

# MTTC

MIDWEST  
TRANSPORTATION  
CONSORTIUM

## ANNUAL PROGRESS REPORT *October 2000*

**SUBMITTED TO:**

*Office of Innovation, Research & Education (DIR-1)  
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400 7th Street, Room 8417  
Washington, D.C. 20590-0001*

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## From the Director

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The Midwest Transportation Consortium (MTC), the University Transportation Center serving the states of Iowa, Kansas, Missouri, and Nebraska, had a very successful first year of operation. The MTC is a complex partnership involving six universities in two states. Yet, in many ways the MTC was able to operate as a close-knit team. For example, the MTC partners were able to employ videoconferencing technology to allow a series of transportation seminars to be shared at three partner universities. This seminar series has allowed students in two states to hear experts in a number of subject areas (particularly asset management) that they would not have otherwise been exposed to.

The MTC's main focus is on education and human capital. This focus is in recognition of the fact that the transportation industry, both public and private, in the region served by the MTC faces a serious shortage of well-trained human capital. For this reason, the MTC is involved in creating totally new transportation education programs at two of its member universities. The University of Northern Iowa (UNI) in Cedar Falls, Iowa, had no courses or students in transportation when the MTC grant began. During the first year of the grant, UNI's Department of Geography took the lead in developing courses, attracting students, and getting involved as a partner in transportation activities in its service region. A similar start-up effort is now underway at Lincoln University in Jefferson City, Missouri. The MTC has also been able to strengthen and add quality to transportation education efforts at universities in the region that were already leaders in transportation.

The MTC has, in its first year, been able to build from the ground up a technology transfer and outreach program in transportation asset management. This effort has enjoyed some early successes. The MTC team has been involved in outreach to a substantial number of local government agencies in the region. More of this close involvement at the grassroots level will follow in 2001 and beyond.

The MTC's sponsored research project program is now also underway. Projects were sought through a regional request for proposal (RFP) process and most are now underway. The projects represent a diverse portfolio of subjects, but are tightly focused on the transportation asset management theme. Results and products from these research efforts will be widely distributed within the region and nationally as they become available.

As noted in our strategic plan, a thread that runs through all aspects of the MTC's activities is an aggressive use of telecommunications and information technology. The MTC region encompasses four states and includes a large number of rural communities. In order to better serve the region, and indeed the nation, the MTC is using technologies such as the World Wide Web and videoconferencing to extend the reach of its educational, outreach, and research activities.

# Year One Annual Report

## Consortium Theme

The MTC is the University Transportation Center (UTC) program for federal Region 7, which includes Iowa, Kansas, Missouri, and Nebraska. Iowa State University (ISU), 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 UM-C's Transportation Infrastructure Center.

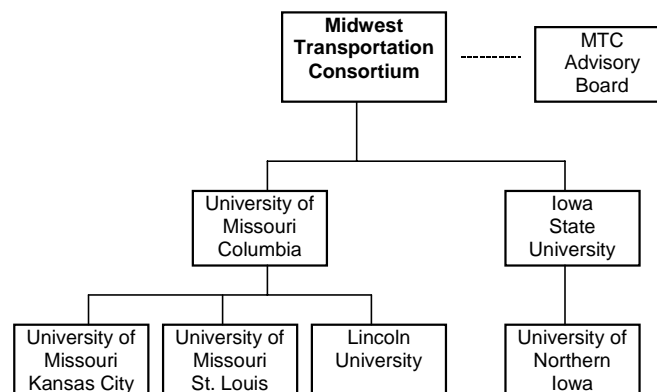
Four junior partner institutions are programmatically linked to the MTC:

- 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

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.

## MTC Organization

The MTC is organized to some extent by geography. The MTC director and associated staff at CTRE/ISU handle most administrative duties and handle meetings and correspondence with the MTC advisory board and research grant principal investigators. The MTC associate director coordinates all activities of partner institutions in the state of Missouri. An organizational chart is shown below.



The key staff listing for the MTC is indicated below and includes the MTC director and 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: build expertise; develop a national reputation; increase the number and diversity of professionals; and become a regional and national resource. Specific MTC goals include the following:

### Education

- Establish transportation scholars programs at all member institutions, based on a successful program at ISU and UM-C 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 a 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 partner 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.

### Technology Transfer and Outreach

- 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 One

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 aiding the University of Northern Iowa, Lincoln University and the other MTC consortium partners to develop new transportation programs from the ground up. UNI was able in year one to begin offering transportation courses for its students. Lincoln University will begin to offer a transportation program during year two of the MTC grant.

