

## Introduction

The Midwest Transportation Consortium (MTC) recently completed its fifth year of operation. In doing so, the consortium has established itself as an effective network that promotes the education of future transportation professionals and the development of new knowledge in how to management transportation infrastructure and services in a more sustainable manner. The MTC has a track record of developing outstanding students; these students are now becoming leaders in the private sector, government, and academia. The MTC has also supported the development of an extensive research portfolio related to sustainable transportation asset management. More research projects are in the pipeline. Finally, the MTC has dedicated itself to the dissemination of asset management research results through an ongoing technology transfer program. This document provides a progress for the latest fiscal year of operation of the MTC, which ran from October 2003 through September 2004.

## Consortium Organization and Theme

The Midwest Transportation Consortium is one of ten regional University Transportation Centers located around the United States. These ten centers were established through a regional competition. The MTC is now entering its sixth year of existence. The MTC is the University Transportation Center for Region 7, which includes the states of Iowa, Kansas, Missouri, and Nebraska.

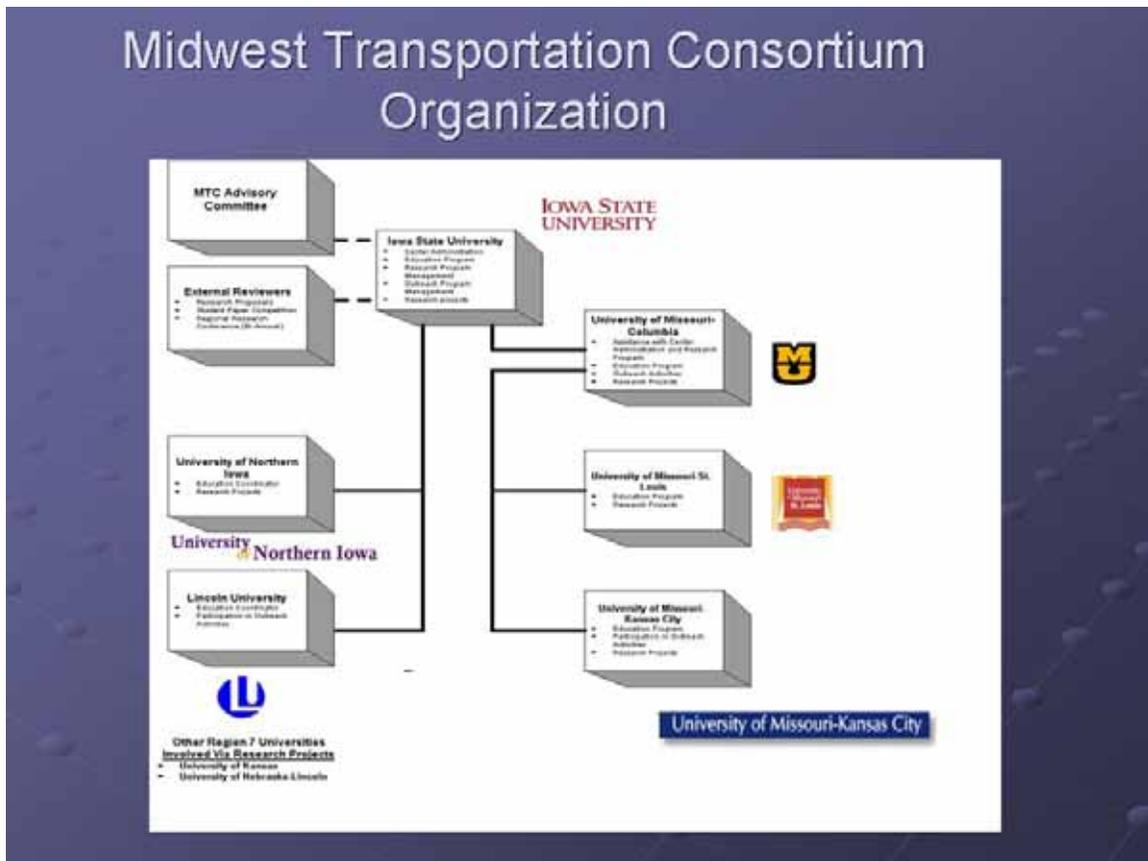


The MTC is organized as a constellation of six cooperating educational institutions. Two schools make up the Administrative Core of the Consortium and employ the Center Director (formerly Mr. David Plazak and now Dr. Tom Maze at Iowa State University) and Associate Director (Mr. Charles Nemmers at the University of Missouri-Columbia). The other four schools are involved in the Education and Research functions of the Consortium. Several of these schools (Northern Iowa and the historically Black institution, Lincoln University, had essentially no involvement in transportation education and research when the MTC was established.

