Mid-Atlantic Universities Transportation Center

Region III

2001-2002 Annual Report

Revised January 2003

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CENTER DIRECTOR'S SUMMARY

The Mid-Atlantic Universities Transportation Center (MAUTC) has just completed its fourteenth year as the competitively selected University Transportation Center for Region III, the five-state Mid-Atlantic Region. This document reports on our activities in the most recent year. MAUTC is a five-university consortium, led by The Pennsylvania State University and includes the University of Pennsylvania, The University of Virginia, Virginia Polytechnic Institute and State University, and West Virginia University.

Since its inception, MAUTC has been guided by the vision that it should be a university-based center of transportation excellence that is recognized as a vital resource to transportation organizations within the region, especially state departments of transportation and transit agencies. Further, MAUTC has sought to be a leader in recruiting and educating transportation professionals who will lead the industry in the 21st century. We believe that our program of activities has allowed MAUTC to accomplish both of these objectives. In the past few years, we have increased our emphasis adding to our nation's intellectual and human capital by recruiting and educating future transportation professionals. All of MAUTC's faculty and staff share this vision, which is consistent and supportive of the University Transportation Centers (UTC) mission, and it has led to the creation of a program that is capable of extending its outreach to meet the objectives of the UTC.

MAUTC has worked closely with the other UTCs within the Mid-Atlantic region. This close collaboration is possible because MAUTC universities are part of two of the other UTCs in the region, and because of MAUTC's past participation with the third UTC, Morgan State. The University of Virginia and Virginia Tech are member schools of the Virginia Center for ITS Implementation; West Virginia University has signed a memorandum of agreement with the Appalachian Transportation Institute that will allow it to work on joint activities with this new UTC. MAUTC established a close working relationship with Morgan State University faculty when they were a part of the MAUTC consortium, and will continue fostering that relationship.

MAUTC faculty have also fostered closer working relationships between all UTCs and the academic transportation community by assuming leadership positions in the Council of University Transportation Centers. I recently completed my service to CUTC as immediate past president and member of the CUTC Executive Committee. Dr. Michael Demetsky, the lead faculty member for MAUTC's efforts at the University of Virginia, served as CUTC secretary and is in line to serve as vice president and then president of the organization in the coming years.

MAUTC has also reached out to non-UTC universities in the Mid-Atlantic region and served as a catalyst and coordinator of research and educational activities. The primary tool for this outreach effort has been Penn State's "Cooperative Agreement" with PENNDOT. As a result of this long-term, open-ended contract, Penn State set up relationships with sixteen other universities throughout the nation so that these universities can conduct research or educational programs for PENNDOT. We have forged relationships with Historically Black Colleges and Universities including Lincoln University, Cheyney State University, and Howard University. Each of these universities is working through Penn State to conduct educational or research projects for PENNDOT. Because of Penn State's and MAUTC's research experience and administrative resources, we are able to assist these universities in obtaining and carrying out sponsored projects.

MAUTC universities are working together to expand the scope of our educational offerings and to concentrate MAUTC's financial resources on funding for students so that we can attract and educate as many undergraduate and graduate students as possible. Because of the funding cutbacks to the UTC program, our ability to offer financial aid is limited; however, we have overcome this financial set back by making student financial support the highest priority use of MAUTC funds.

To implement the educational priority for MAUTC, we have invested in state-of-the-art laboratories for students to use for research and course projects, we have developed new course materials, and we have funded undergraduate and graduate students through internships and graduate assistantships.

MAUTC research projects are selected on the basis of their ability to provide financial support for students. Furthermore, we have continued a model developed as part of the PENNDOT/MAUTC Partnership activity whereby we provide financial support to promising graduate students to extend the research of an agency-sponsored applied project by conducting more basic research leading to a thesis or dissertation. Linking student research to agency-sponsored activities will ensure that the research topics are relevant to real-world problems, but at the same time, by not tying the student support to completion of project deliverables, we will be able to develop new knowledge and techniques that can be applied in the future.

MAUTC continues to conduct research in support of state DOT and local transportation agency needs. Further, we consider U.S. DOT research priorities when seeking matching funds for projects. We look forward to continuing our partnerships with the Pennsylvania, Virginia, and West Virginia departments of transportation. All three agencies are committed to continuing to fund research activities that support MAUTC's objectives as well as delivering products that meet the agencies' current needs. As part of our regional leadership mission, we have continued to seek collaborative research and technology transfer activities with Maryland and Delaware, the other two states in the region.

Because our research activities are focused on the needs of operating agencies, technology transfer is an integral part of our research effort. An explicit part of each project is a plan for implementation of the research results. Such implementation includes conducting training programs, installing software, and/or presenting findings at agency or professional meetings and seminars. Further, MAUTC has taken advantage of current information technology to make the MAUTC web page a principal source of information on our projects and other activities. Potential users of our work have been able to get updates on ongoing projects and full-text versions of current reports.

MAUTC faculty, staff, and students look forward to continuing our regional leadership in the coming years by recruiting students and providing them multidisciplinary, multi-modal educational opportunities, and applying our expertise and resources to addressing key technical and policy issues facing transportation operating agencies in our region.

MAUTC THEME

The theme of the Mid-Atlantic Universities Transportation Center (MAUTC) is *Advanced Technologies in Transportation Operations and Management*. This theme recognizes the critical link between technology and management of our transportation infrastructure, and it provides for a multidisciplinary approach to many critical transportation issues facing the Mid-Atlantic region. As illustrated in Figure 1, MAUTC's research, education, and technology transfer programs focus on the integration of knowledge and expertise in transportation operations, organizational management, and infrastructure management. The theme clearly reflects the strengths of the five universities of MAUTC and the interests of the faculty and state agencies that support much of the research conducted by MAUTC.

The distinctive elements of MAUTC's theme include the following:

- Design and implementation of research and educational programs that apply advanced technologies for information acquisition, analysis, and application to the management of the transportation system.
- Multidisciplinary approach to research, education, and technology transfer activities.
- Emphasis on the operations and management of the transportation system.
- Multimodal mission that addresses passenger and freight transportation, highway and transit and intermodal facilities.

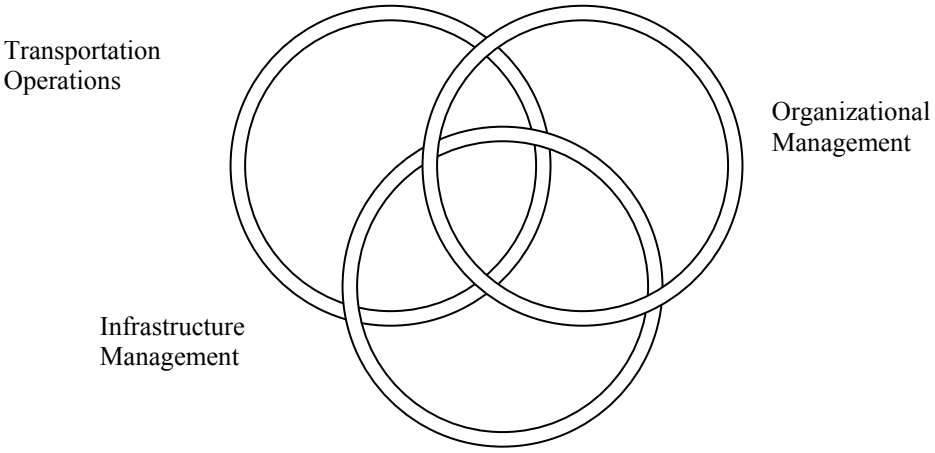


Figure 1. Intersection of transportation operations, organizational management, and infrastructure management.

MANAGEMENT STRUCTURE

In 1988, six universities in the five-state Mid-Atlantic region formed the Mid-Atlantic Universities Transportation Center. The current five universities include The Pennsylvania State University (University Park, Pennsylvania), the University of Pennsylvania (Philadelphia, Pennsylvania), The University of Virginia (Charlottesville, Virginia), Virginia Polytechnic Institute and State University (Blacksburg, Virginia), and West Virginia University (Morgantown, West Virginia). The original six-university consortium also included Morgan State University (Baltimore, Maryland). The consortium was formed in anticipation of the University Transportation Centers Program, but its purposes were not limited to this single program; other opportunities for collaboration were anticipated.

Technically, Penn State is the lead university and grantee for the UTC Program funds. It then enters into sub-grant agreements with each of the other MAUTC members for their share of the MAUTC activities and federal funds. Each sub-grant agreement includes a description of the tasks that the member has agreed to perform and a budget for the federal and matching share of the MAUTC-supported activities. The MAUTC director delegates day-to-day responsibility for MAUTC activities at the member universities to the member of the MAUTC Steering Committee from that university. The MAUTC Steering Committee interacts formally and informally to direct and coordinate the overall activities of the consortium. The Steering Committee meets several times a year to formulate its future plan of activities and long-term strategy. In this way, all MAUTC members collaborate in shaping the direction of the MAUTC program.

MAUTC is administered through the Pennsylvania Transportation Institute (PTI) at Penn State. With the help of the PTI staff, the center director monitors the expenditures and activities of the consortium members. Dr. James H. Miller, director of the Mid-Atlantic Universities Transportation Center, is responsible for all aspects of the center's operation. He is a full-time faculty member and holds a joint appointment with the Smeal College of Business Administration's department of business logistics and the Pennsylvania Transportation Institute. A faculty member and researcher for the past 26 years, he has been the MAUTC director since its inception in 1988. Furthermore, he served as coordinator of the UTC directors for seven years.

While devoting approximately 70 percent of his time to teaching in the Smeal College of Business Administration, he devotes approximately 30 percent of his time to his duties as director of MAUTC and related projects.

As MAUTC director, Dr. Miller is considered by Penn State to be the principal investigator for the federal UTC grant. As such, he is responsible for project fiscal and administrative management.

Dr. Miller serves as the chairman of the MAUTC Steering Committee and is the primary contact for U.S. DOT officials. He acts as the spokesperson for MAUTC at regional and national meetings and seeks opportunities to publicize MAUTC's program and activities.

Dr. Miller also leads the MAUTC steering committee whose members are the lead faculty responsible for MAUTC activities at the consortium member universities. Figure 2 illustrates MAUTC's organizational structure. The organizational structure features MAUTC's Steering Committee and the MAUTC Partners Roundtable. The MAUTC steering committee is responsible for general direction of MAUTC activities. Members include the MAUTC director (Dr. James H. Miller) and a senior faculty member from each MAUTC member university (Dr. Michael Demetsky, Dr. Edward Morlok, Dr. Konstadinos Goulias, Dr. Hesham Rakha, and Dr. David Martinelli). The mentioned members are responsible for MAUTC-related activities at their respective universities. Members of the MAUTC Partners Roundtable are the actual or potential sponsors of research funding agencies and/or future employers of our undergraduate and graduate students.

All faculty members involved in MAUTC activities are full-time members of academic departments at their respective universities. They devote sufficient time to MAUTC activities by supervising graduate students and staff and administering their portion of the MAUTC program. However, with the exception of the MAUTC director, these faculty devote less than 50 percent of their time to MAUTC-sponsored projects.

To the maximum extent possible, MAUTC uses existing staff resources at the consortium member universities. West Virginia University administers its MAUTC activities through the Harley O. Staggers National Transportation Center of the university and uses the staff resources of this organization to manage project budgets and prepare reports. Likewise, Virginia Tech's activities are managed through the University Center for Transportation Research, which provides support for its programs. Departmental staff provide the University of Pennsylvania and the University of Virginia faculty with needed support as well.

