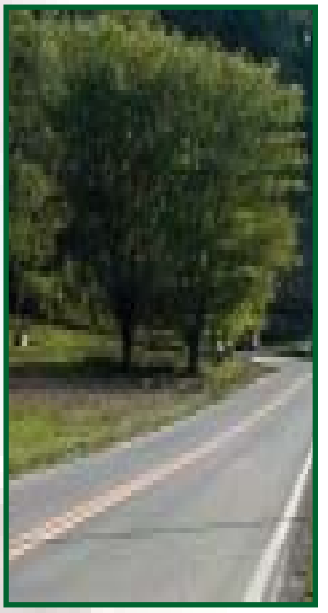
Nick J. Rahall, II

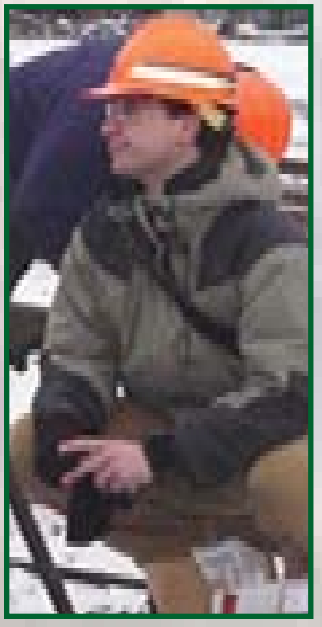
Appalachian Transportation Institute at Marshall University

2001-2002
Annual Report










Transportation and Economic Development in Mountain Regions

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Contents

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Introduction

Left: RTI's July 23, 2001, dedication ceremony included W.Va. Governor Bob Wise, USDOT Secretary Norman Y. Mineta, Congressman Nick J. Rahall, II, Marshall University President Dan Angel and WVDOT Secretary Fred Van Kirk.

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The University Transportation Center at Marshall University was created by a grant specified in the Transportation Equity Act for the 21st Century (TEA-21), which was passed into law by the US Congress June 9,1998, effective through Fiscal Year 2004.

The grant is managed by the Office of Innovation, Research and Education, Research and Special Programs Administration (RSPA), U.S. Department of Transportation (USDOT).

Thirty-three UTCs were funded by the USDOT in TEA-21 and are separated into four Groups (A, B, C and D) with various funding levels and length of funding through TEA-21.

The UTC program was initiated in 1987 under the Surface Transportation and Uniform Relocation Assistance Act and expanded through The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA).

The UTC at Marshall University

Left: National and state government and transportation professionals unveil RTI's new sign.

was dedicated July 23, 2001 as the "Nick J. Rahall, II Appalachian Transportation Institute (RTI)" on behalf of US Congressman Nick J. Rahall, II.

Introduction

The UTC Program

VISION

Internationally recognized centers of excellence, fully integrated within institutions of higher learning, that serve as a vital source of leaders who are prepared to meet the nation's need for safe, efficient and environmentally sound movement of people and goods.

MISSION

To advance U.S. technology and expertise in the many disciplines comprising transportation through the mechanisms of education, research and technology transfer at university-based centers of excellence.

GOALS

1. Education: a multi-disciplinary program of course work and experiential learning that reinforces the transportation theme of the Center.

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.

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

4. Research Selection: an objective process for selecting and reviewing research that balances multiple objectives of the program.

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.

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

Ten of the 33 UTCs, which are designated as Regional Centers (Group

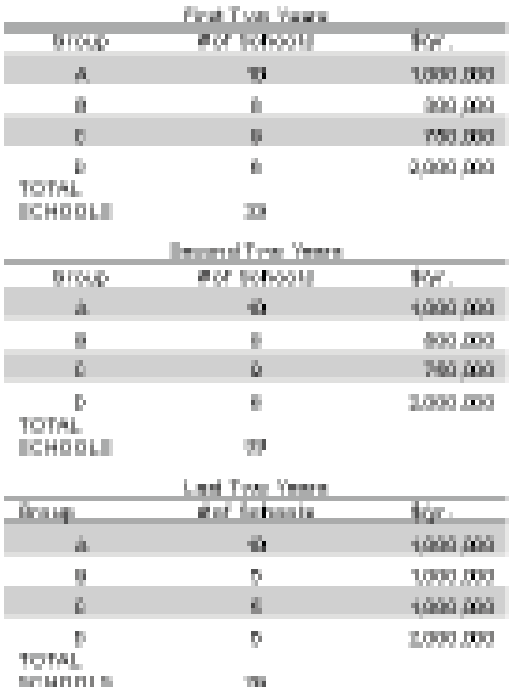
Introduction

A), were selected by competition in 1999. The other 23 UTCs (Groups B,C,D) are located at universities named in TEA-21.

In Fiscal Year 2002, after a limited competition among the named universities, 26 centers will comprise the program.

Interactions between the UTCs occur at least twice each year at regularly scheduled meetings. In some cases, these meetings include the Council of University Transportation Centers, which includes several other institutions involved in transportation research.

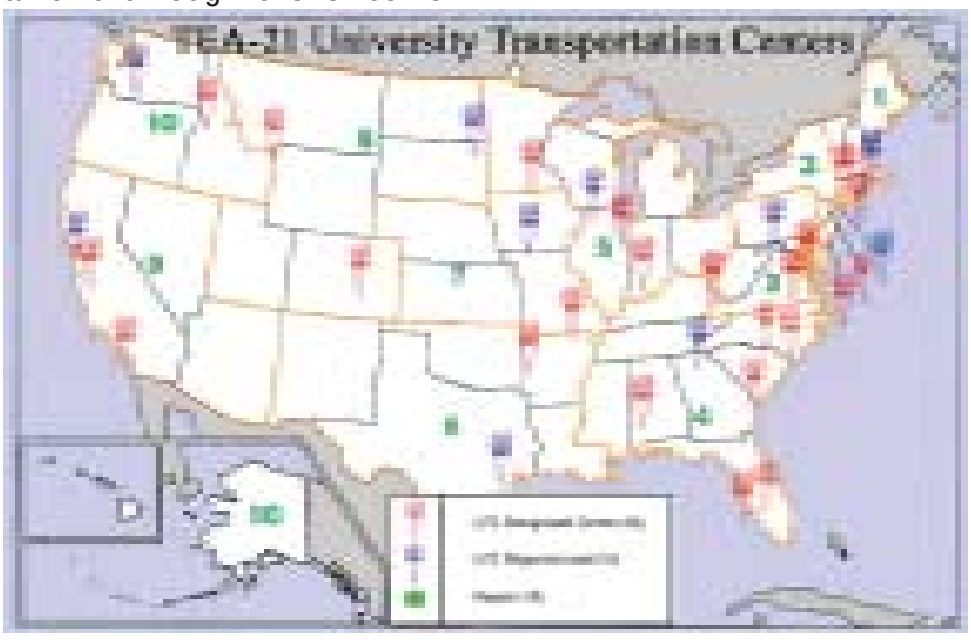
Individual researchers have an outstanding opportunity for partnering through this network on specific projects to complete the expertise needed, in addition to taking advantage of, the technology transfer mechanisms through the UTCs for



** Amount of funding shown subject to change.*

"state of the art assessments."

Marshall University, located in Huntington, W.Va., is one of the six schools in group D. The UTC at Marshall



Left: Shows the approximate location of the UTC lead institutions as of 1999. This network includes nearly 100 institutions of higher learning.

Introduction

Right: Approximate locations of RTI's partner schools are indicated on an outline map of West Virginia.

University may include activities at:

Bluefield State College (BSC), Bluefield, W.Va.;

Mountain State University (MSU) (formerly The College of West Virginia [COWV]), Beckley, W.Va.; and,

West Virginia University Institute of Technology (WVUIT), Montgomery, W.Va.

Partnerships with other schools in West Virginia and elsewhere are developed on a project specific and as needed basis. In addition to academic partnerships, RTI is proactive in developing partnerships with governmental and non-governmental organizations in addition to the private sector to help leverage the federal investment.

All UTCs are required to match federal funds dollar-for-dollar and propose themes for programmatic activities through a Strategic Plan subject to USDOT approval. A list of previous and current UTCs with themes of individual centers has been provided in the following Table.