“Administrative Core” (2 schools)  
Iowa State University (ISU)  
University of Missouri – Columbia (UM-C)

- Junior Partners: Mainly Educational (4)
- University of Missouri – Kansas City (UMKC)
  - University of Missouri – St. Louis (UMSL)
  - University of Northern Iowa (UNI)
  - Lincoln University (Jefferson City, Missouri)

A diagram of the Consortium Organization is shown below. Most of the Administrative Functions of the Consortium take place at Iowa State University. This includes review and contracting of MTC-funded competitive research projects and educational competitions. The University of Missouri-Columbia provides a single point of administration for the participation of the three University of Missouri system campuses. This includes administration of all budgets and contracts. Missouri-Columbia also coordinates some of its activities with Lincoln University, which is located nearby in central Missouri.



The theme of the Midwest Transportation Consortium is **“Transportation Management Systems and Operations Focusing on Sustainable Asset Management”**. As such, the MTC participating institutions are working to prepare students to be leaders for an industry that is quickly evolving from a paradigm of building transportation systems and infrastructure to managing transportation systems and infrastructure for best results. The MTC aims to

integrate operations, management, renewal disciplines along with traditional construction.

The MTC concentrates on education and human capital development, believing that a new generation of leaders is needed to help make the transition from the “building” era to the “managing” era. The need for leadership is even more pressing given the large number of retirements that are occurring among today’s leaders in the transportation industry. The MTC has a number of primary focus areas for its expenditures:

- To fund graduate assistantships for the next generation of industry leaders
- To develop new courses and new course materials for transportation asset management
- To get new faculty members and researchers involved in transportation and transportation asset management activities
- To provide regional leadership in advancing transportation asset management through competitively-funded research projects and technology transfer activities
- To make a national contribution through participation and leadership in asset management through involvement in organizations such as the Transportation Research Board (TRB) and the American Association of State Highway and Transportation Officials (AASHTO).

### **Key Consortium Personnel**

The key personnel of the Midwest Transportation Consortium consists of a Director, an Associate Director and Educational Coordinators at each Consortium member school. As of the end of the 2003-2004 fiscal year, the key personnel were as follows:

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### **Educational Program Highlights**

*Educating Future Leaders In Transportation.* The Midwest Transportation Consortium's main focus for the past five years has been on helping to educate future leaders for the transportation industry who understand the system in a holistic manner and who understand the transition now underway from building the system to managing the system. Over the past five years, the Consortium's MTC Scholars Programs at the cooperating institutions in Iowa and Missouri have supported the education of thirty to forty such graduate students every year, mainly at the Master's degree level.

The Transportation Scholars program operates somewhat differently at each consortium school. For example, at Iowa State University students sign a "Scholars Contract" that requires them to participate in special MTC-sponsored activities. In exchange, faculty members are given access to Federal University Transportation Center matching funds to help support their research and the students' education. MTC Scholars participate in such activities as the Spring Transportation Seminar, the Fall MTC Paper Competition, and travel to conferences such as the Transportation Research Board (TRB) Annual Meeting.

*National Award-Winning Students At Iowa State University.* During the past several years, Iowa State University MTC Scholars have been awarded impressive honors. Iowa State currently is the home of two Eisenhower Scholars, both of whom have also been MTC Scholars. They are Justin Doornink and David Veneziano, both Ph.D. students. Doornink's doctoral research is related to bridge structures, while Veneziano is examining highway intersection safety improvement.

Two other award-winners were Jamie Luedtke and Hillary Isebrads. Luedtke was the first winner in the nation of the Frank Francois Scholarship from the American Association of State Highway and Transportation Officials. She was also the MTC's 2004 Student of the Year Award Winner. Her Masters degree research studied the impact of highway access management on commercial land values. She is now working for Snyder Associates, an engineering and planning consulting firm in Iowa, and was recently named a "Young Member" of the TRB Access Management Committee. She is involved in conducting traffic impact studies and access/corridor management studies at SnyderAssociates.

Hillary Isebrands was one of a small number of students from around the nation selected for the ENO Foundation Fellowship program that brings promising students to Washington, DC for intensive training. She is currently completing a Master's Degree in Civil Engineering at Iowa State concentrating her research on the safety benefits of roadway lighting. She plans to pursue a Ph.D. in Civil Engineering at Iowa State and focus her research on rural roundabouts as a traffic safety tool.