Several important outreach activities related to asset management were also initiated this year. These include holding several workshops that have already been held or will be held in the region and developing specialized World Wide Web content. These activities will be expanded during year two. 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.

The MTC's third major component, research, is also underway. A portfolio of projects involving principal investigators at universities in three of the four MTC states have been approved and are now under contract. These projects will provide 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 subject to sufficiency of available funding.

Success stories for each major programmatic component of the MTC are provided below.

## **Success Stories: Education**

### **Expanded 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, the 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 several MTC member universities was able to attend the annual meeting of the Transportation Research Board (TRB) in Washington, D.C. in January 2000. (The MTC plans to assist students each year to attend TRB.)

A smaller group of students was also able to attend an ITE national conference in Nashville, Tennessee, in the fall of 2000. Two students from the University of Northern Iowa attended the American Society for Photogrammetry and Remote Sensing (ASPRS) Annual Conference in Washington, D.C., May 22–26, 2000. The conference had several presentations on an emerging area of research regarding transportation applications of remote sensing. Students and faculty from all of the MTC member schools were able to attend the Mid-Continent Transportation Symposium in Ames, Iowa, May 15–16, 2000. This symposium was co-sponsored by the MTC and allowed for an exchange of ideas on a wide variety of transportation research topics.

Development of entirely new transportation programs continues at the University of Northern Iowa and at Lincoln University. There are now four Lincoln University students enrolled in the co-op program that has been developed between that historically-Black college (HCB) with the Missouri DOT (MoDOT). Several other Lincoln University students participated in a summer internship program with MoDOT last summer. The efforts at Lincoln were facilitated by Charles Nemmers of the University of Missouri-Columbia.

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### **Expanded 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. In the past, this course has been broadcast to other locations in Iowa. However, this year for the first time Iowa State University, the University of Missouri-Columbia, and the University of Northern Iowa all cooperatively offered it. Videoconferencing technology was used to link the three sites; several times, students from the University of Missouri-Kansas City also participated. Expanding the number of participating universities greatly increased the breadth of subjects covered and also the types of people who presented.

The topics presented this year included transportation asset management (four lectures), intelligent transportation systems (three lectures), transportation futures (three lectures), the politics of transportation (two lectures), context-sensitive highway design, air freight, and river transportation. Speakers came from a variety of public and private sector organizations including the following:

- University of Minnesota
- Northwestern University
- Ewing Marion Kauffman Foundation of Kansas City
- North American Superhighway Coalition
- Federal Highway Administration (FHWA)
- Transportation Research Board
- BRW Inc. (Minneapolis and Phoenix offices)
- CH2M-Hill Inc.
- Army Corps of Engineers
- Black and Veatch Inc.
- Des Moines International Airport
- United Parcel Service
- Iowa DOT
- Missouri DOT

Several of the presenting organizations (in particular BRW, CH2M-Hill, and United Parcel Service) have begun developing closer relationships with Iowa State University as a result of their experience. This should prove beneficial to current and future students.

Twenty-seven students at the three universities were officially enrolled in the course. In addition, the seminars were regularly attended by other students (seminar attendance is a requirement of the ISU scholar contract), by ISU and UM-C faculty and staff, by FHWA staff, by metropolitan planning organization staff members from Des Moines and Waterloo, Iowa, and by staff from the Iowa and Missouri DOTs. In future years, we will be working to extend the seminar to the other MTC partner schools. A new

videoconferencing classroom at CTRE/ISU has just become operational and will be used in future distance education and outreach activities.

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### **Expanded 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. During summer 2000, a number of tests were run to assess the compatibility of CTRE's videoconferencing room with potential distance learning partners, including other universities in the region and the FHWA in Washington, D.C. In addition, a survey and listing of university transportation offerings via distance learning technologies (both videoconferencing and Internet) was completed to establish a baseline for future virtual transportation university activities. The results of the survey indicate that very few courses in transportation are now offered in the MTC region to distance learners, although it also indicated that some programs are considering or planning such offerings.

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
  - more than 400 Iowa facilities, at least one in every county.
  - the Iowa Department of Transportation's video network.
  - the Iowa Communications Network (ICN) through its networking bridge.
  - 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 special-use technologies and equipment:
  - two video cameras and three 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
  - audioconferencing (full-duplex speakerphone)
  - large marker boards and projector screen
  - "smart" whiteboard capabilities that allow for capture of writing on a marker board to electronic formats.