Introduction

Themes of Current and Previous UTCs

Advanced Transportation Infrastructure: Maintenance and Operation of High Volume Systems	Rutgers University
Advanced Materials and Non-Destructive Testing Technologies	*University of Missouri, Rolla*
Advanced Technologies in Transportation Operations and Management	Pennsylvania State University
Advanced Transportation Systems Simulation	*University of Central Florida*
Advanced Transportation Technology	University of Idaho
Commercial Highway Transportation	*University of Michigan*
Deployment of Intelligent Transportation Systems	George Mason University
Design and Operations of Transportation Facilities and Services in Mid-America	*University of Nebraska, Lincoln*
Human-Centered Transportation Technology	University of Minnesota
Infrastructure Technology	*Northwestern University*
Intermodal Transportation: Assessment, Planning, and Design	University of Denver and Mississippi State University
Management and Safety of Transportation Systems	*University of Alabama*
Metropolitan Transportation	University of Southern California and California State University, Long Beach
Optimization of Transportation Investment and Operations	*University of Wisconsin - Madison*
Planning and Management of Regional Transportation Systems	City College of New York
Policy Guidance of Transportation Management Systems	*San Jose State University*
Productivity Increases Through Transportation Improvements	New Jersey Institute of Technology
Professional Capacity Building in Transportation	*South Carolina State University*
Rural and Intermodal Transportation	North Dakota State University
Rural Transportation	*University of Arkansas*
Rural Travel and Transportation	Montana State University, Bozeman
Safe, Quiet and Durable Highways	*Purdue University*
Strategic Management of Transportation Systems	Massachusetts Institute of Technology
Surface Intermodal Transportation Systems and Advanced Transportation Infrastructure with Special Reference to the Marine Environment	*University of Rhode Island*
Sustainable Transportation Asset Management	Iowa State University
Transit and Alternative Forms of Urban Trans-	*University of South Florida*
	Marshall University
	Assumption College
	North Carolina State University

Introduction

portation
Transportation and Economic Development in Mountain Regions
Transportation and Environmental Education for the Twenty-First Century
Transportation and the Environment
Transportation Operations and Planning
Transportation Safety
Transportation Solutions to Enhance Prosperity and the Quality of Life
Transportation Systems Analysis and Policy
Transportation: A Key to Human and Economic Development
Urban Transit Performance in Small and Rural Areas

Assumption College

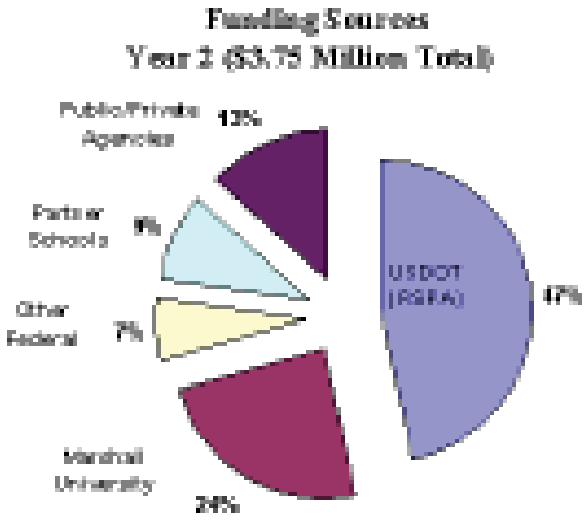
North Carolina State University
University of Washington
University of Tennessee
Texas A & M University

University of California
Morgan State University

North Carolina A & T State University

RTI SOURCES OF FUNDING SINCE GRANT INCEPTION

Appalachian Regional Commission*
Assumption College*
British Petroleum*
Business & Industrial Development Corporation
CSX*
Cabell County Schools
Federal Railroad Administration*
Greater Kanawha Resource Conservation and Development Area*
Huntington Area Development Council
KYOVA Interstate Planning Commission
Lincoln County Econ. Dev. Authority
Meadow Rivers Enterprises, Inc.
Mid-Ohio Valley Regional Planning and Development Council
Norfolk Southern*
Ohio Rail Development Commission*
Putnam County Development Authority
United States Department of Energy
West Virginia Division of Highways*
West Virginia Development Office
West Virginia Public Port Authority*
West Virginia Public Service Corp.*
West Virginia Trails Coalition



Center Theme

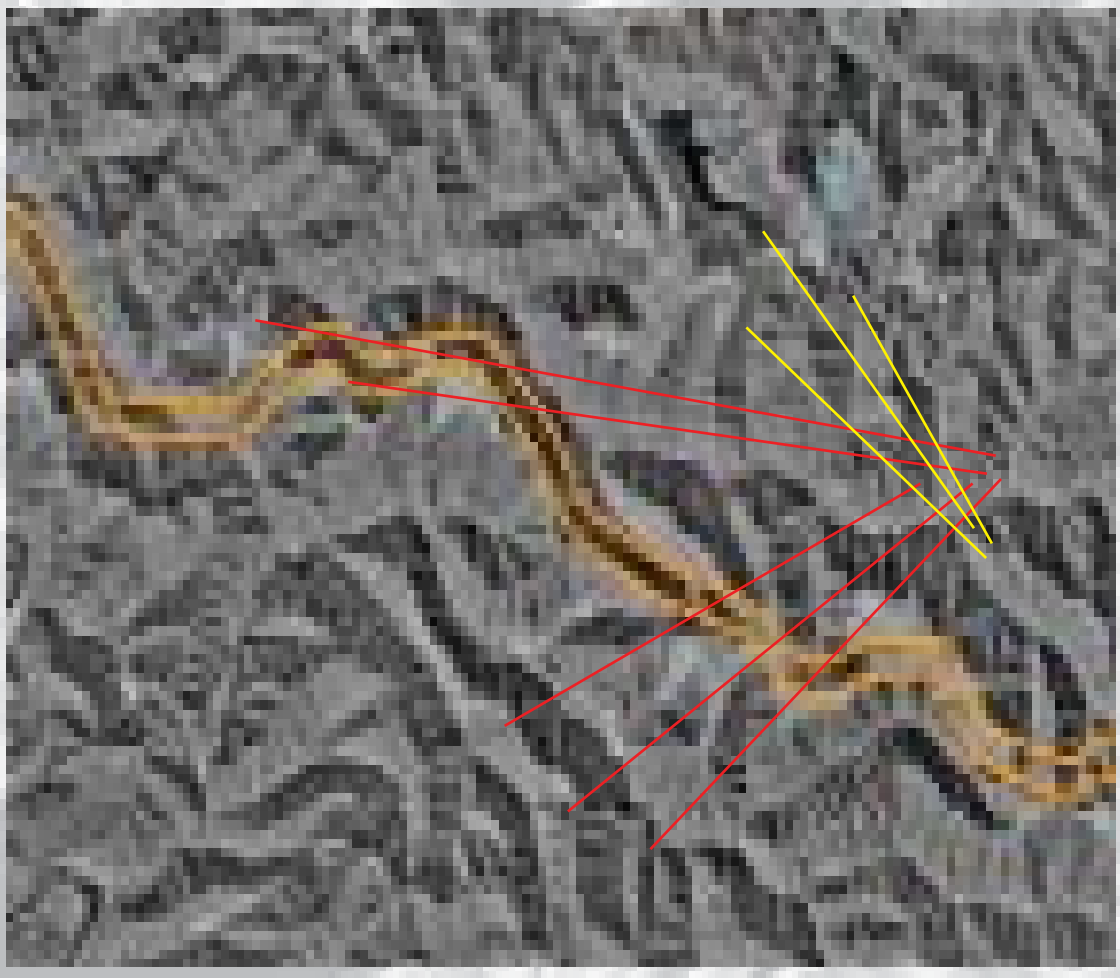
"Transportation and Economic Development in Mountain Regions

The mountainous terrain and dispersed population of Southern West Virginia and other parts of Appalachia have presented and continue to present unique challenges to planning, construction, and maintenance of safe, cost-effective transportation infrastructure.

In addition, the implementation of post-mining land use, which can create flat land suitable for economic development in the region, has been hindered by transportation systems inadequate for commercial and industrial purposes.

