty. Another \$400,000 in research (\$200,000 UTC and \$200,000 matching funds) is anticipated to be approved in Year Three.

So far, projects have been funded in three of the four MTC region states and at five different universities. One project was funded at a university that is not a member of the consortium. All eight new and ongoing projects are described in the following table.

New Projects, Approved and Funded During 2001 (Grant Year Two)

Project Number	Project Title	Principal Investigator(s)
MTC-2001-01	Identification and Development of User Requirements to Support Robust Corridor Investment Models	Kathleen Trauth University of Missouri- Columbia
MTC-2001-02	Application of Advanced Remote Sensing Technology to Asset Management	Shauna Hallmark Iowa State University
MTC-2001-03	Research and Training of Private Transportation Providers for the Efficient and Effective Provision of Transportation Services	Ray Mundy University of Missouri-St. Louis

Ongoing Projects, Approved and Funded During 2000 (Grant Year One)

Project Number	Project Title	Principal Investigator(s)
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MTC-2000-01	Addressing Integration Issues and Developing a Protocol for Integration of Global Positioning Systems Data With Linear Referenced Data in an Asset Management System*	Shauna Hallmark Iowa State University
MTC-2000-02	GIS-Based Integrated Rural and Small Urban Transit Asset Management System	Carl Kurt University of Kansas
MTC-2000-03	Decision-Support System for Management of Slope Construction and Repair Activities—An Asset Management Building Block	Erik Loehr University of Missouri-Columbia
MTC-2000-04	Roadway Asset Management System Manual for Local Governments	Anil Misra University of Missouri-Kansas City
MTC-2000-05	Artificial Intelligence-Based Optimization of Management of Snow Removal	Mohammed Salim University of Northern Iowa

*This project was nearing completion and publication at the time of this report.

Three of the Year One Projects (Hallmark, Loehr, and Roohanirad) were prominently featured in presentations at both the Transportation Research Board Annual Meeting and at the National Transportation Asset Management Workshop.

Strategic Directions for the Future

The MTC is planning on concentrating its efforts in a few strategic areas during the next several years. These include:

1. Continuing to produce high-quality students for the transportation industry in the region and to offer students in the region the best-possible learning experiences.
2. Continuing to aggressively use technologies such as videoconferencing and the World Wide Web to share educational resources within the regions and to coordinate regional research efforts. Considerable focus will go into providing additional distance learning courses and workshops and on the TREXPO web site.
3. Publishing a third round RFP for focused research on asset management and related topics in early 2002.
4. Offering additional regional workshops on asset management and GASB 34 as the market permits. As the MTC-funded research projects are completed, the results will be integrated into the MTC's outreach efforts in the region.
5. Being involved in providing technical assistance to transportation agencies and groups involved in implementing asset management and the infrastructure provisions of GASB 34.

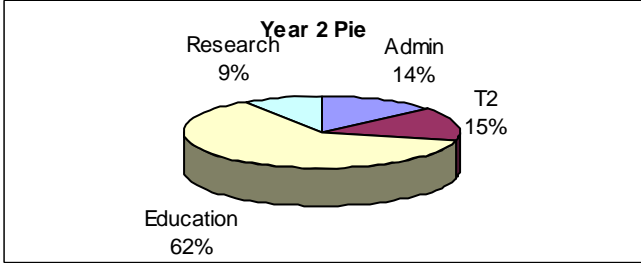
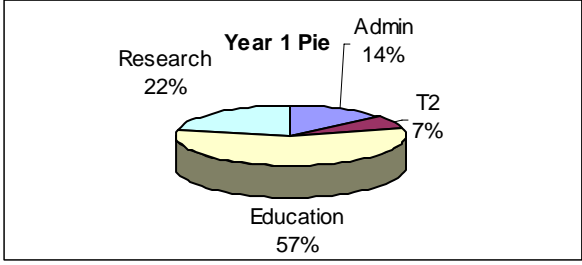
Funding Sources and Expenditures

The MTC is funded primarily from two sources, the federal University Transportation Center grant and matching funds from member universities. At present, matching funds represent slightly more than 50 percent of the MTC's total budget. As the MTC matures, other sources of matching funds will become more common. These will include state DOT funds matching research projects and private funds being used for new graduate scholarship programs.