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### **Hosted the MTC Annual Regional Student Paper Competition**

The MTC hosted its annual student paper competition in November 2000 at Iowa State University in Ames. A considerably larger number of papers (over 15) had been submitted by the deadline this year than last. Once again, papers were received from several institutions in the MTC. Papers were reviewed by MTC key staff and by external reviewers. The best 10 papers were selected by a team of internal and external reviewers. Formal presentations were given on November 16. Topics included pavement management, bridge management, traffic safety, pavement markings, human factors, and “smart growth.” Cash prizes were awarded for the best papers/presentations in several categories.

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### **Provided Unique Opportunities for Transportation Scholars**

While many students have summer jobs in transportation, few can (or would want to) duplicate that of Joseph Turner, a senior at the University of Missouri-Columbia. The Midwest Resource Center of the FHWA entered into a contract with UM-C to provide for the scheduling and demonstration of FHWA’s state of the art retroreflectivity van. This van collects information that feeds a sign management program. Joseph drove the van to 10 Midwestern states (including the four Region 7 states), assisted in presenting the technical material, demonstrated the sophisticated equipment, ran the computers, and even repaired and performed troubleshooting of the equipment. Field demonstrations were conducted on rural and urban interstates, major arteries, roads and streets. At the end of the summer, and 15,000 miles later, Turner definitely earned the title of “transportation engineer.”

The MTC goal of introducing and involving students in transportation was certainly accomplished for Joe Turner. He submitted a paper covering this activity in the annual MTC student paper competition.

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### **Developed Four New Asset Management-Related Courses**

As a result of their membership in the Midwest Transportation Consortium, ISU, UNI, 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 David Plazak. Several hours of asset management concepts will be incorporated into a new transportation policy planning course being offered to graduate and undergraduate students by the Department of Community and Regional Planning. This course will be offered for the first time during the fall 2001 semester.
- Lincoln University—Assistant Professor Sherrie Koechling-Andrae. During the spring 2001 semester, a new asset management course will be offered as part of the public administration curriculum. The course will incorporate the MTC Spring Transportation Seminar as well as including information on fund accounting, asset valuation and depreciation, GASB-required statements, and related topics.
- University of Missouri-St. Louis—Center for Transportation Studies Director Ray Mundy. During the spring 2001 semester, a marketing course, Domestic Transportation, will be offered covering issues in transportation. Professor Mundy will include the MTC Spring Transportation Seminar as part of the basis for special studies by students.
- University of Northern Iowa—Assistant Professor Tim Strauss. Transportation Geography, a new course offered by the Department of Geography, was taught for the first time in the fall 2000 semester. The preparation of this course was facilitated by a provost’s mini-grant. The title of the

mini-grant proposal was “Development of Material for a Transportation Geography Course Using Integrated Geographic Information Systems and Transportation Analysis Software.”

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### **Funded the Mid-America Transportation Center 2000 Summer Internship Program**

Last summer, the MTC co-sponsored the Mid-America Transportation Center’s (MATC) summer internship program at the University of Nebraska-Lincoln. This program provided undergraduate students the opportunity to learn more about transportation engineering careers by working for a transportation engineering consulting firm or public transportation agency located in the Lincoln or Omaha, Nebraska areas. This program has been in place for five years. The MTC helped fund it on a one-year basis as a possible model for a similar program for the MTC-member schools to consider in future years.

The program helped to fulfill the educational component of the university transportation center’s mission to advance U.S transportation-related expertise. The purpose of the program was to search out talented and innovative problem solvers interested in transportation and enhance their classroom learning by encouraging and supporting them in real-world transportation engineering workplaces. The 2000 program included eight interns who worked for their sponsors for 13 weeks during the summer and participated in a field trip visiting transportation-related facilities in Lincoln, Nebraska and Kansas City, Missouri. A recognition luncheon was held on the last day of the internship for interns and their sponsors.

Six of the 10 highest standing civil engineering students in the 1999 senior class (GPAs from 3.82 to 4.0) have participated in this program.

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### **Success Stories: Outreach and Technology Transfer Activities**

MTC 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.