RTI has been empowered through its designation as a University Transportation Center to:

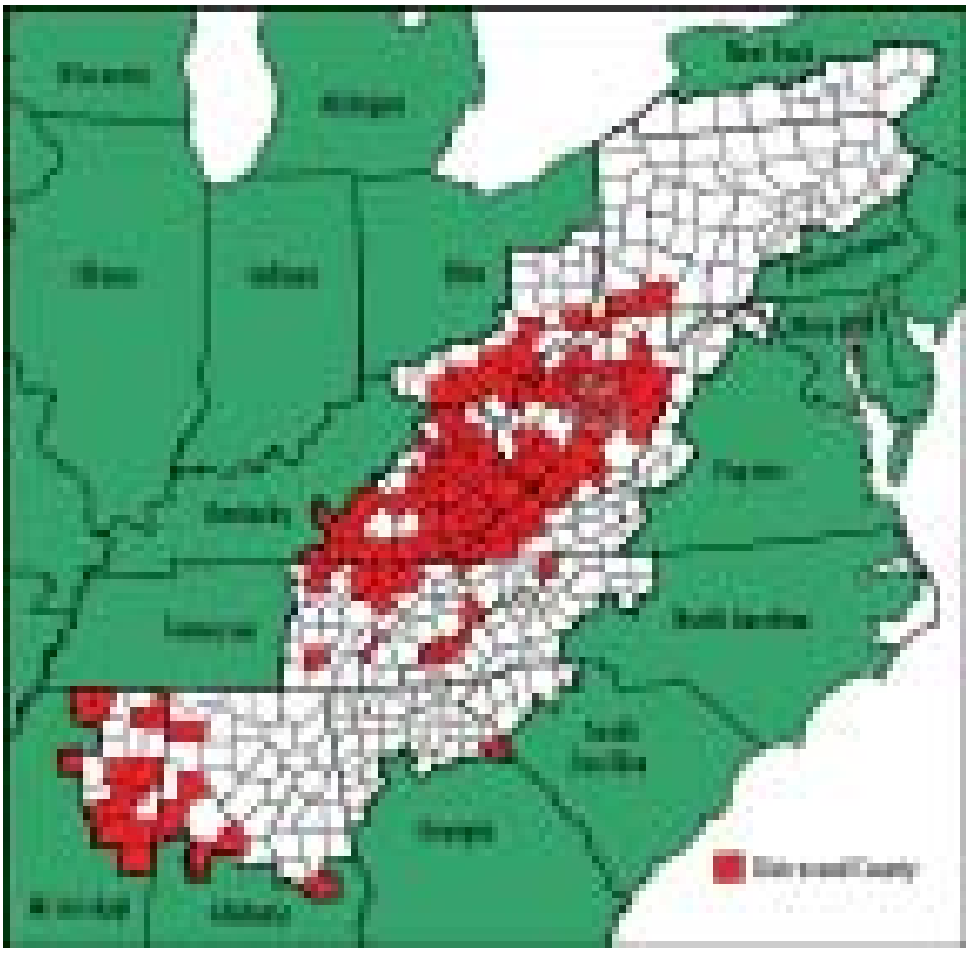
- **Focus a comprehensive, broadly based, multi-disciplinary research, education and technology transfer program, on this region's transportation and transportation related economic development challenges.**



Left: Orange lines indicate the proposed route of the I-73 High Priority Corridor through portions of Southern West Virginia superimposed over high resolution aerial imagery. Red lines indicate rural communities and yellow lines indicate mining activity.

Center Theme

Right: White-shaded areas indicate state and county boundaries that comprise the Appalachian region. Red-shaded counties are economically distressed according to national standards (more than 150% of the national unemployment rate).



- The programmatic activities will include but will not be limited to identifying and deploying the "best available technologies and practices" in case studies that address the socio-economical, environmental and geotechnical uniqueness of the region.

The program results will help ensure that maximum economic benefits can be realized from past and future transportation investments in Southern West Virginia and other parts of Appalachia. Findings will be applicable to other mountainous and rural areas in the United States.

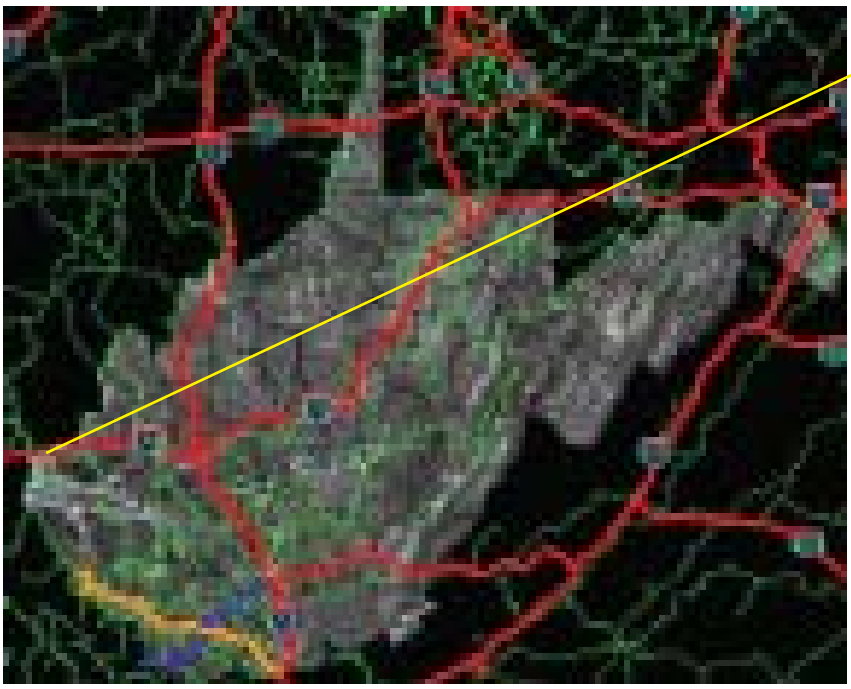
Center Theme

The Appalachian Regional Commission reports:

- 42% of the Appalachian Region's population is rural, compared to 20% of the national population.
- The modern economy of the Region is gradually diversifying, with a heavier emphasis on services and widespread development of tourism, especially in more remote areas where there is no other viable industry.
- Coal remains an important resource, but it is not a major provider of jobs. Manufacturing is still an economic mainstay but is no longer concentrated in a few major industries.

Other resources indicate:

- There is a measurable and well-demonstrated need for significant transportation investment and effective land use policy in the Appalachian Region, especially in Southern West Virginia.
- The number of distressed counties in the region can be partially attributed to a costly surface transportation system that is still under development.
- Multi-modal transportation access and corresponding infrastructure development can be the catalyst for future development of a diverse and equitable economy and increased standard of living for the rural communities.



Above: The yellow line points to the largest inland and river port in the United States, based upon the amount of tonnage transferred over the banks of the Huntington Tri-State Port. Orange and blue lines indicate proposed routes of two new roads in Southern West Virginia and their locations within reference to the National Highway System (indicated by red lines) and Rail Lines (indicated by green lines) superimposed over satellite imagery of the state. Organge lines represent the I-73/74 High Priority Corridor also known as the "King Coal Highway." Blue lines represent the "Coal Fields Expressway." Both corridors have construction, planning and design projects underway.

GRADUATE TRANSPORTATION PROGRAMS

Partnerships between RTI and Marshall University Graduate College (MUGC), MU College of Information Technology and Engineering (CITE) and the MU Lewis College of Business (LCOB), allow students to pursue two new transportation programs, a Master of Science in Technology Management with Emphasis in Transportation Systems and Technologies or a Master of Business Administration with an Emphasis in Transportation and Logistics (Accelerated Executive Program):

Huntington Tri-State Port Statistics (Based upon US Army Corps of Engineers Statistics-1998)

- *Actual River Miles:* ***199 Miles****
- *Active River Terminals:* ***144***

M.S. in Technology Management with Emphasis in Transportation Systems and Technologies

Technology Management combines concepts and methods from management, business, science and engineering, with a specific technology

Education

- *Total Tonnage:* ***81.5 Million Tons***
- *Value of Tonnage:* ***$5.3 Billion***
- *Ohio River -100 miles; Kanawha River- 90 miles; Big Sandy River- 9 miles.*

- Due to an elaborate array of rail lines built many years ago for coal and timber transportation, many surface multimodal opportunities exist.

- RTI headquarters is located in close proximity to the largest inland river port in the US, providing excellent opportunities for case studies related to surface-water mode changes.

Education Goal:

A multi-disciplinary program of course work and experiential learning that reinforces the transportation theme of the Center in addition to an increased number of students, faculty, and staff who are attracted to and substantially involved in the undergraduate, graduate and professional programs of the Center.

- Master of Science in Technology Management with Emphasis in Transportation Systems and Technologies

- Master of Business Administration with and Emphasis in Transportation and Logistics

RTI CO-SPONSORED

Education

emphasis to address organizational needs. The M.S. in Technology Management with an emphasis in Transportation Systems and Technologies integrates course work and experiential learning to prepare students to support transportation systems in Appalachia and the United States.

Assistantships

RTI awards a limited number of Graduate Research Assistantships (GRA) to full-time students pursuing the M. S. in Technology Management degree program and area of emphasis in Transportation. The GRA provides a tuition waiver and a stipend to fully-admitted students who meet eligibility criteria. Graduate students have a unique opportunity to earn and learn of the best practices in the transportation arena.

Courses

Degree requirements consist of 8 core courses (22 hours), 4 area-of-emphasis courses (12 hours), and 1 capstone project (3 hours) for a total of 37 semester hours.