At Penn State, PTI's State Center and general administrative, clerical, editorial, and financial staff are used to the maximum extent possible; however, due to the extent of PTI's MAUTC-related responsibilities, MAUTC provides partial support for four full-time staff members. Ms. Ann Marie Hutchinson, MAUTC coordinator for the past six years, resigned from Penn State. Ms. Janice Dauber assumed the coordinator responsibilities for MAUTC's technology transfer activities (including the Annual Student Fair at TRB), publicity, report preparation, and coordination of the Pennsylvania TRAC Center, a joint MAUTC/PENNDOT outreach initiative. She devotes approximately 90 percent of her time to MAUTC activities.

Other staff members devote significant time to MAUTC activities and are key to its success. Ms. Susan Fuoss, staff assistant for MAUTC, provides clerical support for the overall MAUTC administrative activities as well as for Penn State's MAUTC projects and programs. Ms. Debra Clemmer, finance clerk, maintains budgets and expenditure information for MAUTC. Finally, Mr. Jacob George develops and manages the MAUTC web site and other PTI-related sites.

MAUTC

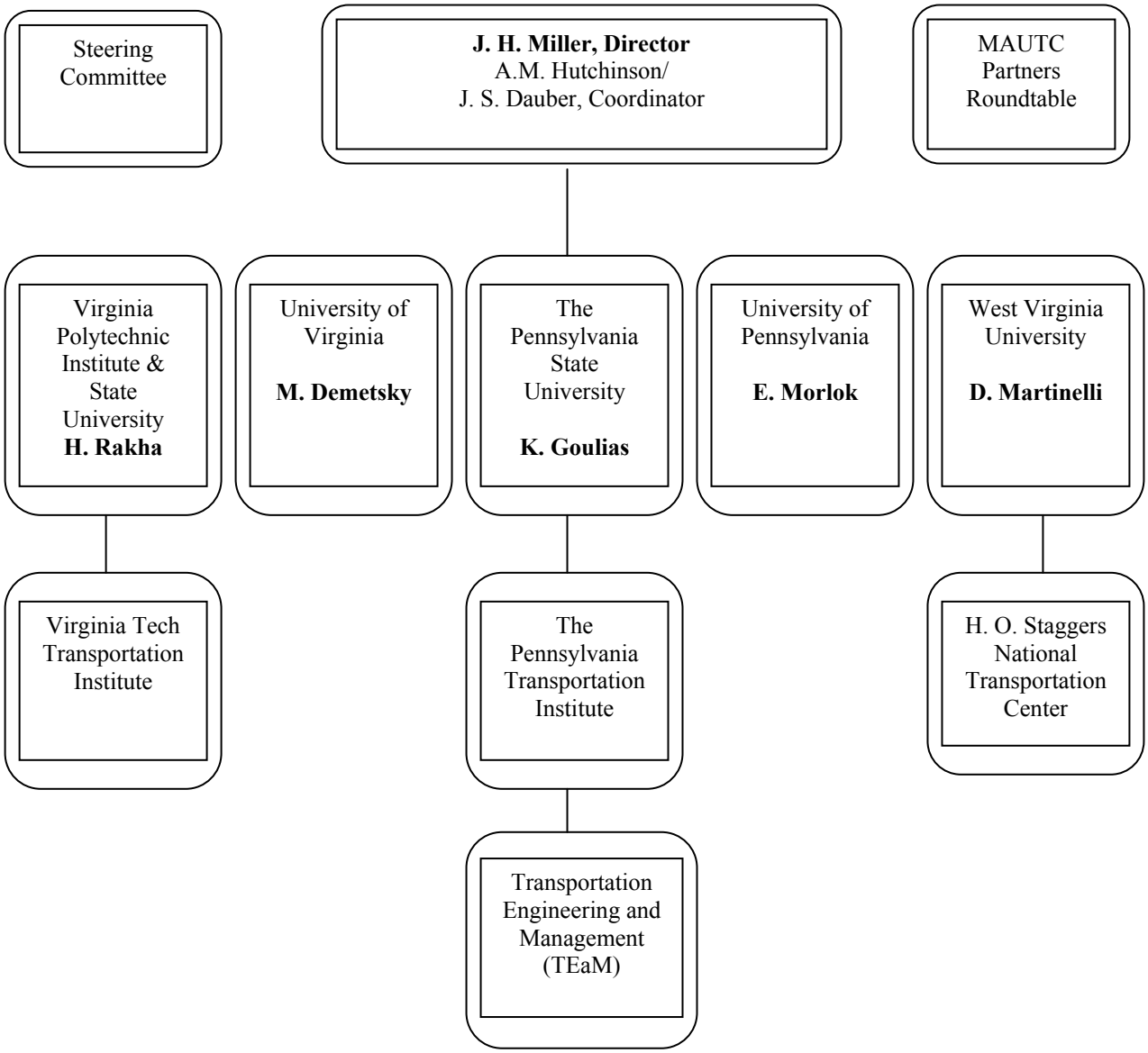


Figure 2. MAUTC's organizational structure.

RESEARCH, EDUCATION, AND TECHNOLOGY TRANSFER PROJECT DESCRIPTIONS

RESEARCH

Project Title: Centre County Simulation
Principal Investigators: Konstadinos G. Goulias
Sponsor: McCormick Taylor and Associates

Urban Airshed Models for estimating air pollution concentrations in a region require travel demand models that can produce hour-by-hour mobile source emission estimates. Regional simulation models of this type are currently created and tested in Australia, Europe, Japan, and the United States using a variety of theories, decision-making formalisms, and operational implementation methods. On one hand, these relatively new conceptualizations and models of transport systems have improved in a substantial way the realism of computerized decision support tools and have the potential of improving quantification of environmental impacts and transport management/control strategies. On the other hand, however, these systems require a substantial amount of data and understanding about behavior that very often are not readily available and for this require additional research. In this project first a brief comparative overview of conceptual designs, data requirements, and models used in computer simulation of regional transport systems is completed. Then, the basic ingredients of a model system called Longitudinal Integrated Forecasting Environment (LIFE) that contains a demographic simulator, a daily time allocation and travel scheduling system, and a Geographic Information System are used to design one component of a larger model system. This component called Centre SIM emphasizes the spatial and temporal dimensions of travel demand and produces hour-by-hour maps of activity participation and travel. The predicted volumes are then validated using observed traffic data. The project is designed in cycles of incremental model improvement. The first cycle ended May 2002 producing a first version used by Penn State for its Master plan, a second version used by Kaunau for her MS thesis, and a third version by Jin-ki Eom that includes truck traffic forecasting. The second cycle of this project started with authorization to proceed on the non-federal component May 1, 2002.

Project Title: Evaluation of Pennsylvania Turnpike ATIS
Principal Investigators: Konstadinos G. Goulias
Sponsor: MAUTC, PENNDOT, and The Pennsylvania Turnpike

Researchers associated with the Center for Intelligent Transportation Systems (CITranS) at The Pennsylvania Transportation Institute at Penn State have joined a team headed by Frederic R. Harris, Inc., to assist the Pennsylvania Turnpike Commission during the implementation of its Phase III Advanced Traveler Information System (ATIS) on the turnpike. CITranS will fill the role of independent evaluator of the project. Specifically, CITranS will measure the resultant benefits in three key areas: user perceptions, traffic flow/operations, and optimal emergency protocol design and use. The evaluations will be based on the perceptions of both turnpike users and managers. Additionally, CITranS will also evaluate the Turnpike's entire ITS system in terms of its interoperability with other ITS systems that are in place and planned for Pennsylvania.

The first component of the MAUTC side in this project has been the review and theoretical framework used in evaluating ITS technologies and services. Researchers used an activity-base approach and total survey design, as well as notions from traffic flow theory to define an evaluation plan. In addition, the project is generating a plethora of data that can be used to develop and test a variety of theories about information provision and use by traffic managers and travelers. Moreover, the traffic impacts of roadside information provision in terms of traffic flow (e.g., weaving behavior and traffic flow characteristics) can be evaluated by performing field experiments.

Project Title: Intelligent Transportation Systems Research and Development Fellowship Program at PSU
Principal Investigators: Konstadinos G. Goulias
Sponsor: PENNDOT and MAUTC

In this educational activity, Penn State faculty and graduate students aimed at developing new ideas in the area of intelligent transportation systems (ITS) and creating the foundation for new methods, software, and hardware to be moved into practice. The project will be renewed yearly, and changes in the emphases of the MAUTC program at Penn State will be reflected.

In addition, a review of new needs for ITS research and development will be performed at regular intervals, and new directions will be incorporated. Two research topics are.

1. Traveler Information and Transportation System Utilization

Traveler information systems within the ITS arena provide major benefits to the transportation system users and managers. Recent evidence may suggest the potential emergence of "induced demand" (i.e., trip making may increase because of information availability, thus nullifying any gains from managing traffic). In addition, longer term changes in the ways people travel (e.g., peak spreading, increase in weekend travel) may require development of information systems different from most of the current systems, which are targeting peak hour commuters. In this topic Penn State researchers will identify the determinants of change in the nature of travel demand, study the relationship between travel demand and information systems, and provide specific guidelines for the design of information systems. Emphasis in this topic will be given to the type of information needed by prospective travelers, the use of multimedia in providing information to them, and their effect on trip-making propensity. Statistical models that can be used to analyze data of this type must be developed.

2. Network Modeling and Stochastic Demand

Many ITS aim at improving network performance. However, network modeling and traffic assignment become extremely complex when one considers fluctuations in the demand for travel. These fluctuations may be due to predictable temporal variation of demand and predictable user variation of demand, but also unpredictable factors. In addition, network modeling under ITS is needed in real time. This implies that a traffic control center or an emergency management center requires traffic predictions in a very short time as new information about the demand for travel becomes available. Within this topic, researchers at Penn State will design new algorithms, methods, and software that advance the state of the art in network modeling.

Project Title: ITS Evaluation
Principal Investigators: Konstadinos G. Goulias
Sponsor: PENNDOT

In this project a CITRANS team evaluates ITS deployments in the State of Pennsylvania for the Pennsylvania Department of Transportation and the Pennsylvania Turnpike Commission. In parallel and in addition to the typical ITS evaluation activities, research at CITRANS, using data from the evaluations, develops new methodologies for study design, data collection, data analysis, modeling, and simulation. Examples of ITS deployments include but are not limited to the Pennsylvania Turnpike Advanced Travelers Information System, the SmartTraveler in Philadelphia, and Roadway Weather Information Systems in rural Pennsylvania.

Project Title: OPTIPATH Lab
Principal Investigators: Elise Miller-Hooks
Sponsor: MAUTC

Dr. Elise Miller-Hooks, assistant professor of civil engineering, created a specialized laboratory called OPTIPATH with specific objective the use of high-speed processing computers (DEC -Alpha) to solve networks' problems in the area of transportation logistics. The new laboratory will be housed at the Pennsylvania Transportation Institute and will be used in education and research. The primary sponsors during the past two years have been the Center for Intelligent Transportation Systems (CITranS) and the Department of Civil and Environmental Engineering at Penn State, MAUTC, and the National Science Foundation.

Dr. Elise Miller-Hooks, who received a CAREER award from the National Science Foundation for her project entitled, Robust On-Line Location and Routing for Urban Service Systems, is focusing on the development of the conceptual framework and algorithmic steps for real-time location and routing decisions in dynamically changing environments for urban service operations, including emergency response services, vehicles carrying hazardous materials, and teams responding to incidents involving hazardous materials. Response time and the associated level-of-service of many of these urban service operations, such as ambulance, police, fire, and emergency repair, depend on travel times experienced on the roadways and the relative location of the call for service to that of the response vehicle. Thus, optimal location and routing decisions are vital to the performance of many emergency service

operations. Real-time information can be used to make improved tactical and operational location and routing decisions for emergency services and other urban operations, including the transport of hazardous materials. However, it is critical that procedures that dynamically respond to current conditions on the state of the network consider the time-varying and uncertain nature of future travel conditions in order to generate robust solutions; i.e. solutions that will remain optimal, or nearly optimal, despite variations in travel conditions and that can be applied to a variety of situations. The inherent stochastic and dynamic characteristics of future travel conditions, including the probability of arc or node failures, as well as the spatial and temporal correlation in travel conditions and the possibility of multiple conflicting objectives will be considered in this work.