In its first two years of operation, the MTC used the majority—approximately 60 percent—of its funding in support of its educational mission. These funds largely provided graduate assistantships to students at its member institutions. In future years, the percentage of funds going toward education may shrink somewhat as other parts of the MTC's operation (e.g. research and outreach) expand. However, education is the top priority mission of the MTC and may be expected to make up over half of the budget each program year.

Outreach activities grew significantly during the first two years and now make up about 15 percent of the total expenditures. Research spending dropped between years one and two, but this is simply a result of carryover funds from Year One being used to fund new research projects during Year Two.

The percentage of funds used for administration should be stable or start to shrink in future years. The 14 percent of funds used for administrative purposes in Years One and Two reflects such start-up costs as strategic planning, design of an identity and web site for the MTC, negotiation of contracts and agreements between member universities, and one-time indirect costs associated with starting up.



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B. Financial Status

**Semi-Annual & Annual Financial Status Report
University Transportation Centers Program**

Name of Grantee: Iowa State University

Grant Year: 6/22/99 - 09/30/00

CATEGORIES	APPROVED BUDGET	FEDERAL SHARE COMMITTED TO DATE	MATCHING SHARE COMMITTED TO DATE
Center Director Salary	\$ 47,925.00	\$ 29,364.09	\$ 16,016.58
Faculty Salaries	\$ 196,162.00	\$ 20,971.84	\$ 22,118.22
Administrative Staff Salaries	\$ 72,328.00	\$ 49,291.90	\$ 53,702.73
Other Staff Salaries	\$ 66,562.00	\$ 21,180.64	\$ 47,308.08
Student Salaries	\$ 704,856.00	\$ 172,206.06	\$ 284,118.24
Staff Benefits	\$ 152,871.00	\$ 30,149.87	\$ 24,512.59
TOTAL SALARIES and BENEFITS	\$ 1,240,704.00	\$ 323,164.40	\$ 447,776.44
Scholarships	\$ -	\$ 1,780.00	\$ 56,031.00
Permanent Equipment	\$ -	\$ -	\$ -
Expendable Property & Supplies	\$ 48,048.00	\$ 3,970.24	\$ 1,170.00
Domestic Travel	\$ 83,821.00	\$ 22,062.29	\$ 8,754.58
Foreign Travel	\$ -	\$ -	\$ -
Other Direct Costs (Specify)	\$ -	\$ 22,113.97	\$ 9,714.01
TOTAL DIRECT COSTS	\$ 131,869.00	\$ 49,926.50	\$ 75,669.59
Facilities & Administrative (Indirect) Costs	\$ 597,945.00	\$ 130,884.93	\$ 272,645.23
TOTAL COSTS	\$ 1,970,518.00	\$ 503,975.83	\$ 796,091.26
Federal Share	\$ 890,000.00	\$ 503,975.83	
Matching Share	\$ 1,080,519.00		\$ 796,091.26
Certification: I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays and unliquidated obligations are for the purposes set forth in the award documents.			
Signature of Authorized Certifying Official		DATE REPORT SUBMITTED; 3/27/01	
Type or Print Name and Title: Lisa L. Shoemaker Sponsored Programs Accountant		TELEPHONE: (515) 294-5214	

C. Year 2 Performance Indicators

for the

Midwest Transportation Consortium

Lead Institutions:

Iowa State University

Center for Transportation Research and Education

University of Missouri – Columbia

Transportation Infrastructure Center

October, 2001

Goal 1 - Education: *A multidisciplinary program of course work and experiential learning that reinforces the transportation theme of the Center.*

Performance Indicator 1a. In the Appendix to your Strategic Plan, you provided a baseline list of undergraduate and graduate courses offered by the institution[s] comprising your Center that you considered to be part of a transportation curriculum. Provide a list of courses that have been added or deleted since your submission of the baseline list.