TM 600	Program Introduction Seminar*
TM 610	Technology and Innovation Management*
TM 612	Economic and Financial Analysis*
TM 615	Information Technology Strategies*
TM 620	Technology Planning*
TM 630	Quality and Productivity Methods*
TM 650	Human Resources in Technology Management*
EM 660	Project Management*

4 Area of Emphasis Courses selected from the following options:

SED 550	Traffic Engineering
SED 601	Safety in Transportation
SED 660	Human Factors in Accident Prevention
SED 669	Traffic Safety Management

Education

GEO 510	Urban Geography
GEO 515	Regional Planning and Development
IE 639	Operations Research I
IE 640	Operations Research II
IS 645	Geographic Information Systems
TM 640	Intelligent Transportation Systems*
TM 699	Capstone Project*_ (Required*)

Education

Master of Business Administration with an Emphasis in Transportation and Logistics (Accelerated Executive Program)

Foundations Courses:

MKT 511	Marketing & Management
MGT 500	Statistics/Calculus
ECN 501	Economic Analysis
ACC 510	Financial Accounting
FIN 510	Finance

MBA Courses:

ECN 650* Transportation Economics [Replaces: Managerial Economics-ECN 630] Profit Planning and Controls-ACC 613

MKT 650 Transportation Law and Public Policy [Replaces: LE 691 Government and Business Relationships]

MGT 601 Quantitative Controls in Business MIS 687 Management Information Systems

MGT 672 Theories of Management

MGT 674 Production/Operations Managem ent

MKT 651* Carrier Management [Replaces: MKT 682 Advanced Marketing Management]

FIN 620 Financial Management

MGT 699 Business Policy (Capstone with Transportation Emphasis)*

International Experience:
10-14 Day Study Tour of European Rail and Distribution

*** New Transportation Courses Under Development**

A variety of course sequences and alternatives are available. All course sequences can be completed in two years, except for Alternative 5, which can be completed in 1 year, 9 months. Other alternatives can be pursued as needed. Additional transportation graduate and undergraduate programs are under development.

EXECUTIVE MBA PROGRAM DELIVERY ALTERNATIVES

One Course at a Time Sequences

Alternative 1:
Standard 5 Weeks Schedule
8 hr. Saturday Class
8 hr. Saturday Class
8 hr. Saturday Class
8 hr. Saturday Class
8 hr. Saturday Class
Weekend Off
Repeat

Alternative 2:
Standard 5 Weeks Schedule with Internet
8 hr. Saturday Class
2 Weeks Internet (No Saturday Class)
8 hr. Saturday Class
2 Weeks Internet (No Saturday Class)
8 hr. Saturday Class
Weekend Off
Repeat

Education

Alternative 3:
Condensed 4 Weeks Schedule
- 4 hr. Friday- 8 hr. Saturday
- 8 hr. Saturday
- 8 hr. Saturday
- 4 hr. Friday-8 hr. Saturday
- 2 Weekends Off
- Repeat

Alternative 4:
Condensed 4 Weeks Schedule with Internet
- 4 hr. Friday- 8 hr. Saturday
- 1.5 Weeks Internet (No Saturday Class)
- 1.5 Weeks Internet (No Saturday Class)
- 4 hr. Friday-8 hr. Saturday
- 2 Weekends Off
- Repeat

3 Courses at a Time Sequence

Alternative 5:
Tri-mester (Finish in 1 Year, 9 months)
- 3 Semesters during the Year (Fall, Spring, Summer)
- Take 3 Classes Each Tri-mester
- Each Class Meets 3 Times in Person
- Additional courses are taught via the Internet

Dr. Robert Walker	Chairman, Family and Community Health, School of Medicine
Mr. James Wolfe	Project Engineer, Environmental and Geotechnical Center
Dr. John Willis	Project Associate, Rural Health, School of Medicine

RTI RESEARCH/EDUCATION FACULTY AND PROFESSIONAL ASSOCIATES

Marshall University College of Business

Dr. Mark Burton	Professor of Economics
Dr. Michael Hicks	Associate Professor in Economics
Dr. Marc Simpson	Associate Professor in Economics

Marshall University College of Information Technology and Engineering

Dr. Richard Begley	Professor in Engineering
Dr. Anthony Szwilski	Professor in Engineering
Betsy Dulin, J.D.	Professor and Associate Dean
Dr. Bill Pierson	Professor in Engineering
Dr. Herb Tesser	Professor in Computer Science
Dr. Michael Robinson	Assistant Professor in Engineering

Marshall University College of Science

Dr. Dan Evans	Professor in Biology
Dr. Frank Gilliam	Professor in Biology
Dr. James Joy	Professor in Biology
Dr. Michael Norton	Professor in Chemistry
Dr. Dewey Sanderson	Professor in Geology
Dr. James Brumfield	Associate Profeesor in Geology
Mr. David Cartwright	Associate Professor in Science and Technology
Ms. Linda Hamilton	Assistant Professor
Dr. Liz Murray	Assistant Professor
Dr. Ashok Vaseashta	Assistant Professor

Other Marshall University Entities

Dr. Larry Arbogast	Professor in Geography
Mr. Raymond Busbee	Professor in Park Resources and Leisure Services
Dr. Bill Carter	Professor in Teacher Education
Dr. Mack Gillenwater	Professor in Geography
Dr. Peggy Gripshover	Associate Professor in Geography
Dr. Stan Maynard	Profressor in Teacher Education
Ms. Jennifer Plymale	Director, Robert C. Byrd Center for Rural Health, School of Medicine
Dr. Jim Sottille	Associate Professor in Education Foundations

Education

RTI Graduate Assistants 2000-2001

Name	Major
Artemyev, Roman	Business Administration
Bailey, Josette	
Boggess, Farrah	Chemistry
Boggess, Megan	Geography
Bowe, Nathan	Physical Science
Barrios, Juan de Dios	Technology Management
Bueno, Juan	Business Administration
Channell, Katherine	Physical Science
Chapman, Cristy	Forensic Science
Crawford, Kellie	Education
Durrah, Steven	Geography
Dykes, Ava Caudill	Ph.D. Biomedical Sciences
Estel, Herbert	Adult and Technical Education
Feazell, Erin	Forensic Science
Ferguson, John	Physical Science
Hanna, Afif	Biological Sciences
Jewell, Errin	Journalism
Knubel, Adam	
Lewis, Kim	Counseling
Lewis, Mark	Information Systems
Li, Tianning	Information Systems
Litteral, Theresa	Physical Science
Mills, Randall	Mathematics
Murphy, Kelli	Adult and Technical Education
Bart Naugle	Forensic Science
Pascual, Fernando	Business Administration
Reed, LeAndria	Safety Technology
Robohm, Eric	
Schlenker, Brooke	Physical Science
Skeide, Eline Marie	Business Administration
Simpkins, Irina	Technology Management
Tourre, Mark	Forensic Science
Vance, Amber	Health Care Administration
Vaughn, Kristy	
Ward, Damon	Elementary Education
Williamson, David	Physical Science
Workman, Jason	Environmental Science
Woody, Joshua	Safety Technology
Yoo, Sanghong	
Zhang, Fan	Information Systems

RTI Undergraduate Assistants 2000-2001

Name	Major
Cains, Brad	Integrated Science and Technology
Cook, Timothy	Geology
Day, Kelley	Nursing
Dudding, Greg	Integrated Science and Technology
Gonsowski, Courtney	Environmental Science
Husted, Ursula	Art
Keenan, Benjamin	Undecided
Kennedy, Brooke	Biology
Mwaura, Ab	Physics
Oliviares, Andres	E.S.L.
Plymale, Lauren	Management Information Systems
Robirds, Josh	Integrated Science and Technology
Smith, Ryan	Business Management
Stephens, Charles	Management Technology
Switzer, Timothy	Integrated Science and Technology
Tingler, Jessica	Special Education
Tully, Lance	Geology
Vilet, Jordi	E.S.L.
Walker, Matt	Management Information Systems
Williams, Vanessa	Physics
Zhibin, Sheng	

STUDENT OF THE YEAR

Left: Litteral receives RTI's 2001 Student of the Year Award.

Sean Keith Litteral was born Jan. 28, 1972, in Ashland, Kentucky. Mr. Litteral earned a Bachelor of Science Degree in Geology (1998) and continued his education at Marshall University earning a the Master of Science Degree in Physical Science.

He began working with RTI as a graduate assistant on a project titled: "Endangered Species Identification along Roads, Planned in West Virginia Using Geographic Information Systems and Remote Sensing."

Working with a multi-disciplinary team of Principal Investigators from Biology, Physical Sciences, Geology, Geography and Engineering, Litteral developed an online, integrated image based Geographic Information System (GIS) for Transportation Systems and the Environment.

The system includes satellite imagery for the entire state of West Virginia and higher resolution aerial imagery in certain areas of concern in the state and integrates the imagery with other data such as physical infrastructure and surface coal mining activity. Users can assess this online Geographical Information System (GIS), which is among the first to contain data queries, with little or no GIS experience. The system is under consideration for further development and expansion to provide needed information for all agencies working in transportation and economic development.