Project Title: Pennsylvania Statewide Long Range Transportation Plan (Penn Plan)
Principal Investigators: Konstadinos G. Goulias
Sponsor: MAUTC and PENNDOT

In the Pennsylvania Statewide Long Range Transportation Plan (PennPlan), the Pennsylvania Department of Transportation with the help of the Pennsylvania Transportation Institute (PTI) at the Penn State, created a new approach to long range planning in the Commonwealth. The approach contained an aggressive, two-stage, public involvement program and an extensive consensus building efforts that are unprecedented. The approach provided for an update to the previously defined Statewide Transportation Long Range Policy Plan of 1995, while at the same time designs an ongoing system for public involvement and statewide decision making to assist in project selection in Pennsylvania.

PennPlan used a unique approach to integrate the needs of people and firms within a complex system of corridors and facilities. From a transportation supply viewpoint, the building blocks of a transportation system are its facilities and the connections (or links) among these facilities, which may be unimodal or multimodal. Examples of these links are airline routes, rail routes, or highway routes. Examples of facilities are marine ports, airports, and major distribution centers. Unlike in other systems (e.g., telecommunications), in which the links perform simple functions, the links of a transportation system play significant roles in enhancing the residents' and visitors' quality of life and fostering economic development. For example, the existence and level of service offered by a transportation link determine the land use patterns and environment of settlements at the two ends of a link and also along each link. For this reason PennPlan considered corridors, instead of modal-specific links among facilities. Corridors were identified by their predominant theme (e.g., US 219 the Allegheny Mountains Corridor). They were described in terms of the area affected, existing conditions, and connectivity with other routes, objectives, and specific projects.

In the same way that living organisms are made of many cells with specialized functions, PennPlan was envisioned as a living organism, constituted by its specialized cells, which were the groups of people identified in the public involvement process. Each group was identified, data collection surveys are defined for it, and associated data were collected from each group to take advantage of the specialization in expertise and experience of the Commonwealth's residents and visitors. The information was in turn used within PennPlan to identify goals, objectives, and priorities for the state as a whole and for each corridor and facility in the Commonwealth. PennPlan was published in January 2000, while its emphasis on public involvement continued into 2001 with publication of a report on first-year progress toward its statewide and corridor objectives. Research on theoretical issues about attitudes and long range planning as a knowledge-management activity for public agencies will continue to August 2002.

Project Title: Roadside Vegetation Management
Principal Investigators: Larry J. Kuhns
Sponsor: PENNDOT and MAUTC

PENNDOT's Bureau of Maintenance and Operations is responsible for maintaining roadside vegetation in a manner that will preserve the functionality of the roadway. To do this most effectively, PENNDOT roadside specialists must be aware of developments in low-maintenance ground cover establishment and maintenance, and in the materials and methods of managing undesirable vegetation.

The researchers on this project, through Penn State's College of Agricultural Sciences, will evaluate available vegetation management techniques and systems, and provide an outreach function to assist in the implementation of improved methods. This will be accomplished through activities in four different tasks, during a four-year period. Although the task structure will be retained from year to year, specific activities within each task may change.

UNIVERSITY OF PENNSYLVANIA

Project Title: Real-World Vehicle Routing and Scheduling Problems
Principal Investigators: Zhi-Long Chen
Sponsor: Manugistics, Inc.

Real world vehicle routing and scheduling (VRS) problems can rarely be solved to optimality because of many complicating constraints, such as prohibitions on mixing cargoes. The complexity of these problems will increase when the new U.S. Department of Transportation driver-hours-of-service rules take effect. The purpose of this research was to develop practical ways to incorporate these constraints into vehicle routing problems, and then to develop efficient ways to find good if not optimal solutions. Real problems from firms such as Hershey Foods will be used for data and as test beds for the resulting methods.

Project Title: Technology Innovation to Reduce Conflicts Between Rail Freight and Passenger Transportation (Old title: Freight Transportation Trends, Policy Options, and Technology Innovations)
Principal Investigators: Edward K. Morlok
Sponsor: Delaware Valley Regional Planning Commission

There is a rapidly emerging problem in the railroad system of the Northeast. The essence is that without action it will be impossible to continue to provide both freight and passenger service on many lines. On the one hand, passenger systems, including commuter operators and Amtrak, are installing high level station platforms at many stations in order to help meet ADA requirements for wheelchair accessibility, and also to speed service by reducing dwell time at stations. On the other hand, many standard freight cars will not safely pass such platforms, and excess dimension loads, carried on many lines, simply cannot pass such platforms.

A family of basic designs and concepts for resolving this conflict by retrofitting or redesigning cars and platforms, have been developed, but research is needed on the costs and benefits of such solutions to all stakeholders: freight carriers, passenger carriers, passengers and the mobility impaired, and shippers. Resolution will require all to benefit. Additional work on refining solutions is also needed to bring them to the point where car builders and others can implement them.

UNIVERSITY OF VIRGINIA

Project Title: Carbon Monoxide Production in Response to Increased Reforestation and Traffic in Eastern United States (Old title: Aersol and Oxidation Production Arising from Urban and Rural Traffic)
Principal Investigators: Jose Fuentes
Sponsor: Virginia Transportation Research Council

Carbon monoxide is an important trace gas contributing to air quality deterioration in eastern United States. This gas is directly emitted from vehicles. It is also produced from oxidation of hydrocarbons. Therefore, we are conducting field and numeric modeling studies to discern the contribution of giogenic hydrocarbons and traffic on carbon monoxide production. Carbon monoxide fluxes will be measured above a deciduous forest within the Piedmont of Virginia. This data set will be used to verify photochemical models designed to determine the carbon monoxide from hydrocarbon oxidation. Utilizing traffic information, the carbon monoxide missions will be derived. These model calculations will be made for the period from 1980 to 2000 to determine the carbon monoxide emission trends in response to increase reforestation and traffic patterns in eastern United States.

Project Title: Development of a Freight Flow Prediction Method for Statewide Planning
Principal Investigators: Michael J. Demetsky
Sponsor: Virginia Department of Transportation

Trip generations and attractions have been estimated in a previous study using the Transearch database secured for Virginia from Reebie Associates. This study investigates the development of a method to predict associated freight flows. The gravity model and variations will be explored to determine if that tool is appropriate for this task, and, if so, at what level (e.g., 2 digit, 4 digit) commodity classification is appropriate.

Project Title: HOV Corridor Evaluation and Improvement (Old title: Study on The HOV/HOT/General Purpose Lane Efficiency Comparison Methodology)
Principal Investigators: Lester A. Hoel
Sponsor: Virginia Transportation Research Council

HOV facilities have been used as an important transportation demand management. But the inefficiency problems of HOV lanes because of underutilization and congestion are widely spread, and some politicians and travelers think of HOV lanes as an inefficient use of the scarce resource. Two objectives of HOV facilities are considered: the HOV facility should provide travel timesavings and a more reliable time to high-occupancy vehicles using the HOV facility, and the HOV facility should increase the per lane efficiency of the total freeway facility. This study develops a Measure of Performance system to evaluate whether a current HOV facility is efficient. Four variables are considered: speed, speed variance, person throughput, and a person-throughput effectiveness index. For inefficient HOV lanes, the thesis establishes an improvement alternatives comparison methodology, based on Dahlgren's queue and delay theory. Two important features of traffic flow are used: excess demand that causes the formation of queues, and traffic-carrying capability of the road that is affected by queues. Kirshner's queuing model is used to analyze vehicles in queue and vehicle hours of delay that occur for a given level of demand for a HOV corridor, a general corridor, and a HOT corridor. A case study on I-64 HOV corridor in Hampton Roads is completed to demonstrate the application of the methodology. Based on the MOP system, it is found that the HOV lane of I-64 in Hampton Roads area provides some travel timesavings and a more reliable trip time to the HOV lane travelers. But the time saving is small, and the HOV lane is not efficient for the whole freeway facility. There is the HOV lane underutilization problem. Two improvement alternatives are considered: change the current HOV lane to another general-purpose lane, which can reduce the vehicles in queue per lane by twelve percent, or to the HOT 2+ lane, which can eliminate the vehicles in queue per lane by applying real time value pricing strategy. The case study shows that the methodology developed in this project is feasible to evaluate HOV lane performance and compare improvement alternatives.

Project Title: Investigating the Application of a GIS Database to Address Statewide Freight Transportation Planning
Principal Investigators: Michael J. Demetsky
Sponsor: MAUTC and Virginia Department of Transportation

This project is an investigation of expanding the uses of GIS in transportation management and planning through expanding this GIS database as part of the Statewide Intermodal Freight Transportation Planning Methodology. Under the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, a need was created for greater coordination of transportation information. From this need for coordinated efforts to collect, manage, analyze, and store transportation-related data, GIS (geographic information systems) have become a growing tool that is being used extensively to manage the information required by ISTEA and TEA-21, an amendment to ISTEA, and will continue to be utilized in the coming years (ISTEA). According to these guidelines, the Virginia Transportation Research Council developed a Statewide Intermodal Freight Transportation Planning Methodology and applied it using a GIS database. Thus, taking previous work on a GIS database, which included previously identified "key" commodities for Virginia, freight volumes, county-level population and employment information, and Virginia's freight transportation network, this project investigated the capabilities of using it to make answering planning questions easier (Brogan).

Given this existing data, recommendations were made for studies that can be completed now, as well as ones that can be completed with additional data. To demonstrate the use of the current GIS database, a comparison of the north-south corridors in the state of Virginia (Interstate 81, Interstate 95, and US Route 29) was undertaken, and I-81 was found to be the most critical corridor. The recommendations show that there is both data acquisition and manipulation necessary to develop the current GIS database into a decision tool for transportation planning.

Project Title: Investigation of Truck to Rail Freight Diversion/Mode Choice Models
Principal Investigators: Michael J. Demetsky
Sponsor: Virginia Department of Transportation

With the advent of the era of federal and state emphasis on intermodal surface transportation systems, there are significant needs for analytical methodologies to address various issues that have arisen to achieve related goals. One such issue is the development of intermodal terminals that effect the diversion of freight traffic from the highway to the rail mode. In particular, the Virginia General Assembly has requested two studies associated with 1) the location of a second intermodal terminal in the Commonwealth, and 2) strategies to divert freight traffic from truck to rail transportation along the I-81 Corridor. These studies will be completed in fall 2000, and will provide a basis for the need for a general analytical approach to estimate truck-rail diversions as conditions for rail transportation improve. This study will review the literature for relevant freight mode choice models and relevant experiences with planning for intermodal freight transportation. Data from the Virginia studies and that obtained for a VTRC study on Statewide freight transportation planning will be used to test the different concepts proposed for forecasting freight traffic diversion in an intermodal era.

Project Title: Safety Impacts of Differential Speed Limits - Phase I: Effects of Differential Speed Limits on Vehicle Speed and Crash Characteristics Using Hypothesis Tests
Principal Investigators: Nicholas J. Garber
Sponsor: Virginia Transportation Research Council

This study would assess the nature and extent of the effects of Differential Speed Limits (DSL) (different speed limits for trucks and passenger cars) on vehicle speeds and crash characteristics. Data will be obtained on speed and crashes on test and comparison sites operating at DSL and non-DSL conditions respectively, in as many states as possible. The speed and crash data will be obtained for before and after periods of the speed limit change.

The data will then be analyzed to determine whether speed and crash characteristics changed significantly as a result of eliminating DSL.