*Transportation Career Fair for High School Students.*

(To be developed)

*MTC Scholars Conference and Paper Competition.* A Transportation Scholars Conference is held every fall semester at Iowa State University, during which students present research papers written for the previous spring semester's Transportation Seminar series. The papers are judged by an outside panel, and the author of the best paper is awarded a cash prize. The following papers were presented in November, 2003:

- Heat of Hydration of the Blended Cement  
Zhi Ge, Iowa State University
- Ethos, Pathos, Logos and the National Transportation Safety Board  
Brett Hansen, Iowa State University

- Using Moisture Sensor to Monitor Fresh Concrete Uniformity  
Jiong Hu, Iowa State University
- Evaluation of Corrosion-Resistant Steel Reinforcement  
Milan J. Jolley, Iowa State University
- The Mechanisms of Corrosion and Utilizing Fiber Reinforced Polymers as a Chloride Barrier  
Elizabeth Kash, Iowa State University (Winner of the student paper competition for 2003)
- Construction and Evaluation of the First Modified Beam-in-Slab Bridge  
Travis Konda, Iowa State University
- Measuring Commercial Land Value Impacts of Access Management Techniques  
Jamie Luedtke, Iowa State University
- Corridor Management: Identifying Corridors with Access Problems and Applying Access Management Treatments, A U.S. 20 Case Study  
Jon Rees, Iowa State University
- Design of a Steel Free Bridge Deck System  
Van Robbins, Iowa State University

Many papers from 2003 and past years from the Transportation Scholars Conference are now available on-line at:

<http://www.ctre.iastate.edu/mtc/papers/index.htm>

*Transportation Seminar Series for Spring 2003.* This seminar series is part of Iowa State University's Transportation Scholar Program and is "beamed" to four MTC member schools on Spring Fridays using Internet-based videoconferencing technology. Speakers and topics for 2003 are noted in the table below.

<b>Date</b>	<b>Speaker/Topic</b>
Jan. 16	Terry Browne (Collins Engineering), <i>Underwater Bridge Inspection</i>
Jan. 23	Matt Shands (Transportation Policy Institute), <i>Asset Management as Communications</i>
Jan. 30	Glen Washer (FHWA Turner Fairbank Highway Research Center), <i>Non Destructive Evaluation in Condition Assessment for Asset Management</i>
Feb. 6	Terry Wipf and Brent Phares (Iowa State University), <i>Bridge Health Monitoring: Present and Future</i>

- Feb. 13 Mike Smid (Yellow Freight), *The Trucking Industry*
- Feb. 20 Ernest Barenberg (University of Illinois) and Dulci Rufino (ERES Consultants), *PCC Pavement Issues*
- Feb. 27 Mark Ward (John Deere Company), *Global Logistics for John Deere*
- March 5 Steve Andrie and Dennis Kroeger (Iowa State University), *Winter Maintenance Management—The MDSS System*
- March 12 Tom Maze (Iowa State University), *The Science of Asset Management*
- March 26 David Plazak and Reg Souleyrette (Iowa State University), *Process to Identify High Priority Corridors for Access Management Near Large Urban Areas in Iowa*
- April 2 Keith Herbold (Federal Highway Administration), *Pavement Preservation and Asset Management*
- April 9 Wayne McDaniel (PB Consultants), *GASB 34 Modified Approach Implementation*
- April 16 Joseph Kellett (US Army Corps of Engineers), *US Army Corps of Engineers: Overview and Opportunities*
- April 23 Stuart Anderson (Iowa Department of Transportation), *Iowa DOT's Long Range Transportation Plan Update*
- April 30 Donald Broughton (A. G. Edwards), *Financial Health of the Transportation Industry*

*UMSL Transportation Program Grows and Thrives.* The University of Missouri-St. Louis was active in education and research activities related to transportation logistics and supply chain management prior to joining the MTC. However, funding from the MTC has allowed UMSL to attract and educate a greater number of graduate students. UMSL students are now working in a variety of settings around the globe. Some recent UMSL graduates' stories are noted below. They are:

- Deborah M. Schillinger graduated in August 2004. She is involved in the St. Louis Roundtable Board of Council of Logistics Management and currently the Facilitator of the CLM Logistics Mentoring Program at UMSL.
- Canser Bilir graduated in May 2004 and has started working at Turkish Airlines in his native country. He is a member of Globalsoft (Turkish Partner of the Peoplesoft) Supply Chain Implementation team.
- Julien Marin-Couilloud graduated in August 2004 and is currently leading a Customs Compliance Gap Analysis project at Emerson Motor Company in St. Louis.
- Ersin Ertikin has been working as a Fleet Manager at Federal-Mogul Corporation since May 2003. His responsibilities include management of daily dedicated fleet operations, analyzing/optimizing the fleet routes, monitoring performance, and customer service.