Litteral was recently hired as full-time Research Associate with RTI to assist Principal Investigators, provide GIS project assistance and help in the development of GIS-related education and training programs.

Research

The UTC Research Goals Include:

1) an objective process for selecting and reviewing basic and applied research; and

2) a process for judging by peers or other experts in the field to advance the body of knowledge in transporta-

RTI Research Solicitation and Selection Process Flowchart

Request for Preliminary Proposal
(One to Two Pages with Cost Estimate)

Review of Preliminary Proposals
Input from RTI Advisory Council

RTI Executive Committee Invites Full Proposals from Selected Preliminary Proposals

Submittal of Full Proposals by Researchers with Detailed Cost Request

Review of Full Proposal
Ranking from three (3) peer evaluators including an Assessment of Relevance to National Transportation Challenges and to the UTC Theme

Executive Committee Reviews Evaluations and Awards Funding

RTI RESEARCH PROGRAM GOALS

Left: Members of an RTI Project Advisory Team (from left): Barbara Roberts-RTI, Alex McLaughlin-WV Development Office; Scott Hercik-Appalachian Regional Commission (ARC); Norman Roush-WVDOT, Dr. Mark Burton-RTI Principal Investigator, Rob Watson-WVDOT, Ed Terry-ARC, Mark Felton-Business and Industrial Development Corporation, Rebecca Davison-WVDOT, Jon Ventura-FHWA and Vincent Post-Mid-Ohio Valley Planning Commission.

RTI research goals, in addition to objective selection with peer review and monitoring, include performing site specific research projects that can contribute to:

- a reduced design, construction and maintenance costs with improved safety and minimal environmental impacts for the transportation system in the region;
- the identification of the best locations for future industrial parks and initiation of their development;
- ensuring opportunities for concurrent infrastructure and info-structure development during road construction are realized;
- improving access to health care, work and education for rural communities through public transit;
- an enhanced trail/scenic bi-way system that will support continued growth of the emerging tourism industry;
- the development and testing of new technologies and or products that can improve transportation safety and efficiency in rural settings and support the diversification of the regional economy simultaneously;
- assistance in the preparation of the future transportation workforce in the region.

RTI seeks to leverage its federal funding through a variety of sources, and in certain cases a traditional cyclical solicitation process may not be able to incorporate all of the opportunities to assist in doubling the value and acceleration of the institutionalization of the UTC.

Examples may include, but may not be limited to: the opportunity to respond to requests for proposals from non-federal entities; availability of non-federal funding to resolve local climatic emergencies and or issues related to safety of the motoring public; certain private sector and or non-governmental agency partnership opportunities and projects of the transportation technology demonstration and/or transfer nature in addition to projects that may have a positive impact on the transportation workforce.

However, consistency with the RTI theme, staff expertise, research goals and general goals of the UTC program are always considered. Projects that materialize from this approach will include a project advisory team from project conception to completion. Representatives from the Federal Highway Administration will be included in all research projects considered for funding with UTC funds.

RTI RESEARCH PROGRAM OVERVIEW

FOCUS AREAS	TYPES OF PROJECTS RECENTLY COMPLETED, ONGOING OR UNDER DEVELOPMENT
Socio-Economical/Political tion	Commodity Flows and Transportation Infrastructure Assessments *Transportation Planning, Financing and Public Policies* Rural, Intermodal/Public Transportation Issues *Land Use Planning* Tourism and Recreational Travel *Rural Transportation Safety*
Geotechnical/Environmental *ments*	Wetland Mitigation *Endangered Species Assessments* Rock Cut/Slope Stability *Inventories and Health Risk Assessments from Abandoned Tires* Tunnel Expansions *Rail Track and Road Bed Stability*
Technology/ Transportation Product Development/Testing nolo-	Geographical Information Systems/ Mapping Technologies *Automatic Vehicle Tracking in Rural Settings* Integration of Remote Sensing Technologies *Optimizing Recoverable Materials in Transportation Components* Intelligent Highway Signage with Improved Visibility and Energy Savings
Transportation Research Initiation	Small start-up grants within the areas above.

RTI Research Project Summaries

Use of Electroluminescent Technology for Highway Signage

Objectives for this project are to develop a suitable prototype for highway signs based upon electroluminescent technology and to assess the economic development potential from the successful integration of this technology into the national transportation system.

RTI TRP 99-06

Potential Uses of Fly Ash and Other Recoverable Materials in New Transportation Infrastructure Components

This project will develop and assess candidate prototypical applications for developing transportation and infrastructure components using recoverable materials. Initial emphasis will be placed on creating concrete railroad ties using coal combustion by-products (CCPS) including fly ash; however, using the materials to make other concrete-like transportation components will also be addressed. In addition, preliminary stability analysis of the prototype will be performed with computer modeling software.

RTI TRP 99-07

Rock Fall Rating, Evaluation and Data Management Systems for Highway and Railway Rock Slopes

Using technologies such as laser scanning, electromagnetic induction, GPS and GIS systems, this project developed methodologies for evaluating the safety of rock cuts and slopes.

RTI TRP 99-08

Abandoned Tire Health Risk Survey/Analysis

Researchers for this project will locate, identify and inventory abandoned tire sites in Nicholas County, W. Va., and assess the health risks to the citizens from mosquitoes that breed at these abandoned tire dumps. Findings from the project will provide the WVDOT with additional information on the locations and characterizations of abandoned tire pile accumulations.

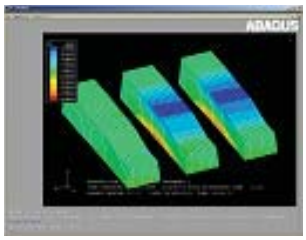
RTI TRP 99-09

Establishment of Pre-Construction Baseline Data as a

Research

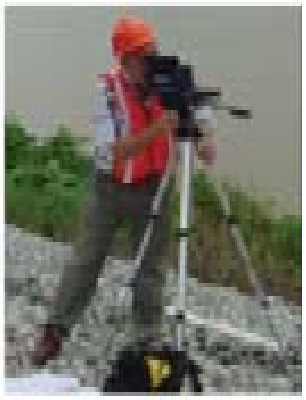
RTI TRP 99-00
Commodity Flows and Transportation Inventory for 13 Counties in Southern West Virginia
This project gathered information that describes commodity flows and cost of transportation services and identified inter-modal infrastructure improvements that may reduce transportation costs for a 13-county region in Southern W.Va.

RTI TRP 99-01
Automated Road Extraction and Update System
This project will aid in the development of an automated road extraction and update system (AREUS), which can recognize and extract roads, bridges, railroads and similar transportation-related structures from satellite imagery.



RTI TRP 99-02
Preserving Branch-Line Railroad Capacity in Southern W. Va.
This project identified branch rail lines most likely to be abandoned in response to diminished coal production in Southern W.Va. and evaluated available alternatives to maintaining the branch line capacity in that region.

RTI TRP 99-03
Lincoln County Transportation Project
This project will assess, develop and evaluate an efficient inter-modal transportation system for access to health care using currently available public vehicles for rural and economically-depressed areas in Lincoln County, W.Va.



RTI TRP 99-04
An Assessment of Site-Specific Geotechnical, Spatial and Climatic Parameters that Influence the Integrity and Stability of Railroad Track
This project will aid in the development of an improved integrated system for monitoring the stability of railroad tracks using remote sensing instrumentation including ground-penetrating radar and laser interferometry.

RTI TRP 99-05

Research

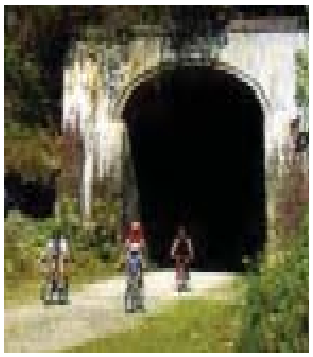
Control for Evalution of the Long- Term Success of a Mitigated Constructed Wetland Site (Case Study along the Tolsia Highway)

The objective of this proposal is to establish pre-construction baseline data for the US 52 (Tolsia Highway) wetland mitigation site in Wayne County, W.Va.

RTI TRP 99-10

Endangered Species Identification Along Roads Planned for W.Va. Using GIS

This project will establish the infrastructure for a web-delivered, interactive mapping system developed from satellite imagery and integrated with Geographical Information Systems (GIS) that will locate endemic, threatened or endangered species affected by transportation systems in W.Va.



RTI TRP 99-11

Maximizing Economic Benefits from a Rails to Trails Project in Southern W.Va.: Case Study of the Greenbrier River Trail

This project collected data from trail users surveys and public meetings to determine the economic feasibility of creating a "Rails to Trails" project in Greenbrier County, W.Va. Results from this project may be used to identify and expand the local economic impact of recreation trail systems in other W.Va. locations and to mobilize community support in the marketing and promotion of such trail systems.