Project Title: Safety Impacts of Differential Speed Limits - Phase I: Determining the Safety Effects of Differential Speed Limits on Rural Interstate Highways Using Empirical Bayes Method
Principal Investigators: Nicholas J Garber
Sponsor: MAUTC and Virginia Transportation Research Council

A differential speed limit is defined as being one limit for automobiles and a different limit for commercial motor vehicles ("trucks") whereas a uniform speed limit is defined as a single limit for cars and trucks. Because states enact differential speed limit (DSL) solely in order to improve safety, assessment of DSL's safety impacts is of significant importance to the transport community. Previous Before-and-After studies could not fully investigate DSL's impact on crashes due to the limited periods of time used in these studies. A different genre of studies based on the comparison of safety effects at different physical sites, such as I-64 in the western portion of Virginia (UNI) and the adjacent section of I-64 in the eastern portion of West Virginia (DSL) were also inadequate because of the limited data available at the time. Thirteen years have passed since the enactment of the Surface Transportation and Uniform Relocation Assistance (STURA), rendering a new set of data available for further study regarding the safety effects of DSL. Using the Empirical Bayes method for before-after safety analysis, this study developed a multivariate crash estimation model (CEM) using the before treatment years data and predicted what the safety would have been if there was no DSL enactment for the after treatment years. This study used data from seven states, which either kept the same speed limit strategy since 1990, or changed their strategy at least once. Six types of crashes (total number of crashes, total number of fatal crashes, total number of rear-end crashes, total number of crashes with truck involved, total number of fatal crashes with truck involved, total number of rear-end crashes with truck involved) were selected for analysis. The evaluations of DSL implementation was then carried out by comparing the predicted "would have been" crash counts and the actual crash counts of the after treatment period. A nonlinear relationship was found between crash counts and section length, and between crash counts and AADT. The results vary for different types of crashes through different states. The results, however, generally showed that as time passed, the actual total numbers of crashes for the after period were greater than the predicted "would have been" after total numbers of crashes. Whether this difference was caused only by the policy change of DSL or other factors that contribute to differing safety conditions is therefore not conclusive.

Project Title: Spatial Analysis Tools for Integrated Transportation Data: Northern Virginia Intelligent Transportation Systems Prototype
Principal Investigators: Brian Smith
Sponsor: Virginia Transportation Research Council

The purpose of this project is to investigate the use of intelligent transportation systems (ITS) data in conjunction with other, more traditional, transportation data (such as planning, traffic engineering, construction, maintenance, etc.) to develop decision support tools to improve Virginia Department of Transportation (VDOT) business process. This effort will include the development of prototype tools built upon a web-enabled, geographic information system (GIS) platform. The project will conclude with the development of an implementation plan to assist VDOT in applying the lessons learned in the research project. This project will provide a tangible example of ways to integrate and use the many sources of data that VDOT currently collects. The prototype, and the experience gained while developing the prototype, will improve VDOT’s use of GIS enterprise-wide, particularly in terms of web-based GIS applications; serve as the proving grounds for the development of new models to support the analysis of integrated transportation data; and provide information that has the potential to help the Data Management Division’s data warehousing efforts, especially regarding ITS data.

Project Title: Supply and Demand of Parking Facilities for Large Trucks: Phase I (Old title: Parking Facilities for Large Trucks on Primary Arterial Highways)
Principal Investigators: Nicholas J. Garber
Sponsor: MAUTC and Virginia Transportation Research Council

There is a growing concern that an inadequacy of facilities for large truck drivers to stop and rest could play a major role in truck drivers losing their alertness because of fatigue. This in turn may result in truck drivers being involved in an increasing number of crashes. The provision of adequate parking facilities for large truck drivers is therefore necessary to avoid the increase in fatigue related crashes involving large trucks. In order to ensure adequate parking facilities for large truck drivers, information on the parking facilities now available, and the demand for such facilities will be required. A study is now under way by the Virginia Transportation Research Council to estimate the demand for large truck parking and the number of parking facilities now available on Interstate Highways in Virginia. The purpose of this project is to carry out a similar study on the primary principal arterial roads in Virginia, with emphasis being placed on those serving the National Highway System (NHS). The location and characteristics of the rest areas and private truck stops will be determined and the factors that influence the demand will be identified. These factors will then be used to develop mathematical relationships that can be used to predict future demand for large truck parking. Current and future shortfall in large truck parking facilities will then be determined for a period of 20 years. The study duration is expected to be two years.

Project Title: Transit Demand Forecasting for Research Parks
Principal Investigators: Michael J. Demetsky
Sponsor: Virginia Department of Transportation

At present, there is no straightforward, widely accepted procedure for estimating transit demand for isolated urban/suburban sites. At the same time, there is a need to have a basis for estimating transit demand for potential new bus services. This study investigates the development of a transit demand forecasting methodology by first implementing a survey to assess user preferences regarding such a new service; and then developing a forecasting tool based on the survey and local data. The focus of the study will be on two research parks in Charlottesville, Virginia.

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Project Title: Addressing I-81 Transportation Issues
Principal Investigators: Hesham Rakha
Sponsor: Virginia Department of Transportation and MAUTC

The mountainous topography, together with the large number of trucks that travel along Virginia's major highways, has resulted in capacity reductions along uphill highway sections. The 2000 Highway Capacity Manual (HCM) produces charts that indicate how a 200-lb/hp vehicle's speed varies as a function of the length of travel along an upgrade section. However, the HCM does not analyze what the impact of a slow moving bottleneck has on the general traffic, nor does it study the interaction of multiple moving bottlenecks (a truck overtaking another truck on a grade). Research in the area of grade impacts on truck performance and on the formation of shockwaves upstream of slow moving bottlenecks are currently underway at Virginia Polytechnic Institute, as discussed below.

This effort involves a combination of research and educational efforts. The research efforts involve a number of tasks:

1. An evaluation of the safety hazard of I-81 relative to other interstate highways in the United States, which was completed.
2. Characterize truck traffic along I-81 in terms of the weight and power characteristics of these trucks.
3. Evaluate the operation of truck weigh stations.
4. Develop and validate vehicle dynamics models for the modeling of truck performance on grade sections.
5. Develop truck performance curves for the design of grade sections.
6. Estimate truck equivalency factors for uncongested and congested regimes for the design of I-81.
7. Develop a model of I-81 for studying the impact of separating trucks along I-81.

8. Quantify the impact of trucks on the surrounding traffic along level, downgrade, and upgrade sections.
9. Identify critical safety hazard locations along I-81, investigating the causes of these vehicle crashes, and a comprehensive analysis of the I-81 crash database.
10. Develop time-to-collision models for estimating rear-end vehicle crash rates. The educational effort involves developing a joint graduate course to be offered at the MAUTC universities.

The course will cover trucking issues, including truck logistics, truck dynamics and traffic flow behavior, and the impact of trucks on the pavement.

Project Title: Addressing Urban Network Transportation Issues
Principal Investigators: Hesham Rakha
Sponsor: Virginia Department of Transportation and MAUTC

The majority of transportation problems occur within urban environments. Tools are required not only to model the traffic flow within an urban environment but also to provide an optimum type of control. Various types of control are emerging, including transit signal priority, adaptive signal control, ramp metering, toll roads, etc.

Project Title: Characterizing Vehicle Dynamics for the Enhancement of Traffic Simulation Models
Principal Investigators: Hesham Rakha
Sponsor: Virginia Department of Transportation and MAUTC

The assessment of Intelligent Transportation Systems (ITS) requires sophisticated evaluation tools that capture the intricacies of vehicle-to-vehicle and vehicle-to-control interaction. Furthermore, the assessment of the fuel consumption and emission impacts of these ITS applications requires models that are sensitive to vehicle dynamics. Consequently, the assessment of the energy and emission impacts of alternative investments can be viewed as a two-level process. At the first level, the microscopic dynamics of traffic, such as car following, lane changing, and acceleration/deceleration behavior, must be captured. The car-following models, together with the lane-changing models, capture the steady-state behavior of traffic (no acceleration or deceleration), while the acceleration and deceleration models capture the transition behavior between steady states (non-steady state). At the second level, the energy and emissions must be computed based on the instantaneous speed and acceleration estimates that were computed in the first level.

The Transportation Systems and Operations Group (TSOG) at the Virginia Tech Transportation Institute (VTTI) is establishing itself as one of the leading agencies in transportation and traffic modeling. The TSOG is involved in the modeling of signal priority along the Columbia Pike Boulevard using the INTEGRATION and VISSIM models. In addition, the TSOG will be evaluating the I-77/I-81 overlap in Wytheville using the INTEGRATION and CORSIM models.

The development and enhancement of microscopic simulation tools requires systematic data collection efforts. The Smart Road facility, together with the fully equipped vehicles at VTTI, provides a unique environment for the systematic collection of traffic data for the validation of these tools.

Project Title: Developing a Fully Instrumented Test Facility
Principal Investigator: Hesham Rakha
Sponsor: Virginia Department of Transportation

There is an urgent need to develop tools for the evaluation of the efficiency, energy, environmental, and safety impacts of traffic flow improvement projects, including those involving intelligent transportation system (ITS) and intelligent vehicle initiative (IVI) alternatives. This research effort will address this need by developing a comprehensive data-collection environment to be for the development, validation, and testing of these evaluation tools, one that may also be used as a test bed for emerging communication, traffic management, and traveler information systems.

Project Title: MAUTC Scholarship
Principal Investigators: Hesham Rakha
Sponsor: Virginia Department of Transportation

This project involved providing a scholarship for the duration of one year towards a student's degree for conducting research in the area of Transportation Infrastructure and Systems Engineering (TISE). This research effort was intended to attract high quality students for conducting research in the transportation field.

WEST VIRGINIA UNIVERSITY

Project Title: Development of Design Vehicles and Characteristics for the HANGUP Software
Principal Investigators: L. James French and Ronald W. Eck
Sponsor: MAUTC and West Virginia Division of Highways

This project involves identifying design vehicles to be used in evaluating high profile vertical geometry and to determine overhang, ground clearance, and wheelbase dimensions for each class of design vehicle. The results will be used in the HANGUP software to enable engineers to model specific types of low clearance vehicles at a specific railroad crossing or other high profile vertical curve. Field data collection was performed, the database was analyzed, and a preliminary proposal was submitted for design vehicle dimensions.

Project Title: Effect of Dowel Bonding Force on Stresses in Concrete Slabs
Principal Investigators: Samir Nabih Shoukry
Sponsor: MAUTC and West Virginia Department of Highways

Experiments will be conducted on simulated doweled joints to determine the effectiveness of different types of bond breakers in eliminating the dowel concrete bonding. The measured pulling forces will be used in finite element programs to compute the thermal stresses induced in concrete slabs.

Project Title: Operational Effects of Highway Geometrics in Mountainous
Principal Investigators: David Martinelli, James L. French, and Ronald W. Eck
Sponsor: MAUTC and West Virginia Department of Transportation

This project involves the collection of certain speed and headway data on highway geometry unique to mountainous terrain, including steep grades, sharp curves, and switchback curves. These data can support headway distributions, capacity studies, and traffic flow modeling and simulation.

EDUCATION

MAUTC

Project Title: The MAUTC Freight Transportation Partnership
Principal Investigators: Edward K. Morlok, University of Pennsylvania
James H. Miller, The Pennsylvania State University
David Martinelli, West Virginia University
Thomas W. Dingus, Virginia Polytechnic Institute & State University
Michael J. Demetsky, University of Virginia
Sponsor: MAUTC

MAUTC researchers are developing a Region III Freight Transportation Partnership by surveying departments at prospective university partners for expertise in freight transportation. Each participating university will select two to three research topics that will benefit the Mid-Atlantic Region. The research partnership will run for the duration of the 1999-2004 MAUTC contract.