Courses Added:

- **Infrastructure Management** (*University of Missouri - Columbia*)
- **Contemporary Issues in Transportation** (*University of Northern Iowa*)
- **Transportation Policy Planning** (*Iowa State University*)

Courses Deleted:

- **Surveying and Advanced Surveying** (*University of Missouri - Columbia*)

Performance Indicator 1b. Provide the following information about your Center’s transportation education program for the academic year being reported (Yr 2), in comparison with the baseline data (Base) you provided in the Appendix to your Strategic Plan:

Transportation Education	Undergraduate		Graduate		Total	
	Base	Yr 2	Base	Yr 2	Base	Yr 2
1b.1 Number of Courses Offered	43	47	30	27	73	74
1b.2 Number of Academic Departments Offering Them	14	14	9	9	15	15
1b.3 Number of Students* Completing Above Courses	3501	3070	150	194	3651	3264
1b.4 Number of Students* Involved in Transportation Research Projects	46	39	81	75	127	114

**Do not track individual students. One student completing three courses or involved in three research projects counts as three students.*

Goal 2 - *Human Resources:* *An increased number of students, faculty and staff who are attracted to and substantively involved in the undergraduate, graduate and professional programs of the Center.*

Performance Indicator 2a. In the Appendix to your Strategic Plan, you provided a baseline list of the advanced degrees that you considered transportation-related and which were awarded by the institution[s] comprising your Center. Provide a list of advanced degrees that have been added or deleted since your submission of the baseline list.

- **Supply Chain Management Track added to MBA/MIS Program** (*University of Missouri – St. Louis*)

Performance Indicator 2b. Provide the following information about your Center’s transportation education program for the academic year being reported (Yr 1), in comparison with the baseline data (Base) you provided in the Appendix to your Strategic Plan:

Advanced Transportation Students	Transportation-Related Degree Programs					
	Masters		Doctorate		Total	
	Base	Yr 2	Base	Yr 2	Base	Yr 2
2b.1 Number of Students* Enrolled	51	44	14	7	65	51
2b.2 Number of Students* Receiving Degrees	22	16	4	1	26	17

**Count individual students. One student pursuing or receiving a dual degree counts as one student.*

Performance Indicator 2c. For each of the individuals who received advanced transportation degrees from the institutions comprising your Center since the start of the grant, provide the following information concerning their first career move after receiving the advanced degree.

Identifier ¹	Citizenship		Title/Position	Is the Position Transportation -Related?		Organization	Type of Organization	
	U.S. ²	Other		Yes	No		Description	Sector ³
IS01	X		Staff Engineer	X		Snyder Associates	Consultant	I
IS02	X		Staff Engineer	X		Kittleson Associates	Consultant	I
IS03		X	Staff Engineer	X		Benshoof and Associates	Consultant	I
IS04	X		Staff Engineer	X		Iowa DOT	State DOT	G
IS05	X		Staff Engineer	X		Wisconsin DOT	State DOT	G
IS06		X	Staff Engineer	X		O.R. George and Associates	Consultant	I
IS07	X		Staff Engineer	X		HNTB	Consultant	I
IS08	X		Staff Engineer	X		HR Green	Consultant	I
IS09	X		Staff Engineer	X		Oregon DOT	State DOT	G
IS10	X		Ph.D Studies	X		U.C. Davis	State University	A
IS11	X		Unknown	X		BRW	Consultant	I
IS12	X		Transportation Planner	X		Des Moines Iowa MPO	MPO	G
IS13	X		Transportation Planner	X		LSC, Inc.	Consultants	I
MC01		X	Unknown	X		Unknown (Boston Area)	Consultant	I
MC02		X	Unknown	X		Unknown (Texas)	Consultant	I
MC03	X		Unknown	X		University of Missouri	Trans Engineering	T
MS01		X	Unknown		X	Greek Military	Military	G

¹ Do not report the graduates' names, student numbers or other information that could identify individuals. Instead use some simple identifier that will prevent double-counting of, e.g., a recipient of a Masters degree who then goes on to get a Ph.D.