RTI TRP 99-13

Commodity Flows in Northern W.Va.

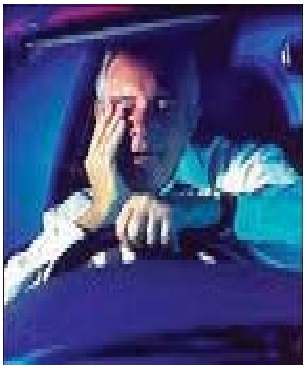
This project will gather information describing commodity flows and the cost of transportation services and identify inter-modal infrastructure improvements that could reduce transportation costs for a 19-county region in Northwestern West Virginia.

RTI TRP 99-14

Drowsy/Fatigued Driving: Prevelance and Under-

Research

Reporting in W.Va.
This project will first compare accident data related to drowsy driving in W. Va. to data from the remainder of the United States and then suggest preventive strategies including targeted outreach activities to reduce drowsy-driving accidents.



RTI TRP 99-15
Impacts of the Appalachian Corridor on Small Business Development
This project will develop statistical methodology capable of estimating the relationship between micro-business development and access to highway transportation in Appalachia.

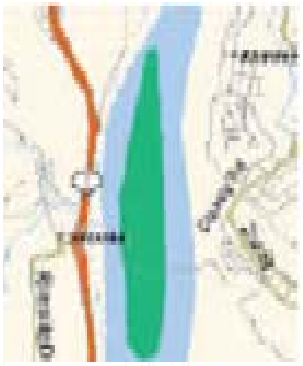
RTI TRP 99-16
McDowell County Transportation Project
This project will assess, develop and evaluate an efficient inter-modal transportation system for access to health care using currently available public vehicles for rural and economically depressed McDowell County in Southern West Virginia.

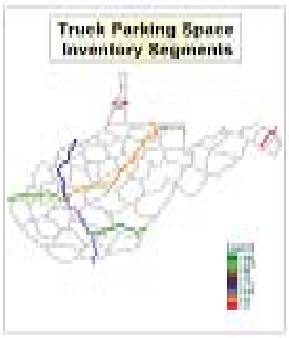
RTI TRP 99-17
Magnetic Levitation Transportation and Economic Development Opportunities for W.Va.
This project will review the various applications of magnetic levitation around the United States and assess its applicability as a potential mode of transportation in W. Va.

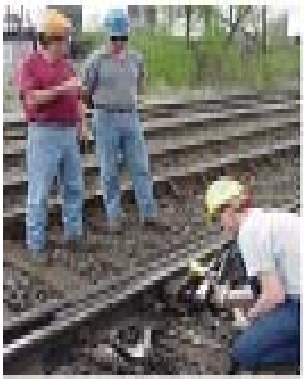
RTI TRP 99-18
ITS Research Initiation Project
This project will review a variety of Intelligent Traffic Monitoring Systems and suggest the most applicable project to propose a demonstration project in Huntington,W.Va. Findings may provide a better and interactive navigation mechanism to facilitate the increasing traffic flow in W. Va. and other areas.

RTI TRP 99-19
Public/Private Port Case Studies

Research







The proposed research is aimed at assessing the economic efficiency of public port development with the hope of clarifying the roles that might be best played by public and private sector entities.

RTI TRP 99-23
Survey of Truck Parking Places (Private) in W.Va.
This project sought to conduct a survey of available public and private parking spaces and the amenities available at each site in W.Va. It also reviewed the designs of current rest areas to determine possible upgrades that would increase parking and amenities and reviewed the design of the DOH weigh stations for innovations to allow for better use of the surrounding acreage and improvements to the overall facilities.

RTI TRP 99-24
Railroad Tunnel Size Restrictions
This project will identify the costs and benefits of modifying railroad trackage to accommodate double-stack equipment by increasing the size of railroad tunnels in W.Va.

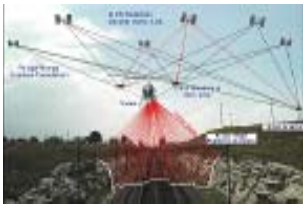
RTI TRP 99-25
Bolt Installations at Railroad Crossings
This project will identify, develop and test procedures for reduciing maintenance costs and reducing safety risks at railroad crossings as a function of the bolt and nut connections currently employed.

RTI TRP 99-26
Beckley Exhibition Mine Expansion: Project Management and Evaluation for a Transportation Enhancement Project to Be Built along a National Scenic Byway in W.Va.
The objective of this project is to provide project management assistance for a Southern West Virginia community to ensure environmental quality and logistical feasibility for a transportation enhancement project along the Coal Heritage Trail. The project will also propose a model to other transportation enhancement projects that will be constructed along this National Scenic Byway related to matching funds determinations and project selection processes.

RTI TRP 99-27

Research

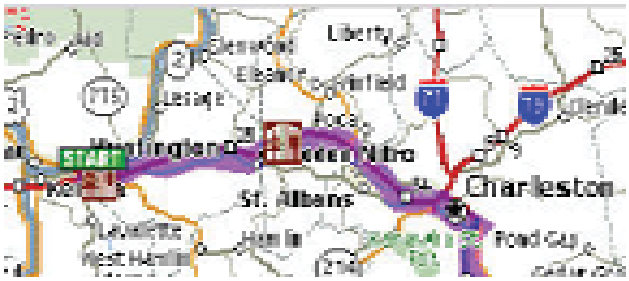
Using FLI-MAP Technology for Transportation Applications: Research Initiation Demonstration Project



This project will review the uses of FLI-MAP software by various states' Departments of Transportation and identify steps for the West Virginia Department of Transportation to consider how to implement this technology in work completed by the West Virginia Division of Highways.

RTI TRP 99-29

Development of a Plan for a Non-Motorized Transportation Corridor in Southern W.Va.: Case Study for Alternate Sources of Transportation between Huntington and Charleston



The objective of this project is to explore the possibility of developing a "greenway," or non-motorized transportation corridor, between Charleston and Huntington W.Va. The proposed greenway will contain natural, open space, bikeways and walking or jogging paths.

RTI TRP 99-32

Development of a GIS Implementation Strategy for WVDOT

This project will review the uses of Geographical Information Systems (GIS) software by various states' Departments of Transportation and identify steps for the WVDOT to consider for GIS implementation

RTI TRP 99-33

Major Corridor Financing Options

This project will identify options used around the United States to finance major corridor construction and assess the applicability for consideration and implementation in West Virginia. This study will help provide the most cost effective plan to help acquire critically needed improvements in the transportation infrastructure of some of the most rural and economically depressed regions in W.Va. with applicability to similar regions in the United States.

Technology Transfer Goal:

Technology Transfer

In addition to research papers, technical reports and conference proceedings, RTI maintains a website to promote programmatic activities and to archive and disseminate research results.

RTI also sponsors workshops and seminars to promote the transfer of transportation technology and information from experts in the field to practicing transportation professionals, UTC researchers, UTC student assistants and K-12 students.

Peer Review Papers and Technical Reports as a Result of UTC Funding

Papers Presented or to be Presented

Herbert Tesser, Ph.D., Marshall University; and Theo Pavlidis , Computer Science, SUNY—Stony Brook. *RoadFinder Front End: An Automated*

Technology Transfer

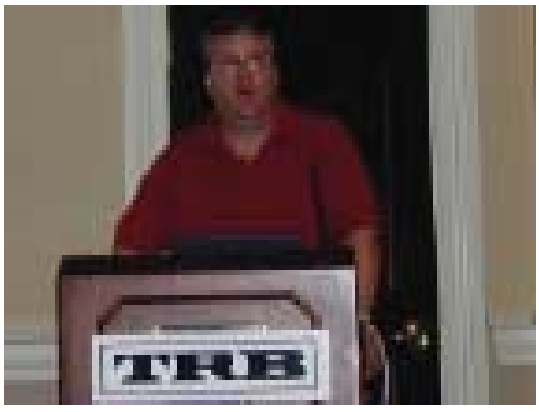
Availability of research results to potential users in a form that can be directly implemented, utilized or otherwise applied.

Road Extraction System., Paper presented at 15th International Conference on Pattern Recognition, ICPR 2000. September 3-8, 2000, Barcelona (Spain).

Mark L. Burton, Ph.D., *Measuring the Cost Of Incremental Railroad Capacity: A GIS Approach,* presented to the Transportation and Public Utilities Group of the American Economics Association, March 21-22, 2002, Atlanta.

Mark L. Burton, Ph.D., *Improving Access to Rail/Highway Intermodal Transport: Lessons from West Virginia,* Transportation and Economic Development 2002 (TED2002), May 5-7, 2002, Portland, Oregon, Transportation Research Board.