Project Title: Support Transit Internship Program at PSU, UPENN, and UVA
Principal Investigators: Edward K. Morlok, University of Pennsylvania
Lester A. Hoel, University of Virginia
James H. Miller, The Pennsylvania State University
Sponsor: MAUTC

MAUTC at Penn State sponsored an Undergraduate Internship Program for Transit Systems in Pennsylvania. Students, each completing the sophomore or junior year of study in a transportation related curriculum, are selected to fill paid internship positions with public transit agencies throughout Pennsylvania. Students are placed with Centre Area Transportation Authority, Beaver County Transportation Authority, and York County Community Transportation Authority.

The University of Pennsylvania established a national program to enhance student interest in transportation careers. University of Pennsylvania's future internship program will be administered through the established Kent T. Healy Memorial Fund. The program is designed to stimulate interest in the knowledge of transportation, with particular reference to railroads, and to encourage young men and women to choose careers in transportation, particularly railroad management and engineering. The program also provides a clearinghouse for summer internship opportunities. They poll possible employers, compile information on internships, and publicize to students at UTC universities. Planned fund activities under this program include academic symposia, conferences, industry/university workshops, internships, and scholarship and fellowship programs. The program maintained its web site for announcing internships, as well as explaining the origin and purposes of the fund.

MAUTC at UVA arranges for UVA interns to work with the Charlottesville Transit System on a yearly basis. Their work at the Transit System is used for their senior thesis. UVA has also established graduate student projects that have been requested by other transit agencies.

Virginia Tech has been successful in attracting undergraduate students to the ITIS undergraduate scholarship program, all of who were actively involved in research under the supervision of center staff. Last year, this scholarship program was converted to an ITIS summer internship program, with the objective of providing a more meaningful experience to the students through their direct involvement in the research activities of the Center. Internships are offered to four meritorious students, one each from civil, mechanical, and industrial and systems engineering, and one student from the architecture department, thus promoting inter-disciplinary education and research. These research opportunities have not only provided funding support to the students but have also enabled their participation in advancing the state-of-the-art in research. In addition, MAUTC's research activities also benefit from the students' involvement.

PENNSYLVANIA STATE UNIVERSITY

Project Title: Pennsylvania TRAC Careers Center Program at Penn State
Principal Investigators: James H. Miller and Janice Dauber
Sponsor: PENNDOT and MAUTC

TRAC faculty and staff in Pennsylvania provide high school science and mathematics teachers with the training and materials they need to establish sound transportation- and engineering-related curricula in their classrooms. TRAC's educational outreach mission is to interest high school students in civil engineering careers in the transportation industry. The mission is addressed by providing the students with the tools and the challenges to conduct real engineering investigations in their classrooms.

PENNDOT civil engineers serve as role models to TRAC students and resources for high school teachers. The success of TRAC in Pennsylvania has led to the establishment of a Pennsylvania Regional TRAC Center, supported by MAUTC and PENNDOT, to manage an effective administrative structure.

The TRAC program has been introduced to more than 38 high schools in Pennsylvania, including high schools in Allentown, Bellefonte, Erie, Farrell, Franklin, Harrisburg, Johnstown, Lancaster, Philadelphia, Pittsburgh, Reading, Scranton, and Williamsport.

UNIVERSITY OF PENNSYLVANIA

Project Title: Transportation and Logistics Doctoral Program Support
Principal Investigators: Edward K. Morlok
Sponsor: MAUTC

Penn has traditionally been a major supplier of Ph.D.s to both academia and to industry. This program formalizes this and makes a major goal the production of well-trained Ph.D.s, in a program of study that encompasses not only the traditional transportation subjects but also includes other fields that are increasingly important. These include operations research and systems analysis methodology, economics and other social science fields, and subjects dealing with information sciences and new technology.

Project Title: Transportation and Logistics Systems Laboratory and Course Development-Phase 4
Principal Investigators: Edward K. Morlok
Sponsor: MAUTC

The laboratory was recently expanded with a grant from the Beatty Trust, and a major grant of software from Manugistics enables the inclusion of realistic distribution and transportation problems in laboratory exercises. Algorithms used in courses and research involving optimization problems are being developed and tested on supercomputers, in part supported by a grant for use of the supercomputer at the National Council for Supercomputing Applications. Our computer specialist is working with faculty to develop new courseware problems. Undergraduates are working with staff and faculty to enhance the database available for course and independent study projects, and for research.

Project Title: Undergraduate Research Experience
Principal Investigators: Edward K. Morlok
Sponsor: MAUTC

A major goal of the University of Pennsylvania (Penn) is to increase the involvement of undergraduates in research. This initiative is directed toward transportation and logistics research. This is being done in three ways. One is to have students work part-time on projects with faculty and graduate students. A second is to have students work on topics of interest that are related to research projects, but not necessarily part of such projects. The third is to have students work on design, analysis, or strategy projects in the field with clients, advised by a faculty member, and the client organization.

UNIVERSITY OF VIRGINIA

Project Title: Transportation Courses in Information Technology for Graduates and Undergraduates
Principal Investigators: Brian Smith
Sponsor: Virginia Highway and Transportation Research Council and MAUTC

A workstation and three terminals were purchased for the transportation laboratory. A new GIS course was developed and taught by VTRC staff in spring 1995 and spring 1996. Departmental staff now teaches the course. Beginning in spring 1997 the course was taught using ARC View 3.0 on PC's, making the course available to more students. A second course for graduate students only will be developed using the workstation for advanced training and research. In the fall semester 1998 a new course on IT applications was taught.

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Project Title: Continuing Education Courses in Transportation Systems and Operations
Principal Investigators: Hesham Rakha and John Collura
Sponsor: MAUTC and Virginia Department of Transportation

This educational effort involves offering a combination of one-day, two-day, and three-day short courses to the Virginia Department of Transportation, the Federal Highway Administration, and transportation-consulting firms for continuing education purposes based on any requests received. Courses that cover a wide range of areas, including transportation planning, traffic operations in traffic-signalized networks, traffic operations on freeways, communication networks, and transit operations will be offered on demand. Funding for these courses might involve some minor support from MAUTC together with backing from the supporting agencies. (In the event that funding for these courses does involve support from MAUTC, the budgets from other VTTI projects will be reduced.)

WEST VIRGINIA UNIVERSITY

Project Title: Graduate Student Assistantships in Transportation
Principal Investigator: David Martinelli
Sponsor: West Virginia Department of Transportation

The success of the highway system in West Virginia and the nation relies heavily on the abundance of engineering talent attracted to the transportation and civil engineering profession. The challenges for the future almost certainly will require a substantial number of transportation professionals to have an education beyond the bachelor's degree. Attracting such students will insure that a competent workforce in transportation analysis, design, and research is maintained. The package of competitive financial support coupled with the strong graduate programs at West Virginia University is a very powerful recruiting tool for attracting higher quality students.

Project Title: The West Virginia TRAC/TCAP Program of West Virginia University
Principal Investigators: Crystal May
Sponsor: West Virginia Department of Highways

The West Virginia TRAC program has a goal to better prepare and encourage secondary school students to pursue higher education while increasing their awareness of engineering careers, especially in civil engineering, in the context of the needs of our transportation system. The WV TRAC program changed directions last year with the development of the TCAP (Transportation Careers Awareness Program) Program. A web page was designed and went live in April 2001. This new program will allow our outreach program the potential to reach all secondary schools in WV instead of just the 50 participating TRAC schools. TCAP is partnering with ASCE this fall to promote the West Point Bridge Competition and will use this momentum to develop an annual WV Bridge Building Contest, which will get underway in the fall of 2002.

Project Title: Bridge Builder Design Competition
Principal Investigators: Crystal May
Sponsor: West Virginia Department of Highways and West Virginia University

The bridge building competition will be used as a marketing tool for the TRAC/TCAP program at West Virginia University. TCAP will work with ASCE (American Society of Civil Engineers) to promote the West Point Bridge Builder Design Competition. Col. Stephen Ressler, of West Point, will provide TCAP with a list of the top ten West Virginia entries after round one of the West Point Bridge Competition. TCAP will invite these ten teams to participate in a State Finals Competition to be held in Charleston, West Virginia, during the annual Virginias Conference.

TECHNOLOGY TRANSFER

THE PENNSYLVANIA STATE UNIVERSITY

Project Title: Annual Transportation Engineering and Safety Conference
Principal Investigators: Kevin Mahoney and Eric Donnell
Sponsor: MAUTC and PENNDOT

The Annual Transportation Engineering and Safety Conference, held at The Penn Stater Conference Center at Penn State, attracts transportation professionals from across Pennsylvania, the Mid-Atlantic States, and the country. The conference features speakers and workshops that fosters discussion and encourages questions.

The responsibility of transportation professionals for improved safety, efficiency, and capacity is expanding as more demands are placed on existing transportation systems. Constantly changing legislative requirements also have increased the responsibility of the transportation professional beyond design and operation, into areas of air quality, systems management, and intelligent transportation systems. Hence, there is a need for programs to increase the knowledge within the profession so that these new responsibilities can be adequately met. It was the intent of this conference to fulfill this need in a dynamic and enlightening setting.

PROJECT STATUS LIST

Mid-Atlantic Universities Transportation Center
RESEARCH PROJECT STATUS
July 1, 2001 - June 30, 2002

NEW RESEARCH PROJECTS

Project Number	Project Name	Principal Investigator	University
PSU-2001-01	Centre County Simulation	Konstadinos G. Goulias	The Pennsylvania State University
PSU-2001-02	ITS Evaluation	Konstadinos G. Goulias	The Pennsylvania State University
UP-2001-01	Technology Innovation to Reduce Conflicts Between Rail Freight and Passenger Transportation (Old title: Freight Transportation Trends, Policy Options, and Technology Innovations)	Edward K. Morlok	University of Pennsylvania
UVA-2001-01	Carbon Monoxide Production in Response to Increased Reforestation and Traffic in Eastern United States (Old title: Aersol and Oxidation Production Arising from Urban and Rural Traffic)	Jose Fuentes	University of Virginia
UVA-2001-02	Development of a Freight Flow Prediction Method for Statewide Planning	Michael J. Demetsky	University of Virginia
UVA-2001-03	HOV Corridor Evaluation and Improvement (Old title: Study on The HOV/HOT/General Purpose Lane Efficiency Comparison Methodology)	Lester A. Hoel	University of Virginia
UVA-2001-04	Transit Demand Forecasting for Research Parks	Michael J. Demetsky	University of Virginia

NEW RESEARCH PROJECTS

Project Number	Project Name	Principal Investigator	University
UVA-2001-06	Investigating the Application of a GIS Database to Address Statewide Freight Transportation Planning	Michael J. Demetsky	University of Virginia
VPI-2001-01	Developing a Fully Instrumented Test Facility	Hesham Rakha	Virginia Polytechnic Institute & State University
VPI-2001-02	MAUTC Scholarship	Hesham Rakha	Virginia Polytechnic Institute & State University

ONGOING RESEARCH PROJECTS

Project Number	Project Name	Principal Investigator	University
PSU-2000-01	Pennsylvania Statewide Long Range Transportation Plan (Penn Plan)	Konstadinos G. Goulias	The Pennsylvania State University
PSU-2000-04	OPTIPATH Lab	Elise Miller-Hooks	The Pennsylvania State University
PSU-2000-07	Evaluation of Pennsylvania Turnpike ATIS	Konstadinos G. Goulias	The Pennsylvania State University
PSU-R-06	Roadside Vegetation Management	Larry J. Kuhns	The Pennsylvania State University
PSU-R-26	Intelligent Transportation Systems Research and Development Fellowship Program at PSU	Konstadinos G. Goulias	The Pennsylvania State University
UP-2000-04	Real-World Vehicle Routing and Scheduling Problems	Zhi-Long Chen	University of Pennsylvania
UVA-2000-03	Investigation of Truck to Rail Freight Diversion/Mode Choice Models	Michael J. Demetsky	University of Virginia