- Francois Charvet graduated in December 2003 and started work with ORTEC (Atlanta) as business analyst and routing software specialist, taking on several roles and responsibilities in large-scale optimization software projects. At ORTEC, he worked directly with key logistics and transportation players at an impressive list of companies including Coca Cola Enterprises, Roadway Express, PittOhio Express, and Longview Fibre Company. Recently, he decided to further pursue his interest in the logistics and supply chain field through a PhD in Business Logistics at the Fisher College of Business at The Ohio State University.
- Hani Yafi graduated in May 2003 and has been working for The Arthur Wells Group as a Logistics Analyst since October 2003. He is a key player in analyzing data, developing cost effective programs that helps secure new business, supporting modeling and optimizing the logistics operations for different customers to achieve cost efficiency for my company.
- Kwabena Boaten graduated in 2002, and is currently work as a logistics planner at the distribution arm of Praxair Inc. His current work entails implementing routing software for next day delivery of cylinder gases to customers ranging from restaurants to hospitals to manufacturing outfits.

*MTC Goes International.* Although the main emphasis of MTC educational activities is regional or national activities, several of the institutions are in the process of developing international relationships. Currently, Consortium members are at work developing relationships across the globe, from Russia, to China to Italy.

The University of Northern Iowa has developed a relationship with Herzen University of St. Petersburg, Russia. This has culminated in the reworking of the Transportation Geography Course originally developed with the help of the University Transportation Center grant to include broader public policy considerations. This has allowed for the development of a second course on public policy issues in the United States and Russia that is being videoconferenced between Herzen University and Northern Iowa using the same technology that the MTC uses for its spring transportation seminar.

UMSL is working on developing a joint program with the Beijing Jiaotong University, a university that has been designated as China's premier logistics school. This program will bring in some highly selected graduate students to spend one year of their three graduate years with UMSL as graduate research assistants. The University is attempting to encourage and involve St. Louis based firms with businesses in China to support these students. It is anticipated that these students will be able to take necessary UMSL courses to grant them a Graduate Certificate in Supply Chain Management. The Chinese students would bring some knowledge of China's transportation and logistics systems, while

having the opportunity to work on U.S. supply chain. This program would also allow the supporting firms to gain a much greater insight into the Chinese transportation infrastructure, and ways of doing business in China.

Iowa State University-based MTC staff (specifically then-Director Davis Plazak) taught the first-ever transportation course for Iowa State University's long-running summer in Rome study abroad program. The course in transportation planning used Rome to teach concepts that are more difficult to teach in the Midwestern United States, such as the role of modes other than automobiles and how land development patterns impact transportation demand. In preparation for this course, he developed relationships with the City of Rome's Mobility Agency (STA) and the University of Rome, which offers a number of transportation courses and conducts transportation research for the European Community (EC).

### **Research Program**

The Midwest Transportation Consortium research program continues to build a successful portfolio of completed projects related to the Consortium theme: Sustainable Transportation Asset Management. Funded research is focused on the development of improved asset management tools and techniques.

All MTC-funded projects are expected to provide technology transfer of research results. Many of the results of funded projects have been presented at conferences and workshops, such as regional workshops on asset management, the past two National Transportation Asset Management Workshops, and the Transportation Research Board's Annual Meeting in January. Printed research summaries have been prepared for selected projects and web documentation has been prepared for all completed projects. For the past two years, the top-requested project on the Center for Transportation Research and Education's (CTRE) web site has been an MTC-funded project. This is noteworthy in that CTRE publishes numerous research reports each year. In 2003, an Iowa State University project on laser scanning was the research project with the most "hits"; in 2004, it was one of the University of Northern Iowa's winter maintenance asset management projects. This indicates that the MTC research selection process is developing projects that are of great interest to the transportation community.