Mark L. Burton, Ph.D., *Assessing Transportation-Related External Costs: Valuing Decreases in PM-10 Emissions due to Mode Switching,* Transportation and Economic Development 2002 (TED2002), May 5-7, 2002, Portland, Oregon, Transportation Research Board.



Michael J. Hicks, Ph.D., *The Impact of Appalachian Highway Corridors on the Scope of Small Business Activity*, Transportation and Economic Development 2002 (TED2002), May 5-7, 2002, Portland, Oregon, Transportation Research Board.

Marc W. Simpson, Ph.D., *Highway Financing: Alternatives, Mixes, Sustainability and Public Policy*, Transportation and Economic Development 2002 (TED2002), May 5-7, 2002, Portland, Oregon, Transportation Research Board.

Robert B. Walker, M.D., *Transportation-related Barriers to Medical Care: A Grant Supported Study of a Rural West Virginia County,* Transportation and Economic Development 2002 (TED2002), May 5-7, 2002, Portland, Oregon, Transportation Research Board.

Francisco Lezaun De Ubago and Fernando Pascual, *A Dynamic Model for Studying Comfort on Locomotives Mounting Nose-Suspended Motors.* 5th Congress on Transportation Engineering (CIT 2002), June 11-13, 2002 Santander, Spain.

Fernando Pascual, Emilio Larrodé Pel-

licer, Luis Castejón Herrer, Richard Begley and Tony Szwilski, *A Numerical Model for Analyzing a Concrete Crosstie's Resilient Pad Under Heavy Haul Traffic Conditions.* 5th Congress on Transportation Engineering (CIT 2002), June 11-13, Santander, Spain.

Tony Szwilski, Ph.D., and Richard Begley Ph.D., *Evaluating Geophysical Technologies for Real-Time Assessment of Near-Surface and Subsurface Conditions***.** 7th International Symposium on Environmental Issues and Waste Management in Energy and Mineral Production Conference (SWEMP 2002), October 7-10, Cagliari, Sardinia, Italy.

Technical Reports

Richard Begley, Ph.D., Anthony Szwilski, Ph.D., John Ball, P.E. and Fernando Pascual: *Improving Safety and Operational Conditions at Railroad Crossings—An Analysis of Bolt Installations, Designs and Torque Procedures* (November 2001).

Richard Begley, Ph.D., Anthony Szwilski, Ph.D., John Ball, P.E. and Fernando Pascual: *Briefing Report: Integrated Track Stability Assessment and Monitoring System:(ITSAMS).*

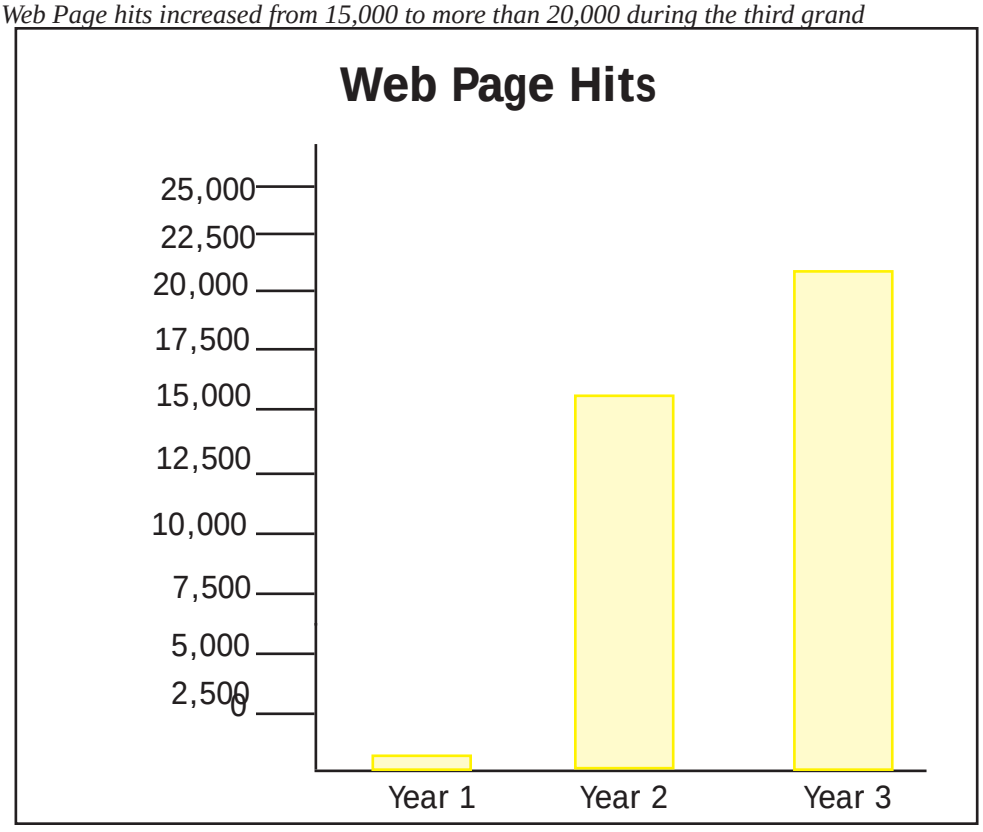
Mark L. Burton, Ph.D. *Transportation and the Potential for Intermodal Efficiency Enhancements in Western West Virginia***.** Final Phase I Report (May 2000). Final Phase II Report (November 2000).

Raymond L. Busbee, Ph.D. *Maximizing Economic Benefits from a Rails-to-Trails Project in Southern West Virginia—A Case Study of the Greenbrier River Trail*. (May 2001).

RTI Web Page

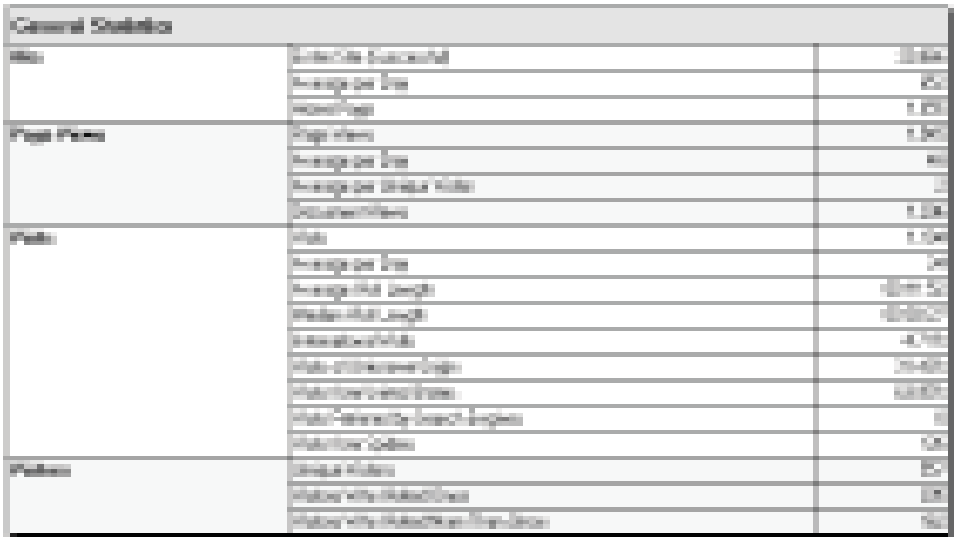
Left: The number of hits from unique visitors to RTI's home page is indicated in the bottom left corner of the frame.

Left: Web Page hits increased from 15,000 to more than 20,000 during the third grand year; hits increased from 750 to over 15,000 during the second year.



Technology Transfer

Right: General Statistics about visitors to RTI's website are listed.



General Statistics		
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Technology Transfer

Transportation Professional Development Seminars

Transportation professional development courses, seminar series, workshops and conferences allow practitioners, UTC researchers and students to hear from experts in the field, network with others and identify new resources while earning Continuing Education Units (CEUs).

Year 3 Transportation Development Courses

Railroad and Highway Traffic Safety and Operations Seminar, April 9-10, 2002

Advanced Urban Travel Demand Forecasting, March 12-15, 2002

Computerized Traffic Signal Systems, March 5-7, 2002

Advanced Techniques for Managing Roadway Emergencies, Feb. 19-20, 2002

Using the National Intelligent Transportation System (ITS) Architecture for Deployment, Oct. 31-Nov.1, 2001

Train the Trainer for the Transportation Industry Workshop, Sept. 19-21, 2001

Year 3 Transportation Seminar Series

Geological Hazards in Transportation in the Appalachian Region
Chaired by: Dr. Tony Szwilski;
Presented by: Thomas Hopkins, Thomas Berg, Rick Ruegesser, Carl Ealy, Richard S. Olsen and Gerald Wieczorek, Aug. 7, 2001

Traffic Crashes: What We Know, How We Know It, What Can Be Done
Presented by: Dr. Leonard Evans, President, Science Serving Society, Oct. 17, 2001

Technology Transfer

Technology Transfer

K-12 OUTREACH WORKSHOPS

Goal: To nurture a new generation of transportation professionals by introducing transportation issues during the school years and to encourage students to consider transportation-related careers later in life.