ONGOING RESEARCH PROJECTS

Project Number	Project Name	Principal Investigator	University
UVA-2000-05	Supply and Demand of Parking Facilities for Large Trucks: Phase I (Old title: Parking Facilities for Large Trucks on Primary Arterial Highways)	Nicholas J. Garber	University of Virginia
UVA-2000-07	Spatial Analysis Tools for Integrated Transportation Data: Northern Virginia Intelligent Transportation Systems Prototype	Brian Smith	University of Virginia
UVA-2000-08	Safety Impacts of Differential Speed Limits-Phase I: Effects of Differential Speed Limits on Vehicle Speed and Crash Characteristics Using Hypothesis Tests	Nicholas J. Garber	University of Virginia
VPI-2000-02	Characterizing Vehicle Dynamics for the Enhancement of Traffic Simulation	Hesham Rakha	Virginia Polytechnic Institute & State University
VPI-R-01	Addressing I-81 Transportation Issues	Hesham Rakha	Virginia Polytechnic Institute & State University
VPI-R-14	Addressing Urban Network Transportation Issues	Hesham Rakha	Virginia Polytechnic Institute & State University
WVU-2000-01	Operational Effects of Highway Geometrics in Mountainous Terrain	L. James French David Martinelli Ronald W. Eck	West Virginia University
WVU-2000-02	Development of Design Vehicles and Characteristics for the HANGUP	L. James French Ronald W. Eck	West Virginia University
WVU-2000-05	Effect of Dowel Bonding Force on Stresses in Concrete Slabs	Samir Nabih Shoukry	West Virginia University

COMPLETED RESEARCH PROJECTS

Project Number	Project Name	Principal Investigator	University
PSU-2000-02	Advanced Traffic Simulation Laboratory (ATLAS)	Ageliki Elefteriadou	The Pennsylvania State University
PSU-2000-06	E-Commerce and Transportation	Konstadinos G. Goulias	The Pennsylvania State University
PSU-R-01	Center for Intelligent Transportation Systems Research	Konstadinos G. Goulias	The Pennsylvania State University
PSU-R-05	Strategic Plan for the Implementation of Intelligent Transportation Systems in Pennsylvania	John M. Mason	The Pennsylvania State University
PSU-R-07	Climate Survey Development and Organizational Assessment	Robert J. Vance	The Pennsylvania State University
PSU-R-15	Support of the ITS Statewide Steering Committee	John M. Mason	The Pennsylvania State University
PSU-R-27	Pennsylvania Quality Initiative: Synthesis of Customer Satisfaction and Information Requirement	James H. Miller	The Pennsylvania State University
PSU-R-70	Probing Motorists' Perceptions of Highway Quality (Coop Agreement)	James H. Miller	The Pennsylvania State University
PSU-R-71	Increasing the Pool of Highway Construction Subcontractors and Construction Personnel (Coop Agreement)	James H. Miller	The Pennsylvania State University
PSU-R-72	Construction and Materials Training and Education Plan	John A. Anderson	The Pennsylvania State University

COMPLETED RESEARCH PROJECTS

Project Number	Project Name	Principal Investigator	University
UP-R-09	Transportation and Logistics Network Research Program	Edward K. Morlok	University of Pennsylvania
UVA-2000-01	Finite Element Evaluation of the Structural Integrity of Composite Concrete-Steel Bridge Decks	C. E. Orozco	University of Virginia
UVA-2000-02	A Methodology for Oversized Vehicle Trip Scheduling: A Case Study in the Hampton Roads Area (Old title: Oversized Vehicle Routing and Scheduling	Lester A. Hoel	University of Virginia
UVA-2000-06	Assessment of Advanced Engine Technology for the University of Virginia Transit Systems (Old title: Feasibility Study of Alternative Travel Modes and Vehicle Fuels for UVA "Groundswalk")	Michael J. Demetsky	University of Virginia
UVA-2000-09	Crash Characteristics at Work Zones	Nicholas J. Garber	University of Virginia
UVA-2000-10	Predicting Crashes from Increased Signalization: Prototype Software for Corridor Planning	Michael J. Demetsky	University of Virginia
UVA-2000-11	Safety Impacts of Differential Speed Limits - Phase I: Determining the Safety Effects of Differential Speed Limits on Rural Interstate Highways Using Empirical Bayes Method	Nicholas J. Garber	University of Virginia

COMPLETED RESEARCH PROJECTS

Project Number	Project Name	Principal Investigator	University
UVA-R-37	An Investigation of Web-Based Technologies for the Peninsula Transportation District Commission	Brian Smith	University of Virginia
UVA-R-38	Evaluation of Traveler Diversion Due to En-Route Information (Old title: Prediction of Traveler Response to	Michael J. Demetsky	University of Virginia
UVA-R-41	Evaluating ITS Parking Management Strategies: A Systems Approach (Old title: ITS Alternatives Analysis: Evaluating Parking Management	Lester A. Hoel	University of Virginia
UVA-R-43	Ozone Formation Attributable to Emissions from Rural Interstate Traffic	Michael J. Demetsky	University of Virginia
VPI-2000-03	The Development of TRANSIMS Modeling Capabilities	Antoine G. Hobeika	Virginia Polytechnic Institute & State University
VPI-2000-04	Electronic Payment Systems	John Collura Wei Hua Lin	Virginia Polytechnic Institute & State University
VPI-2000-05	Use of Video Surveillance for Rural Highway Safety	Antoine G. Hobeika Hesham Rakha	Virginia Polytechnic Institute & State University
VPI-2000-07	SUPERPAVE HMA Mixes	Immadeddin Al Qadi	Virginia Polytechnic Institute & State University
VPI-R-11	Professional Capacity Building in Transportation	Hesham Rakha John Collura Alejandra Medina	Virginia Polytechnic Institute & State University

COMPLETED RESEARCH PROJECTS

Project Number	Project Name	Principal Investigator	University
VPI-R-12	Quantifying the Impacts of Average Speed, Speed Variability, Level of Deceleration, and Level of Acceleration on Vehicle Fuel Consumption and Emissions	Hesham Rakha	Virginia Polytechnic Institute & State University
VPI-R-13	Development of a Macroscopic Model for Evaluating the Impact of Emergency Vehicle Signal Preemption on Traffic	John Collura Wei Hua Lin	Virginia Polytechnic Institute & State University
WVU-R-06	Fitting Falling Weight Deflectometer with SASW Measurement Capability	Samir N. Shoukry	West Virginia University
WVU-R-07	Evaluation of Backcalculation Algorithms Through Dynamic Modeling of FWD Test	Samir N. Shoukry	West Virginia University
WVU-R-17	Identification of Critical Stress Concentration Around Dowel Bars	Samir N. Shoukry	West Virginia University

Mid-Atlantic Universities Transportation Center
EDUCATION PROJECT STATUS
July 1, 2001 - June 30, 2002

NEW EDUCATION PROJECTS

Project Number	Project Name	Principal Investigator	University
WVU-2001-01	The West Virginia TRAC/TCAP Program of West Virginia University	Crystal May	West Virginia University
WVU-2001-02	Graduate Student Assistantships in Transportation	David Martinelli	West Virginia University
WVU 2001-03	West Virginia Bridge Building Contest	David Martinelli	West Virginia University

ONGOING EDUCATION PROJECTS

Project Number	Project Name	Principal Investigator	University
MAUTC-2000-01	The MAUTC Freight Transportation Partnership	James H. Miller Michael Demetsky David Martinelli Edward K. Morlok Thomas W. Dingus	The Pennsylvania State University University of Virginia West Virginia University University of Pennsylvania Virginia Polytechnic Institute & State University
MAUTC-E-03	Support Transit Internship Program at PSU, UPENN, and UVA	James H. Miller Edward K. Morlok Lester A. Hoel	The Pennsylvania State University University of Pennsylvania University of Virginia
PSU-R-38	Pennsylvania TRAC Careers Center Program at Penn State	James H. Miller Janice Dauber	The Pennsylvania State University

ONGOING EDUCATION PROJECTS

Project Number	Project Name	Principal Investigator	University
UP-2000-03	Transportation and Logistics Systems Laboratory and Course Development-Phase 4	Edward K. Morlok	University of Pennsylvania
UP-E-01	Undergraduate Research Experience	Edward K. Morlok	University of Pennsylvania
UP-E-05	Transportation and Logistics Doctoral Program Support	Edward K. Morlok	University of Pennsylvania
UVA-E-05	Transportation Courses in Information Technology for Graduates and Undergraduates	Brian Smith	University of Virginia
VPI-2000-06	Continuing Education Courses in Transportation Systems and Operations Hesham Rakha	John Collura	Virginia Polytechnic Institute & State University
WVU-2000-03	The West Virginia TRAC/TCAP Program Of West Virginia University	Crystal May	West Virginia University
WVU-2000-04	Graduate Student Assistantships in Transportation	David Martinelli	West Virginia University

COMPLETED EDUCATION PROJECTS

Project Number	Project Name	Principal Investigator	University
MAUTC-E-01	Transportation Computational Laboratory	Martin T. Pietrucha	The Pennsylvania State University
		Edward K. Morlok	University of Pennsylvania
		David Martinelli	West Virginia University
		Hesham Rakha	Virginia Polytechnic Institute & State University
		Brian B. Park	University of Virginia

COMPLETED EDUCATION PROJECTS

Project Number	Project Name	Principal Investigator	University
MAUTC-E-04	Maintain and Seek New Opportunities for the VDOT Fellowship Program at UVA and VPI	Lester A. Hoel	University of Virginia
MAUTC-E-06	Maintenance and Enhancement of Transportation Laboratories	Konstadinos G. Goulias Thomas W. Dingus Michael J. Demetsky Edward K. Morlok David Martinelli	The Pennsylvania State University Virginia Polytechnic Institute & State University University of Virginia University of Pennsylvania West Virginia University
PSU-E-01	Transportation Engineering and Management (TEaM) Laboratory Maintenance and Enhancement (Survey Center, MANTIS, ATLAS, OPTIPATH, and TEaM)	Konstadinos G. Goulias	The Pennsylvania State University
PSU-E-02	MAUTC's Annual TRB Research Showcase	Ann Marie Hutchinson	The Pennsylvania State University
PSU-R-03	Traffic Engineering Education Plan and Program (Work Order 6 - 1997-99) (Deployment of Study Guides and Development of Additional Study Guides)	John A. Anderson	The Pennsylvania State University
UP-E-02	National Summer Internship Program in The Railroad and Transit and Industries	Edward K. Morlok	University of Pennsylvania
UP-E-04	Transportation and Logistics Systems Laboratory and Course Development-Phase 3	Edward K. Morlok	University of Pennsylvania
UVA-E-01	Studies in Transportation Engineering and Planning at UVA	Lester A. Hoel	University of Virginia

COMPLETED EDUCATION PROJECTS

Project Number	Project Name	Principal Investigator	University
VPI-E-03	Education Program at the Center for Transportation Research	Hesham Rakha John Collura	Virginia Polytechnic Institute & State University
VPI-2001-02	MAUTC Scholarship	Hesham Rakha	Virginia Polytechnic Institute & State University

Mid-Atlantic Universities Transportation Center
TECHNOLOGY TRANSFER PROJECT STATUS
July 1, 2001 - June 30, 2002

ONGOING TECHNOLOGY TRANSFER PROJECTS

Project Number	Project Name	Principal Investigator	University
PSU-2000-08	Annual Transportation Engineering and Safety Conference	Kevin Mahoney Eric Donnell	The Pennsylvania State University

COMPLETED TECHNOLOGY TRANSFER PROJECTS

Project Number	Project Name	Principal Investigator	University
WVU-R-16	International Symposium on Use of Nonlinear Finite Element Modeling for Pavement Analysis and Design	Samir N. Shoukry	West Virginia University