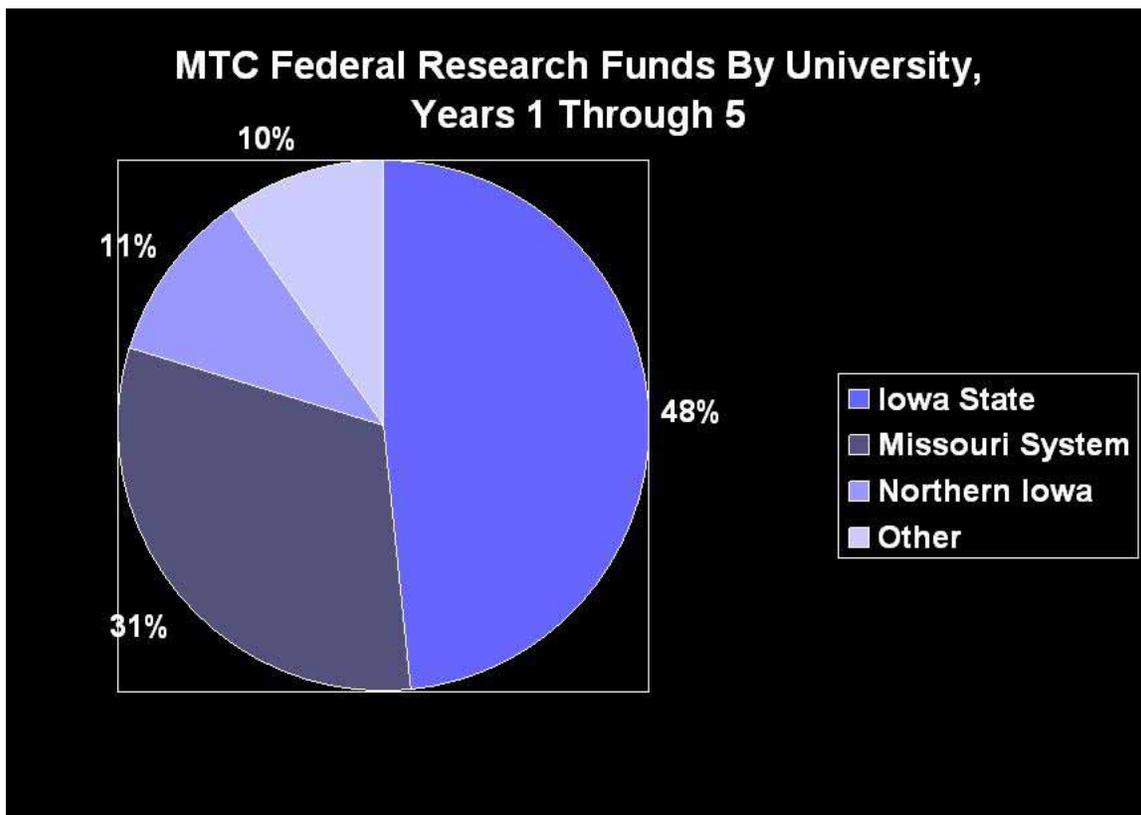
MTC research project selection is made using a two-round selection process each Fall. The Year 6 research competition was being conducted as this report was being written. During Round 1 brief (2-3 pages) Research Prospectuses are submitted by Principal Investigators from any academic institution in US DOT Region 7. This includes the states of Iowa, Kansas, Missouri, and Nebraska. Submitted prospectuses are rated and ranked by academic reviewers from the Region and outside the Region, the four regional state DOT research managers, and Federal Highway Administration Division staff in either Iowa or Missouri. About 30 to 50 percent of prospectuses are selected for further development. During Round 2 detailed proposals are requested. Matching funds must be

guaranteed with a letter of commitment for match (Fifty percent match must be provided at a minimum, including cash and/or “soft” match.)

Through summer 2004, MTC had funded 17 different research projects at six lead universities in three states. These included:

- Iowa State University (9)
- University of Kansas (1)
- University of Missouri-Columbia (2)
- University of Missouri-Kansas City (1)
- University of Missouri-St. Louis (2)
- University of Northern Iowa (2)

Most of the lead universities have been consortium member schools, but this is not a requirement for funding. The University of Nebraska and Northern Iowa have also served as subcontractors on projects. Total project funding has been over \$2.1 million, including around \$1.1 million in Federal UTC Funding and about an equal amount of matching funds. About half of all research funding has remained at Iowa State and about a third has gone to various University of Missouri System campuses.



The status of the 17 MTC-funded research projects funded through the first five years of operation of the Consortium is shown below. A wide variety of asset management topics have been researched. Although highways and bridges have been the focus of most research, several projects have involved other modes, including public transportation and inland waterways.

As of the writing of this report, seven projects have been completed and published and ten are in progress. Several of the projects in progress are nearing completion.

### MTC Research Projects Year One (2000)

Lead	Project Title	Dates / Status
Iowa State University	Addressing Integration Issues and Developing a Protocol for Integration of Global Positioning Systems Data With Linear Referenced Data in an Asset Management System	7/00-5/01 Completed
University of Kansas	GIS-Based Integrated Rural and Small Urban Transit Asset Management System	7/00-12/00 Completed
University of Missouri-Columbia	Decision-Support System for Management of Slope Construction and Repair Activities--An Asset Management Building Block	7/00-8/02 Completed
University of Missouri-Kansas City	Roadway Asset Management System Manual for Local Governments	7/00-2/02 Completed
University of Northern Iowa	Artificial Intelligence-Based Optimization of Management of Snow Removal	7/00-5/02 Completed