### **Helped Guide the Implementation of GASB 34’s Infrastructure Asset Requirements in Iowa**

Iowa State University/CTRE and the MTC partnered with the Iowa League of Cities, the Iowa Association of Counties, the Iowa State Auditor’s Office, the Iowa County Engineers Association, Howard R. Green Company, and others to offer an introductory workshop in August 2000 on GASB 34. GASB 34 in effect requires governments to adopt generally accepted accounting principals and to account for depreciation of infrastructure assets and is a prime motivation for the adoption of asset management systems. GASB 34, rather than asset management, was the main focus of this workshop and it attracted a huge audience—over 400 people, mainly from Iowa. The workshop was aimed primarily at government decision-makers, financial officers, and managers. However, it also attracted a large number (approximately 100) of municipal and county engineers. A second workshop (see “Held a Regional Asset Management/GASB 34 Workshop”) was more technical and aimed at local government and DOT engineers.

As a result of this workshop, CTRE and the MTC have been 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.

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### **Held a Regional Asset Management/GASB 34 Workshop**

Iowa State University, in partnership with Lincoln University, University of Missouri-Columbia, and the Federal Highway Administration, held a one-day workshop on the requirements of GASB 34 and how they relate to asset management systems for infrastructure. The workshop was held in Kansas City, Missouri on November 14, 2000, and 60 people from throughout and outside the region attended.

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### **Constructed a GASB 34 Web Site**

Iowa State University has created a small, information web site on GASB 34, primarily aimed at the local governments that must comply with its infrastructure accounting provisions. The web site contains links to useful information plus a number of articles on asset management and GASB 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 web site.

The URL for this web site is: <http://www.ctre.iastate.edu/gasb34/index.htm>

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### **Planning to Co-host the 2001 AASHTO Asset Management Task Force Meeting**

The MTC has agreed to work with the Midwestern Regional University Transportation Center at the University of Wisconsin-Madison to co-host the 2001 Association of State Highway and Transportation Officials (AASHTO) Access Management Task Force meeting. The two-day meeting will be held in the fall of 2001, probably in a large metropolitan area in one of the two centers' regions. This should give the two centers some national exposure within the asset management community.

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### **Building 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. 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 was 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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## Success Stories: Research Projects

The MTC is in the early stages of its research component. Projects were sought throughout the region through an RFP process that took place in the late winter and early spring of 2000. In the end, six projects were approved and funded subject to availability of adequate and eligible matching funds. All of the six selected projects focus tightly on asset management and closely related subjects. They include subjects ranging from optimizing snowplowing assets to research that will allow asset management data sources to be related in geographic information systems (GIS).

Projects were 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 six projects are described in the table below.

### Approved MTC Research Projects, Year One

<b>Project Number</b>	<b>Project Title</b>	<b>Principal Investigator(s)</b>
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 and Joel Lee University of Kansas
MTC-2000-03	Decision-Support System for Management of Slope Construction and Repair Activities—An Asset Management Building Block	J. Erik Loehr and Kristen Sanford Bernhardt University of Missouri-Columbia
MTC-2000-04	Roadway Asset Management System Manual for Local Governments	Ali Roohanirad, Sanley Niu, and Anil Misra University of Missouri-Kansas City
MTC-2000-05	Artificial Intelligence-Based Optimization of Management of Snow Removal	Mohammed Salim, Marc Timmerman, Tim Strauss, and Michael Emch University of Northern Iowa
MTC-2000-06	Development of a Model Asset Management Strategic Plan *	Omar Smadi and Tom Maze Iowa State University

\* This research project is approved, but is not yet underway due to a lack of necessary matching funds. The MTC and CTRE are pursuing these funds at this time by re-scoping the project to better meet the asset management technical assistance needs of the Iowa Department of Transportation and its management. The re-scoped project will be focusing on the management of unique environmental, archeological, and cultural artifacts so they can be protected in conjunction with transportation improvements. The project will employ cutting-edge GIS and remote sensing technologies and will be a partnership between the Iowa DOT and Iowa State University.

# Strategic Directions for the Future

The MTC plans to concentrate 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 second-round RFP for focused research on asset management and related topics.
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 of agencies 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. In future years, 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 year of operation, the MTC used the majority of its funding in support of its education mission, largely to provide graduate assistantships to students at its member institutions. In future years, the percentage of funds going toward education will shrink as other parts of the MTC's operation expand. However, education is the number one mission of the MTC and may be expected to make up over half of the budget each program year. During year one, the amounts spent on research and technology transfer were relatively low. However, these percentages (particularly that for research) will grow in future years since there are now active research projects and outreach activities. Much of the technology transfer budget for year one involved the costs of designing and developing the TREXPO web site.

Administrative expenses were a relatively high percentage of the uses of funds in year one, however this percentage should shrink in future years. The administrative funds used in year one reflect 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.

## USES OF MTC FUNDING YEAR ONE 1999-2000