² Includes graduates who are U.S. citizens or Permanent Residents when they make their first career move.

³ Sector:
A - Advanced Degree Program
G - Government
I - Industry
T - Teaching / Academic Research
U - Unknown

Performance Indicator 2d. Using the information you provided as Performance Indicator 2c, break out by sector the total number of individuals who are U.S. citizens (or permanent residents of the United States) and whose first career moves have placed them in transportation-related positions.

Sector	Number
2d.1 Advanced Degree Program (A)	1
2d.2 Government (G)	4
2d.3 Industry (I)	6
2d.4 Teaching/Academic Research (T)	1
2d.5 Unknown (U)	0

Goal 3 - Diversity: *Students, faculty and staff who reflect the growing diversity of the U.S. workforce and who are substantively involved in the undergraduate, graduate and professional programs of the Center.*

Performance Indicator 3. Provide the following data for the students receiving transportation-related advanced degrees (as shown in Performance Indicator 2b.2) and for all students receiving any advanced degree awarded by the institution[s] comprising your Center.

Diversity of Those Receiving Advanced Degrees	Transportation-Related Advanced Degrees Only		All Advanced Degrees	
	Base	Yr 2	Base	Yr 2
3.1 Non-Hispanic White	16	10	2,067	2,910
3.2 Hispanic	0	1	31	63
3.3 African-American	0	0	116	231
3.4 Asian/Pacific Islander	8	1	48	67
3.5 Native American	0	0	8	13
3.6 Other	2	5	753	512
Total	26	17	3,023	3,796
3.7 Male	22	15	1,631	1,670
3.8 Female	4	2	1,392	2,126
Total	26	17	3,023	3,796
3.9 U.S. Citizens and Permanent Residents	20	12	2,292	3,226
3.10 Non-U.S. Citizens	6	5	731	570
Total	26	17	3,023	3,796

Goal 4 - Research Selection: *An objective process for selecting and reviewing research that balances multiple objectives of the program.*

Performance Indicator 4a. Provide the following information about your Center's transportation research selection process during the academic year being reported (Year 2):

Transportation Research Selection	Yr 2
4a.1 Number of Transportation Research Project Proposals Submitted to Center	3
4a.2 Number of Transportation Research Projects Awarded by Center	3
4a.3 Total Budgeted Costs for Those Projects	\$657,153
4a.4 Number of Individuals Listed as Principal Investigators* in Those Projects Awarded	3

**Count individual Principal Investigators (PIs). One PI overseeing several projects is counted as one PI.*

Performance Indicator 4b. Provide the number and budgeted costs of all research projects which your Center has funded during the year being reported, broken out according to the primary subject of the research.