## MTC Research Projects Year Two (2001)

Lead	Project Title	Dates / Status
University of Missouri-Columbia	Identification and Development of User Requirements to Support Robust Corridor Investment Models	7/01- In progress
Iowa State University	Application of Advanced Remote Sensing Technology to Asset Management	7/01- In progress
University of Missouri-St. Louis	Research and Training of Private Transportation Providers for the Efficient and Effective Provision of Transportation Services	7/01-8/03 Completed

## MTC Research Projects Year Three (2002)

Lead	Project Title	Dates / Status
Iowa State University	Reducing Uncertainty in Estimating Heavy Truck VMT and Intersection Inventories	10/02- In progress
Iowa State University	Iowa DOT Bridge Asset Management Using PONTIS: Data Integration, Performance, and Decision Support Tools	1/03- In progress
Iowa State University	Improving Efficiency of Transportation Projects Using Laser Scanning	9/02-12/02 Completed

## MTC Research Projects Year Four (2003)

Lead	Project Title	Dates / Status
Iowa State University	User Benefits of Winter Maintenance – Intercity Traffic During Winter Storms	5/03- In progress
Iowa State University	Roadway Alignments as Assets: Evaluating Alternatives for Valuing Major Highway Corridor Rights of Way	5/03- In progress
University of Northern Iowa	A Web-Based Implementation of Winter Maintenance Decision Support System (WMDSS) Using GIS and Remote Sensing	7/03- In progress

## MTC Research Projects Year Five (2004)

Lead	Project Title	Dates / Status
Iowa State University	Implementation of HERS-ST in Iowa and Development/refinement of a National Training Program	7/04- In progress
Iowa State University	Planning, Developing and Implementing the Iowa Pavement Marking Management System (IPMMS)	7/04- In progress
University of Missouri – St. Louis	Appointment Systems for Inland Waterway Traffic Control	4/04- In progress

All MTC project research reports and synopses of projects in progress are available on the World Wide Web at:

<http://www.ctre.iastate.edu/mtc/projects/yr1projects.htm>

In order to facilitate technology transfer efforts, a series of Tech Transfer Summaries is now being prepared for projects that are thought to be the most valuable for transportation professionals. An example of one of these is shown below for the University of Missouri-Columbia project on Asset Management Tools for Slope Maintenance and Repair Decisions.



IOWA STATE UNIVERSITY

**RESEARCH PROJECT TITLE**

Decision Support for Slope Construction and Repair Activities: An Asset Management Building Block (MTC Project 2000-03)

**FINAL REPORT DATE**

February 2004

**SPONSORS**

Research and Special Programs Administration, U.S. DOT; Missouri DOT

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**KEY WORDS**

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earth slopes  
embankments  
geotechnical engineering  
maintenance management

**MORE INFORMATION**

<http://www.ctre.iastate.edu/mtc/projects/2000-03.htm>

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## Asset Management Tools for Slope Maintenance and Repair Decisions

tech transfer summary

### Objectives

- Develop a decision support framework, based on asset management principles, to facilitate effective decision making for selection of appropriate methods to stabilize failed earth slopes.
- Develop a simple asset management framework suitable for managing geotechnical assets.
- Develop several analysis models to evaluate alternative slope maintenance and repair strategies.

### Problem Statement

Geotechnical assets such as highway embankments are critical for transportation systems to function effectively. Transportation agencies across the country are faced with the recurring task of repairing numerous slope erosion and surface failures, commonly referred to as nuisance slides. These problems present significant hazards, including damage to or loss of pavement sections, loss or reduced effectiveness of guardrails and other safety measures, blocking of drainage channels, and potential damage to bridges and other structures. A decision support framework based on asset management principles is necessary for effective systematic slope maintenance and repair decisions.

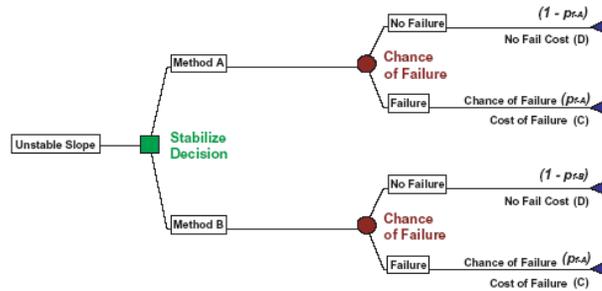
### Technique Description

Recent efforts at the University of Missouri–Columbia focused on developing the required analysis tools needed for a geotechnical asset management system. Assets were categorized in terms of function as “exclusively geotechnical,” “partially geotechnical,” or “minimally geotechnical” to indicate the degree of interaction with other assets. Highway embankments and slopes, as a category, are the most clearly geotechnical type of asset.