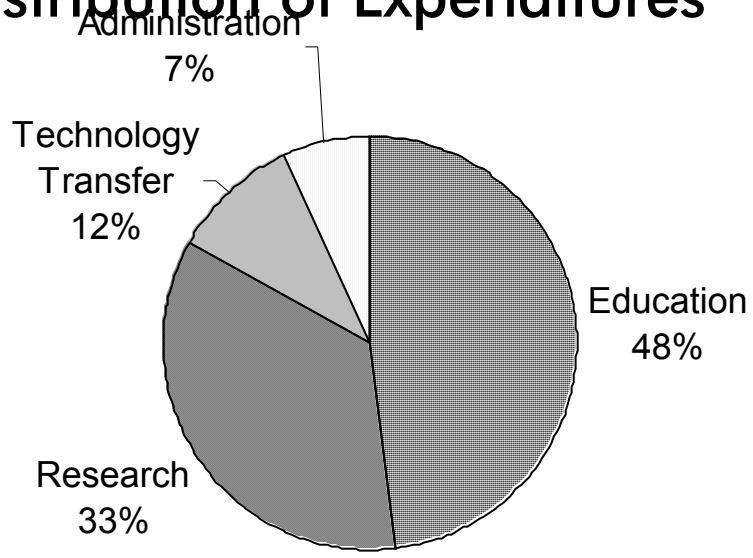
Mid-Atlantic Universities Transportation Center
PROJECT STATUS
July 1, 2001 - June 30, 2002

DELETED PROJECTS SINCE DECEMBER 31, 2001 REPORT

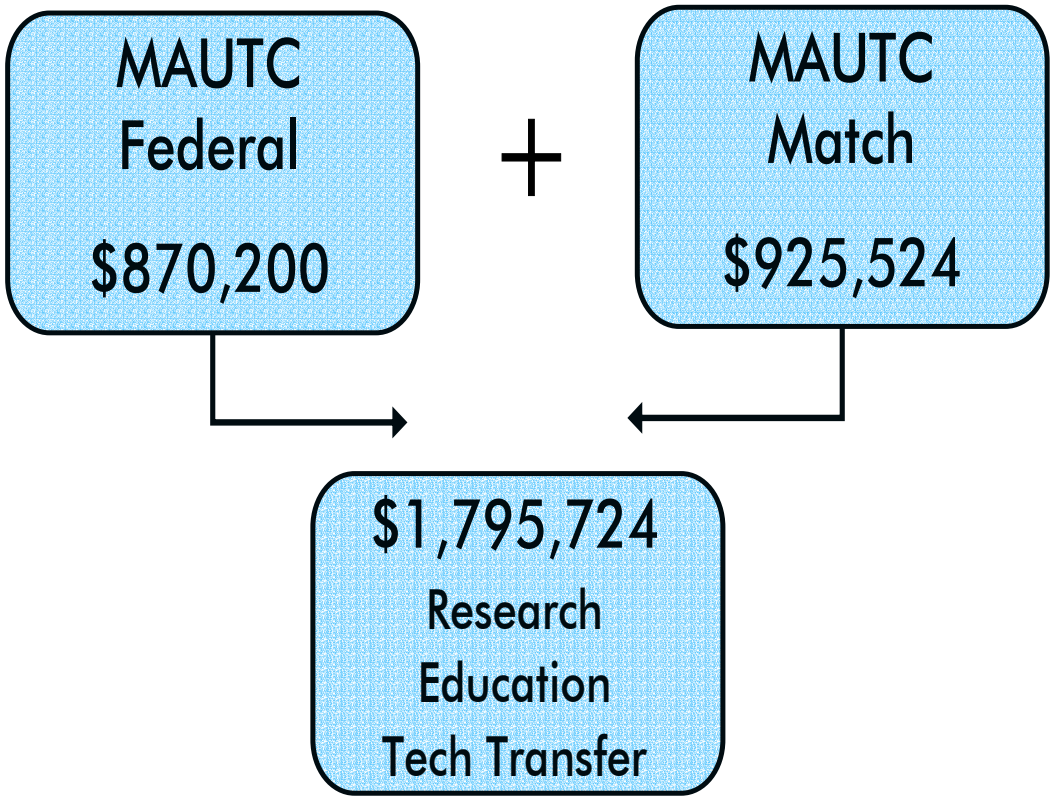
Project Number	Project Name	Principal Investigator	University
PSU-2000-05	Pennsylvania Statewide Long Range Transportation Plan (Penn Plan) (Duplicate of PSU-2000-01)	Konstadinos G. Goulias	The Pennsylvania State University
UP-2000-05	Exploratory Study of Impact of Urban Congestion on Freight Transport and Costs of Goods and Services (canceled)	Edward K. Morlok	University of Pennsylvania
UP-R-12	Logistics Networks (Duplicate of UP-R-09)	Edward K. Morlok	University of Pennsylvania
UVA-2000-04	Evaluation of General Trends of E-Commerce Impact on Shopping, Discretionary, and Freight Traffic in an Urban Area (canceled)	Michael J. Demetsky	University of Virginia
UVA-R-40	Reliability-Based Monitoring of Bridge Structures for Bridge Management (Reassigned no. UVA-2000-01)	C. E. Orozco	University of Pennsylvania
UVA-R-42	GIS-Based Decision Support System for Commercial Vehicle Routing (canceled)	Lester A. Hoel	University of Virginia

ILLUSTRATION OF FUNDING SOURCES AND EXPENDITURES

MAUTC 2001-2002
Distribution of Expenditures



MAUTC 2001-2002 Financial Plan



FINANCIAL STATUS
AND
PERFORMANCE INDICATORS

FY 2001-2002 ANNUAL FINANCIAL STATUS REPORT (Grant No. DTRS99-G-0003)
UNIVERSITY TRANSPORTATION CENTERS PROGRAM
OVERALL MAUTC BUDGET

Budget Period: July 1, 2001 THROUGH June 30, 2002

CATEGORY	AMOUNT	EXPENDITURES TO DATE
Center Director Salary	$42,993.00	$26,143.00
Faculty Salaries	$265,694.00	$170,721.89
Administrative Staff Salaries	$79,398.00	$74,004.20
Other Staff Salaries	$92,669.00	$179,636.95
Graduate Student Salaries	$323,816.00	$214,038.55
Undergraduate Student Salaries	$122,865.00	$57,025.45
Staff Benefits	$128,622.00	$107,280.69
Total Salaries and Benefits	**$1,056,057.00**	**$828,850.73**
Scholarships	$72,542.00	$15,586.16
Permanent Equipment	$39,475.00	$993.10
Expendable Property and Supplies	$35,541.00	$118,624.16
Domestic Travel	$31,394.00	$21,678.05
Foreign Travel	$2,500.00	$0.00
Other Direct Costs (Specify)	$92,179.00	$65,211.30
Total Direct Costs	**$1,329,688.00**	**$1,050,943.50**
Indirect Costs	$466,036.00	$303,842.69
TOTAL COSTS	**$1,795,724.00**	**$1,354,786.19**
Federal Share	$870,200.00	$573,503.33
Matching Share	$925,524.00	$781,282.86

2000/2001 ANNUAL FINANCIAL STATUS REPORT
UNIVERSITY TRANSPORTATION CENTERS PROGRAM
OVERALL MAUTC BUDGET

Budget Period: July 1, 2000 THROUGH June 30, 2001

CATEGORY	AMOUNT	EXPENDITURES TO DATE
Center Director Salary	$41,940.00	$41,649.74
Faculty Salaries	$304,580.00	$262,846.72
Administrative Staff Salaries	$79,165.00	$68,857.68
Other Staff Salaries	$94,910.00	$233,922.32
Graduate Student Salaries	$308,855.00	$219,772.87
Undergraduate Student Salaries	$77,680.00	$82,010.35
Staff Benefits	$162,897.00	$130,879.20
Total Salaries and Benefits	$1,070,027.00	$1,039,938.88
Scholarships	$61,367.00	$20,105.77
Permanent Equipment	$52,475.00	$64,242.42
Expendable Property and Supplies	$48,476.00	$22,646.48
Domestic Travel	$34,200.00	$27,096.75
Foreign Travel	$2,500.00	$8,429.41
Other Direct Costs (Specify)	$86,408.00	$130,350.34
Total Direct Costs	$1,355,453.00	$1,312,810.05
Indirect Costs	$463,070.00	$375,583.42
TOTAL COSTS	$1,818,523.00	$1,688,393.47
Federal Share	$862,300.00	$862,300.00
Matching Share	$956,223.00	$826,093.47

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

UVA- CE 635	Intermodal Transportation
UVA- CE 732	Transportation Systems Planning and Analysis II
UVA - CE 733	Transportation Systems Planning and Analysis III
UPENN- SYS 444	Project and Construction Management
VPI - CEE 5104	Environmental Chemistry
VPI - UAP 5234	Urban Economy and Public Planning
VPI - CEE 4624	Planning Transportation Facilities
VPI - CEE 4814	Analysis of Infrastructure Systems
VPI - CEE 5474	Advanced Reinforced Concrete Design
VPI - CEE 5484	Advanced Bridge Design
VPI - CEE 5634	Analysis and Planning of Mass Transit Systems
VPI - CEE 5754	Pavement and Bridge Infrastructure Management Systems
VPI - CEE 5767	Asphalt Technology
VPI - UAP 5664	Intercity Transportation
VPI - CEE 4014	Estimating, Production and Cost Engineering
VPI - CEE 5764	Asphalt Technology
VPI - CEE/UAP 5644	Transportation Systems Planning
PSU - CEE 100S	Highway Accident Reconstruction
PSU - CE 300	The Civil Engineering Profession
PSU - CE 424	Optimization in Civil Engineering Systems
PSU - CE 436	Construction Engineering Materials

Courses Deleted

UVA - CE 733	
UVA - CE 735	
VPI - CEE 4484	Bridges and Their Builders
VPI - CEE 4604	Traffic Engineering
VPI - CEE 4814	Analysis of Infrastructure Systems
VPI - CEE 5104	Construction Control Technology
VPI - CEE 5474	Advanced Reinforced Concrete Design
VPI - CEE 5654	Advanced Geometric Design and Highway Safety
VPI - CEE/UAP 5664	Intercity Transportation
VPI - CEE 5674	Advanced Pavement Design
VPI - CEE 5767	Asphalt Technology
VPI - CEE 5944	Seminar on Various Topics
VPI - CEE 5984	Integrated Vehicle Highway Systems
VPI - UAP 5234	Urban Economy and Public Planning
PSU - CE 143	
PSU - CE 221W	Transportation Systems Engineering
PSU - CE 380	Characterization and Specifications of Civil Engineering Materials
PSU - CE 431W	Civil Engineering Construction
PSU - CE 446	Advanced Soil Mechanics I
PSU - CE 449W	Design of Prestressed Concrete Structures
PSU - CE 451	Hydrologic Process, Analysis and Design
PSU - CE 474	Management of Water Pollution Control Processes
PSU - CE 477	Industrial Hazardous and Residual Waste Management
PSU - CE 481	Pavement Materials and Design

PSU - CE 482 Portland Cement Concrete and Aggregates
PSU - CE 300 The Civil Engineering Profession

Performance Indicator 1b. Provide the following information about your Center's transportation education program for the academic year being reported (Yr 2001-02), in comparison with the baseline data (Base) you provided in the Appendix to your Strategic Plan:

Transportation Education	Undergraduate		Graduate		Total	
	Base	01-02	Base	01-02	Base	01-02
1b.1 Number of Courses Offered	60	**42**	51	**43**	111	**85**
1b.2 Number of Academic Departments Offering Them	9	**8**	12	**9**	21	**17**
1b.3 Number of Students* Completing Above Courses	5,263	**1,707**	448	**450**	5,711	**2,157**
1b.4 Number of Students* Involved in Transportation Research Projects	82	**76**	122	**151**	204	**227**

*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.