Primary Subjects of Center-Funded Research in Year 2 (Report each project only once)	Number of Projects	Budgeted Costs (All Sources)
TRANSPORTATION SYSTEM PERFORMANCE:		
4b.1 Measurement, characterization and modeling of system performance and impacts measurement.		
4b.2 Transportation and logistics system operations and management.		
4b.3 Behavioral sciences and human performance.		
4b.4 Transportation planning, economics, and institutional issues.	1	\$ 143,878
4b.5 R&D resource base.		
PHYSICAL INFRASTRUCTURE:		
4b.6 Construction - Improved design and construction practices, processes, structures, and materials.		
4b.7 Maintenance and operations - Technologies and procedures associated with operational efficiency, safety, security, durability, and renewal and maintenance of all categories of transportation infrastructure.	1	\$ 256,377
4b.8 Intermodal facilities - Design and construction principles and technologies specifically relevant to modal connection points.		
INFORMATION INFRASTRUCTURE:		
4b.9 Traffic management - Technologies and systems to maximize infrastructure capacity and improve safety and efficiency, while minimizing environmental impacts.		
4b.10 Fleet operational management - Technologies that facilitate optimal use of vehicles and other assets.	1	\$ 256,898
4b.11 Intermodal operations - Information technologies that facilitate efficient movement of cargo and people among modes and provide needed information to shippers and travelers.		
VEHICLES:		
4b.12 Design and manufacture - Design of new vehicles; development of design tools and principles; application of new materials and technologies, including the investigation of their impacts on safety and security.		
4b.13 Fuels - Vehicle fuels and energy sources, including production and delivery systems.		
4b.14 Technologies involved in inspection, maintenance, repair, disposal and recycling of vehicles.		
OTHER		
4b.15 (Describe)		
TOTAL CENTER RESEARCH	3	\$ 657,153

Performance Indicator 4c. Provide the number and budgeted costs of the research projects which your Center has funded during the year being reported, broken out according to special focus area. Unlike the previous break-out by research subject, this assessment expects some double-counting, as projects may involve more than one goal, issue or mode.

Center-Funded Research Relating to Special Focus Areas in Year 2	Number of Projects	Budgeted Costs (All Sources)
GOALS:		
4c.1 Safety		
4c.2 Mobility		
4c.3 Economic Growth and Trade		
4c.4 Human and Natural Environment		
4c.5 National Security		
ENABLING RESEARCH:		
4c.6 Human Performance and Behavior		\$ 256,898
4c.7 Advanced Materials		
4c.8 Computer, Information and Communication		\$ 400,255
4c.9 Energy and Environment		
4c.10 Sensing and Measurement		
4c.11 Tools for Modeling and Design		
MODAL ORIENTATION:		
4c.12 Air		
4c.13 Highway		\$ 400,255
4c.14 Maritime		
4c.15 Rail		
4c.16 Transit		\$ 256,898

Goal 5 - Research Performance: *An ongoing program of basic and applied research, the products of which are judged by peers or other experts in the field to advance the body of knowledge in transportation.*

Performance Indicator 5. Provide the following information about your Center's transportation research performance during the academic year being reported (Year 2):

Transportation Research Performance	Yr 2
5.1 Number of Peer-Reviewed Transportation Research Reports and Books Published	0 *
5.2 Number of Transportation Research Papers Accepted for Presentation at Academic / Professional Meetings	0 *
5.3 Number of External Awards Received for Transportation Research	0 *

* *Year 1 MTC Research Awards are just beginning to conclude; reports expected to follow during Year 3.*

Goal 6 - *Technology Transfer:* *Availability of research results to potential users in a form that can be directly implemented, utilized or otherwise applied.*

Performance Indicator 6. Provide the following information about your Center’s technology transfer and outreach efforts during the academic year being reported (Year 2):

Transportation Technology Transfer and Outreach	Year 2
6.1 Number of Visitors to Transportation Center Website	6,936
6.2 Number of Peer-Reviewed Transportation Research Publications Available on Website	0
6.3 Number of Transportation Outreach Events Conducted for Pre-College Students	1 *
6.4 Number of Pre-College Students Participating in Those Events	50 *
6.5 Number of Transportation Seminars, Symposia, Distance Learning Classes, etc., Conducted for Practicing Professionals	28 *
6.6 Number of Practicing Professionals Participating in Those Events	977 **
6.7 Number of Transportation Center Newsletters and Other Transportation Periodicals Published	1
6.8 Number of Issues Produced	2
6.9 Total Circulation	6073
6.10 Number of Transportation Technology Products Deployed	0

* *Includes activities leveraged with host institutions*

** *Includes activities leveraged with host institutions and some attendance estimates*