Two alternative forms of decision tree models were developed for the purpose of analyzing alternative courses of action for stabilization and maintenance of failed slopes:

1. The Instant in Time (IIT) model was developed for making a repair decision at a given instant in time.
2. The Specific Time Horizon (STH) model was developed for explicit consideration of the possible outcomes as a function of time.

*Continued on next page*



*Instant in Time (IIT) decision model representing the slope repair problem*

#### *Instant in Time (IIT) Decision Model*

The IIT decision model provides the capability to analyze a wide range of decision scenarios simply by substituting appropriate values for the decision variables. It can be used to evaluate alternative stabilization measures by substituting appropriate values for the respective variables. It can also be used to evaluate whether or not stabilization should be undertaken at all by simply analyzing the model for a preferred stabilization technique and for no stabilization.

#### *Specific Time Horizon (STH) Decision Model*

The STH decision model was developed considering the possibility of having to apply a specific repair technique multiple times over a specific time horizon. Two following forms of the STH model were developed as a part of the project:

- The three-method STH model can be used to evaluate among three alternative stabilization methods over specified time horizons.
- The constant-method STH model can adopt a single stabilization method throughout the specified time horizon rather than permitting the stabilization method to be changed within the time horizon.

The analysis models developed during this project make use of formal decision analysis techniques—specifically, “decision trees.” Decision tree models provide the capability to compare alternative stabilization techniques with appropriate consideration of the costs, consequences, and reliability of the techniques from an organizational perspective.

All models were developed and evaluated using the commercially available decision support software suite DecisionTools, which consists of a number of Microsoft Excel “add-ins,” as well as stand-alone programs to facilitate development and analysis of alternative decision tree models.

## Key Findings

- Decision trees were found to be a useful technique for modeling the analysis options.
- IIT model can be modified to account for life-cycle costs. The simplicity of the approach offers notable advantages over the more complicated STH models.
- The constant-method STH model is restricted to repeated application of a single stabilization measure over the specified time horizon.
- The three-method STH model has the capability of comparing repeated application of three alternative stabilization measures with the possibility of “switching” between methods during the specified time.
- The recommended decisions obtained using the two alternative forms of the STH model were found to be practically identical for time horizons of practical interest.

## Implementation Benefits

- Decision trees can be used to effectively model slope maintenance and repair decision options with consideration of important aspects such as the costs, consequences, and reliability of the techniques.
- The IIT and SHT decision models provide the basis upon which future enhancements can be made with relative ease.

## Implementation Readiness

- Additional work is needed to incorporate the data collection tools and procedures being developed by others with the analysis tools developed as part of this project.
- More work is also required to provide additional guidance to potential users on selection of appropriate input parameters.

**Outreach and Technology Transfer Program Highlights**

This year's emphasis in terms of outreach and Technology Transfer has been on disseminating research results to the community of transportation practitioners through the World Wide Web and the new Tech Transfer Summary series of publications. However, more "hand-on" activities also continue.

The University of Missouri-Columbia has been particularly active in providing outreach activities this year. Its outreach efforts to cities and counties in Missouri, especially with respect to Transportation Asset Management fundamentals and GASB (Government Accounting Standards Board) Circular 34 engaged over 200 local agency representatives statewide, including 18 Regional Planning Commissions and Cole, Jackson and Boone Counties. This outreach effort also resulted in a parallel effort in Ohio where eight courses were held on Asset Management for local governments. These workshops were sponsored by the Ohio Local Technical Assistance Program (LTAP) Center.

UM-C also sent a group to actively participate in the National Association County Engineers annual meeting in Mendocino County California to present the results of a previously-completed MTC research project on local asset management guidelines.

The University of Missouri—St. Louis participated in a broad range of outreach activities in its region during 2003 through 2004. At the request of TriStar Business Communities the Center for Transportation Studies evaluated designs of alternative supply chain networks to investigate the role of the St. Louis region in prospective import oriented supply chains. The St. Louis region was found to be competitive with other national distribution locations for certain network configurations, typically involving a Midwest distribution center.