No advance degrees have been added or deleted.

Performance Indicator 2b. Provide the following information about your Center's transportation education program for the academic year being reported (Yr 2001-02), 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	01-02	Base	01-02	Base	01-02
2b.1 Number of Students* Enrolled	85	**92**	44	**67**	129	**159**
2b.2 Number of Students* Receiving Degrees	37	**20**	11	**3**	48	**23**

*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
01	X		District Engineer	X		PENNDOT District 10	State Government	G
02	X		Transportation Engineer	X		KPMG Transportation Division	Industry	I
03	X		Engineering Consultant	X		Unknown	Eng.ineering Program	I
04		X	Ph.D.	X		Penn State	Ph.D. Program	A
05	X		Ph.D.	X		Penn State	Ph.D. Program	A
06	X		Engineering Consultant	X		Kittelson & Associates	Engineering Firm	I
07	X		Engineering Software Designer	X		AT&T Software Development	Software	I
08	X		Traffic Engineer	X		Maryland State Highways	State DOT	G
09		X	Ph.D.	X		Penn State	Ph.D. Program	A
10	X		Traffic Research Engineer	X		Science Applications International Corp.	Industry	I
11	X		Area Manager	X		PB Farradyne	Consulting Industry	I
12	X		Manager Planning	X		Compaq Computer Corp.	Global Logistics	I
13	X		Assistant Professor BLOG	X		Penn State	Faculty	T
14	X		Medical Logistics Officer	X		Department of Defense	U.S. Army	G
15		X	Instructor	X		U.niversity of Belgrano	Faculty	T
16	X		Officer	X		U.S. Army	Logistics	G
17	X		Assistant Professor	X		A University	Logistics Program	T
18	X		Manager of Info. Services	X		A Railroad	Railroad	I
19	X		Assistant Professor	X		A University	Operations Res. Program	T
20	X		Management Trainee	X		Cooper Smith, Inc.	Brewery	I
21		X	Ph.D. Candidate	X		University of Adelaide	Engineer	A
22	X		Transportation Engineer	X		Kimley Horn	Engineer	I
23	X		Transportation Engineer	X		Mitretek	Engineer	I
24		X	Management Trainee		X	Dean & Co.	Management Consultant	I

25	X		Transportation Engineer	X		R, K & K	Engineer	I
26	X		Management Consultant		X	Boston Consulting Group	Management Consultant	I
27		X		X			Consulting Firm	I
28		X		X			Consulting Firm	I
29	X			X			Consulting Firm	I
30		X		X			Consulting Firm	I
31	X			X			Consulting Firm	I
32		X		X			Consulting Firm	I
33		X		X			Consulting Firm	G
34	X		Engineer	X		HDR	Consulting	I
35	X		Engineer	X		HDR	Consulting	I
36	X		Engineer	X		Wilbur Smith Assoc.	Consulting	I
37		X	Research Scientist	X		Union Switch and Signal	Railway Products and Services	I
38	X		Engineer	X		Conrail	Railway	I
39		X	Ph.D. Studies	X		WVU	University	A
40	X		Not Available	NA		NA	NA	NA
41	X		Not Available	NA		NA	NA	NA
42	X		Not Available	NA		NA	NA	NA
43		X	Not Available	NA		NA	NA	NA
44		X	Not Available	NA		NA	NA	NA
45	X		Consultant	X		Anderson Consulting	Consultant	I
46	X		Systems Engineer	X		Transportation Research Association	Design	I
47	X		OR Analyst		X	Morgan Stanley	Bank	I
48		X	Operations Planner	X		TACA	Airline	I
49	X		Senior Analyst	X		Manugistics	Logistics	I
50	X		Transportation Engineer	X		Cambridge Systematics	Engineer	I
51		X	Ph.D. Candidate	X		UVA	Engineer	A
52	X		Transportation Engineer	X		Kimberly Horn	Engineer	I
53	X		Assistant Professor	X		University of Alabama, Birmingham	Education	T

54	X		Research Scientist	X		VTRC	Engineer	G
55	X		Transportation Engineer	X		R, K & K	Engineer	I
56		X	Transportation Engineer	X		Gannet Fleming	Engineer	I
57		X	Transportation Engineer	X		HDR, Inc.	Engineer	I
58	X		Traffic Engineer	X		Kimley Horn & Associates	Consulting Firm	I
59		X	MS Candidate			VPI & SU	Engineering Program	A
60	X		ITS Systems Analyst	X		Mitretek Systems, Inc.	Non-profit	I
61		X	ITS Engineer	X		Transcore, Inc.	Manuf./Oper. Firm	I
62	X		Instructor	X		PSU	University	A
63	X			X		Compaq Computer Corp.	Global Logistics	I
64	X		Instructor	X		PSU	University	A
65	X		Staff Engineer	X		McMahon Associates	Engineering Firm	I
66		X	Not Available	NA	NA	NA	NA	NA
67	X		Engineering Consultant	X		Sear-Brown Group	Consulting Firm	I
68	X		Engineer	X		Herbert, Roland & Grubek	Engineering Firm	I
69	X		Doctoral Candidate	X		VPI&SU	University	A
70	X		Engineer	X		McCormick Taylor	Engineering Firm	I
71		X	Engineer	X		Missouri DOT	State Government	G
72		X	Senior Specialist	X		E Squared Engineering	Transportation Firm	I
73	X		Transportation Engineer	X		SAIC	Research & Engineering	I
74		X	Ph.D. Candidate			VPI&SU	College of Engineering	A
75	X		Lead Engineer	X		Vehicle Manufacturer	Vehicle Mfg.	I
76	X		Senior Consultant	X		Major Transportation Consulting Firm	Logistics	I
77	X		Transportation Engineer	X		Virginia DOT	Engineer	G
78	X		Transportation .Engineer	X		Univ. of Maryland Ctr. for Advanced Transp. Technology	Engineer	T
79		X	Transportation .Engineer	X		Precision Systems, Inc.	Engineer	I
80		X	Transportation Engineer	X		Jacobs Civil, Inc.	Engineer	I
81		X	Not Available	NA		NA	NA	NA
82		X	Not Available	NA		NA	NA	NA

83		X	Not Available	NA		NA	NA	NA
84	X		Transportation .Engineer	X		R K & K	Engineer	I
85		X	Ph.D.	X		Penn State	Ph.D. Program	A
86		X	Jr. Traffic Engineer	X		AKRF, Inc.	Engineering Firm	I
87		X	Not Available	N/A		N/A	N/A	N/A
88		X	Not Available	N/A		N/A	N/A	N/A
89		X	Not Available	N/A		N/A	N/A	N/A
90	X		Transportation Engineer	X		URS Corporation	Engineering Firm	I
91		X	Engineer	X		Maryland State Highway Administration	State DOT	G
92	X		Traffic Engineer	X		RK&K	Engineering Firm	I
93		X	Not Available	N/A		N/A	N/A	N/A
94	X		Engineer	X		HDR, Inc.	Consulting	I

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)	4
2d.2 Government (G)	6
2d.3 Industry (I)	38
2d.4 Teaching/Academic Research (T)	5
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	01-02	Base	01-02
3.1	Non-Hispanic White	33	10	5071	7276
3.2	Hispanic		0	113	231
3.3	African-American	1	0	318	549
3.4	Asian/Pacific Islander	9	13	344	601
3.5	Native American		0	20	28
3.6	Other	5	0	1473	2740
	Total	48	23	7339	12,261

3.7 Male	29	17	3989	6651
3.8 Female	19	6	3350	5610
Total	48	23	7339	12,261

3.9 U.S. Citizens and Permanent Residents	30	7	5853	7394
3.10 Non-U.S. Citizens	18	14	1486	2099
Total	48	23	7339	9493

*This number must match the total number shown as Indicator 2b.2.

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 2001-02):

Transportation Research Selection	Yr 2001-02
4a.1 Number of Transportation Research Project Proposals Submitted to Center	13**
4a.2 Number of Transportation Research Projects Awarded by Center	13**
4a.3 Total Budgeted Costs for Those Projects	$902,608**
4a.4 Number of Individuals Listed as Principal Investigators* in Those Projects Awarded	8

*Count individual Principal Investigators (PIs). One PI overseeing several projects is counted as one PI. **New projects only. These figures do not include ongoing projects, as reported in prior reports.

Performance Indicator 4b. Provide the number and budgeted costs of all research projects that 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 2001-2002 (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.	3	$320,000
4b.2 Transportation and logistics system operations and management.	2	$100,000
4b.3 Behavioral sciences and human performance.	0	$0
4b.4 Transportation planning, economics, and institutional issues.	4	$185,000
4b.5 R&D resource base.	1	$30,000
PHYSICAL INFRASTRUCTURE:		
4b.6 Construction - Improved design and construction practices, processes, structures, and materials.	0	$0

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.	0	$0
4b.8 Intermodal facilities - Design and construction principles and technologies specifically relevant to modal connection points.	0	$0
INFORMATION INFRASTRUCTURE:		
4b.9 Traffic management - Technologies and systems to maximize infrastructure capacity and improve safety and efficiency, while minimizing environmental impacts.	2	$238,804
4b.10 Fleet operational management - Technologies that facilitate optimal use of vehicles and other assets.	0	$0
4b.11 Intermodal operations - Information technologies that facilitate efficient movement of cargo and people among modes and provide needed information to shippers and travelers.	0	$0
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.	0	$0
4b.13 Fuels - Vehicle fuels and energy sources, including production and delivery systems.	0	$0
4b.14 Technologies involved in inspection, maintenance, repair, disposal and recycling of vehicles.	0	$0
OTHER		
4b.15 (Describe) Continuing Education Courses, MAUTC Scholarship	1	$28,804
TOTAL CENTER RESEARCH	13	$902,608

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 breakout 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 2001-2002	Number of Projects	Budgeted Costs (All Sources)
GOALS:		
4c.1 Safety	11	$522,463
4c.2 Mobility	15	$787,904
4c.3 Economic Growth and Trade	4	$359,884
4c.4 Human and Natural Environment	4	$395,884
4c.5 National Security	2	$202,000
ENABLING RESEARCH:		
4c.6 Human Performance and Behavior	8	$210,000
4c.7 Advanced Materials	1	$48,804
4c.8 Computer, Information and Communication	7	$412,000

4c.9 Energy and Environment	5	$353,608
4c.10 Sensing and Measurement	3	$202,012
4c.11 Tools for Modeling and Design	12	$713,020

MODAL ORIENTATION:		
4c.12 Air	0	$0
4c.13 Highway	25	$1,251,071
4c.14 Maritime	0	$0
4c.15 Rail	2	$90,000
4c.16 Transit	3	$80,523

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 2001-02):

Transportation Research Performance	Yr 2001-02
5.1 Number of Peer-Reviewed Transportation Research Reports and Books Published	36
5.2 Number of Transportation Research Papers Accepted for Presentation at Academic / Professional Meetings	27
5.3 Number of External Awards Received for Transportation Research	12

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 2001-02):

Transportation Technology Transfer and Outreach	Year 2001-02
6.1 Number of Visitors to Transportation Center Website	8,000
6.2 Number of Peer-Reviewed Transportation Research Publications Available on Website	15
6.3 Number of Transportation Outreach Events Conducted for Pre-College Students	13
6.4 Number of Pre-College Students Participating in Those Events	453
6.5 Number of Transportation Seminars, Symposia, Distance Learning Classes, etc., Conducted for Practicing Professionals	6
6.6 Number of Practicing Professionals Participating in Those Events	889

6.7 Number of Transportation Center Newsletters and Other Transportation Periodicals Published	4
6.8 Number of Issues Produced	4
6.9 Total Circulation	4,724
6.10 Number of Transportation Technology Products Deployed	6