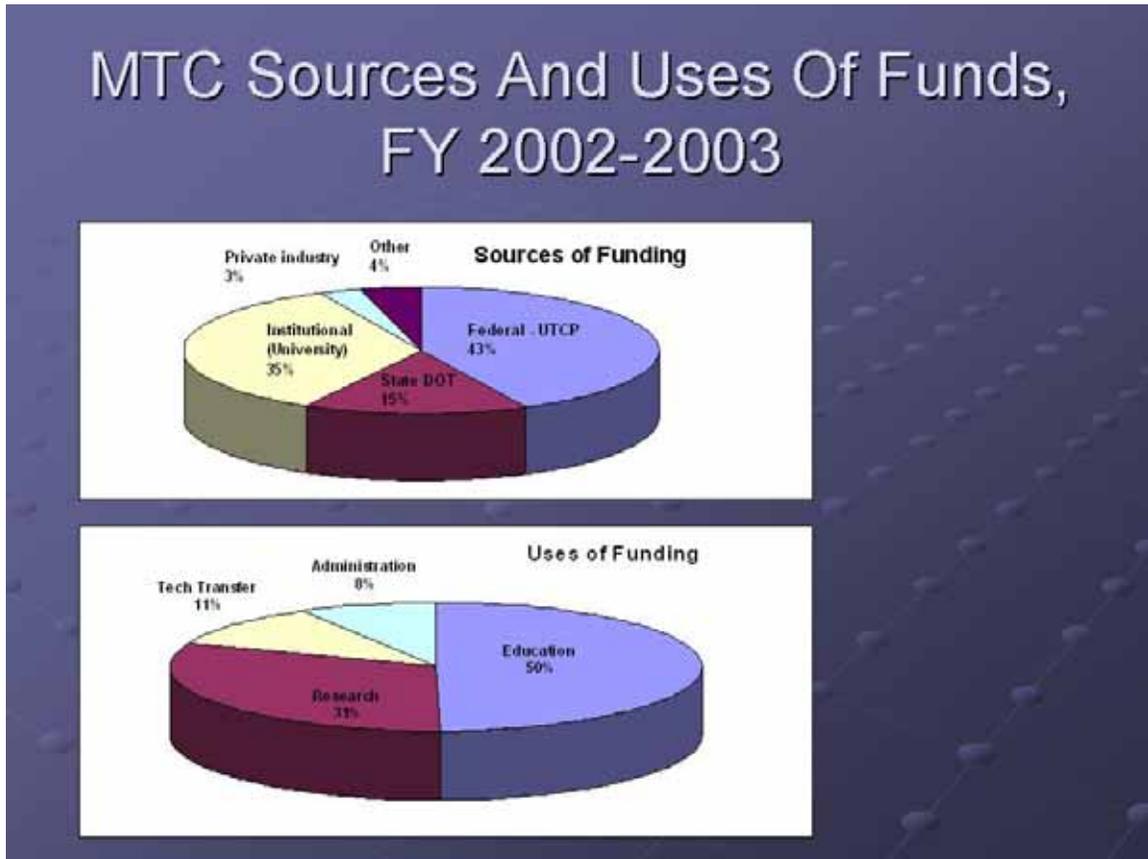
The proposed Federal Highway Administration Rules for changing the limits on hours of service for truck drivers may have negative effects on transportation providers' costs. At the request of the Landair Corporation the UMSL Center for Transportation Studies evaluated the effects of the proposed rules on an existing distribution network and concluded that the proposed regulations could have a significant impact on delivery costs.

The Center for Transportation Studies at the University of Missouri-St. Louis is also examining the extent to which changes in operating rules at individual locks and the availability of real-time location information for commercial vessels on the Upper Mississippi River system might potentially help to alleviate congestion that occurs between Lock 20 and Lock 25. They are concentrating on alternative scheduling schemes for lockage operations and on the acquisition and presentation of information that would be required to implement such schemes.

UMSL also provided outreach services in the form of seminars targeted to a large number of private transportation officials engaged in providing public transportation. The topics for the seminars were selected on the basis of surveys and an understanding of the most important issues and concerns in the industry. Over the course of two years, these seminars were given on the topics of marketing, maintenance, dealing with the media, human resource development, and technology innovations. Seminar attendees were able to learn best practices and share experience on issues involving the human resources management, dispatching technologies, relation with media, sales and marketing, and fleet maintenance.

**Consortium Sources and Uses of Funding**

During Federal Fiscal Year 2003, the Midwest Transportation Consortium received approximately 43 percent of its funding from Federal University Transportation Center Program (UTCP) grant funds. These funds were mainly matched with Institutional (University) funds (35 percent of total funds) and funding from State Departments of Transportation located in Region 7. The largest state contributions came from Iowa and Missouri.



As was indicated in the MTC's Strategic Plan, the Consortium's main focus is on Education—the development of new human capital and leadership for the transportation industry in the region served by the MTC. In Federal Fiscal Year 2002-2003, exactly half of MTC funding went for Education. This includes items such as graduate student research assistantships, development of new courses and course material related to transportation asset management, student competition awards, and student educational travel to conferences such as the Transportation Research Board Annual Meeting. About a third of funding went into the MTC competitive Research program. Most of the remainder went toward Technology Transfer, for instance presenting workshops or co-sponsoring conferences and preparing Tech Transfer Summaries. About eight percent of funding went toward the administration of the MTC program, including general administration and costs related to research contracts.