LEGO DUPLO Activities

RTI instructors use LEGO DUPLO blocks to introduce basic transportation concepts to pre-K through third grade students during workshops and other activities.

Younger students (ages 3-5) learn to assemble vehicles, tracks and cargo carriers from pictorial charts and LEGO DUPLO blocks. After creating railroad or highway systems, students move “cargo” from one location while factoring time, distance and weight into the transportation process.

Older students (ages 5-8) receive transportation-related “story challenges,” which must be solved using LEGO DUPLO blocks. The students use LEGO CAD to design vehicles or simple machines, which contain gears, levers or pulleys, to solve the “story challenges.”

Technology Transfer

Left: Students from local elementary and middle schools assemble ITS vehicles from LEGO DACTA kits.

Intelligent Transportation Systems with LEGO Robotics Workshops

ITS experts instruct middle school students to assemble and program intelligent vehicles and automated traffic control and monitoring devices in week-long workshops sponsored by RTI.

Students assemble vehicles and traffic control components from LEGO DACTA kits and install microcomputers, light sensors, digital timing devices and motors.

Using ROBOLAB software, students write computer programs that instruct the microcomputers to operate the vehicles and traffic control devices, which include gates, signals and speed measuring devices.

Top Left: After constructing a vehicle and installing an RCX computer chip, students write computer programs using ROBOLAB software and download them to the RCX chips. Bottom Left: A team of students from Barboursville Middle School construct an ITS traffic gate that contains a device programmed to measure speed.

Technology Transfer

Exploring Engineering Academy

Right: Future engineers from local high schools who attended MU CITE's Exploring Engineering Academy visited the John Amos Power Plant. Below Right: EEA students construct a trebuchet from PVC pipe.

Thirty-two juniors from area high schools participated in a weeklong workshop after being chosen on the basis of written essays and academic achievement.

Sponsored by the Marshall University College of Information Technology and Engineering, RTI and local businesses, the academy encourages students to explore careers in engineering by allowing them to participate in hands-on engineering activities, tour engineering-related facilities and interact with professional engineers.

Attendees participate in team design and building competitions that highlight engineering concepts and careers in civil, mechanical, chemical, robotic, electrical and hydraulic engineering. Participants learn to incorporate concepts such as effectiveness, safety, cost and appearance into designs.

Tours of the New River Gorge Bridge, Bluestone Dam, Robert C. Byrd Center for Flexible Manufacturing and the U.S. Army Corps of Engineers Robert C. Byrd Locks and Dams complex allow students to see engineering concepts applied in professional settings.

Technology Transfer

Transportation Outreach on the Web

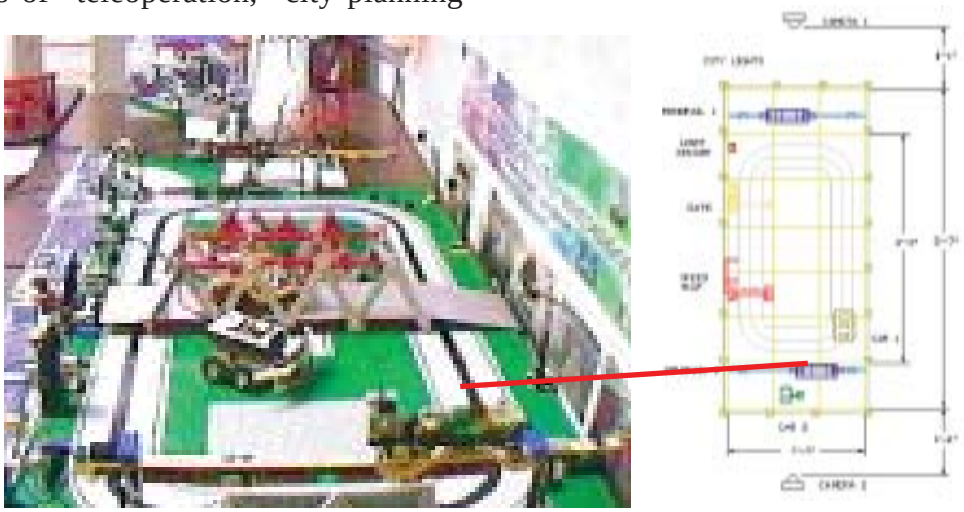
RTI's Design a Future Vehicle (DAFV) website contains information for students, parents and teachers about the six technologies of transportation used to create vehicles and road systems. Lesson plans that integrate transportation concepts into subjects including math, science, social studies, language arts and computer technology are available at the DAFV Teacher's corner.

Visit RTI's Design a Future Vehicle Workshop Website and DAFV Teacher's corner at http://www.marshall.edu/ati/dfv/teacher/index.htmlx.

Technology Transfer

Intelligent Transportation Systems - LEGO Robotics City

Middle school students learn the concepts of "teleoperation," city planning and traffic control through AppaLEGO City, a robotic model city located at RTI headquarters. AppaLEGO City includes an oval track, monorails, a traffic gate, an autonomous vehicle, traffic lights and a gated bridge. City components are constructed from LEGO bricks and contain RCX microcomputer chips that are programmed with ROBOLAB software.



Right: The red line shows an ITS monorail as seen from AppaLEGO City (viewed from web camera 2) and indicated on a schematic drawing.

Two web cameras provide continuous live views of the city, which can be teleoperated after Red Rover Operating System software is downloaded from RTI's website. The software facilitates interactive e-mail exchanges between visitors and RTI operators. This software also directs components, such as the monorail, to move back and forth or for the gate to open and close.

Red Rover's computer programming process requires operators to string together command icons and is identical to some professional software packages The software also facilitates interactive e-mail exchanges between visitors and RTI operators.

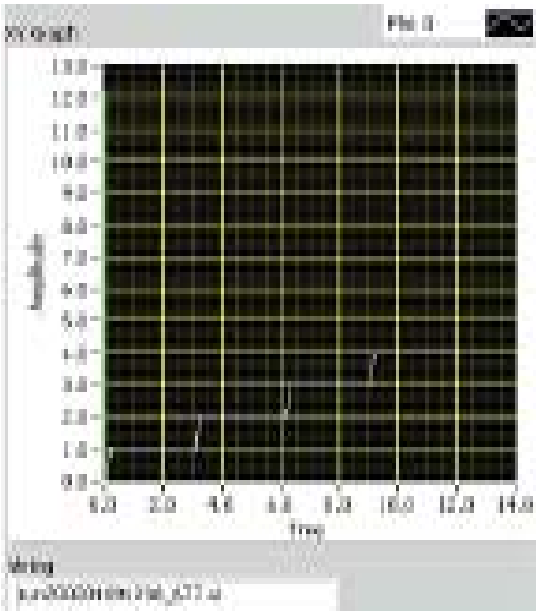
Far above: The Red Rover Operating System control screen facilitates interactive e-mail exchanges from visitors with RTI operators. The system has control buttons that operate the monorail forward or backward. Programs may be written and sent to the system to perform more advanced operations such as opening the traffic gate or moving the monorail multiple times.
Above: Students from Miller Elementary can be seen in the screen from a direct video link to the school.

Technology Transfer

Science and Engineering NASA Site of Remote Sensing (SENSORS City)

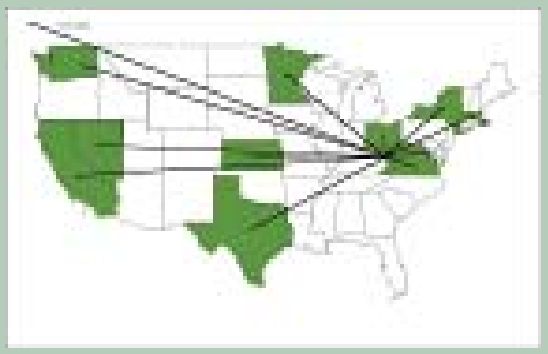
Through the Science and Engineering NASA Site of Remote Sensing (SENSORS) City, students use sensors to obtain feedback related to operation, control and "teleoperation" of intelligent vehicles and traffic control devices. Students use the SENSORS site to send computer programs to operate ITS components, which can be seen through a typical web connection and requires no special operating software.

After a program or "mission" is submitted, the system returns results, which include graphs that illustrate data collected by the sensors, such as changes in direction, temperature, light or elevation. Computer programming challenges and competitions for students who have ROBOLAB software are also posted on the SENSORS Site.

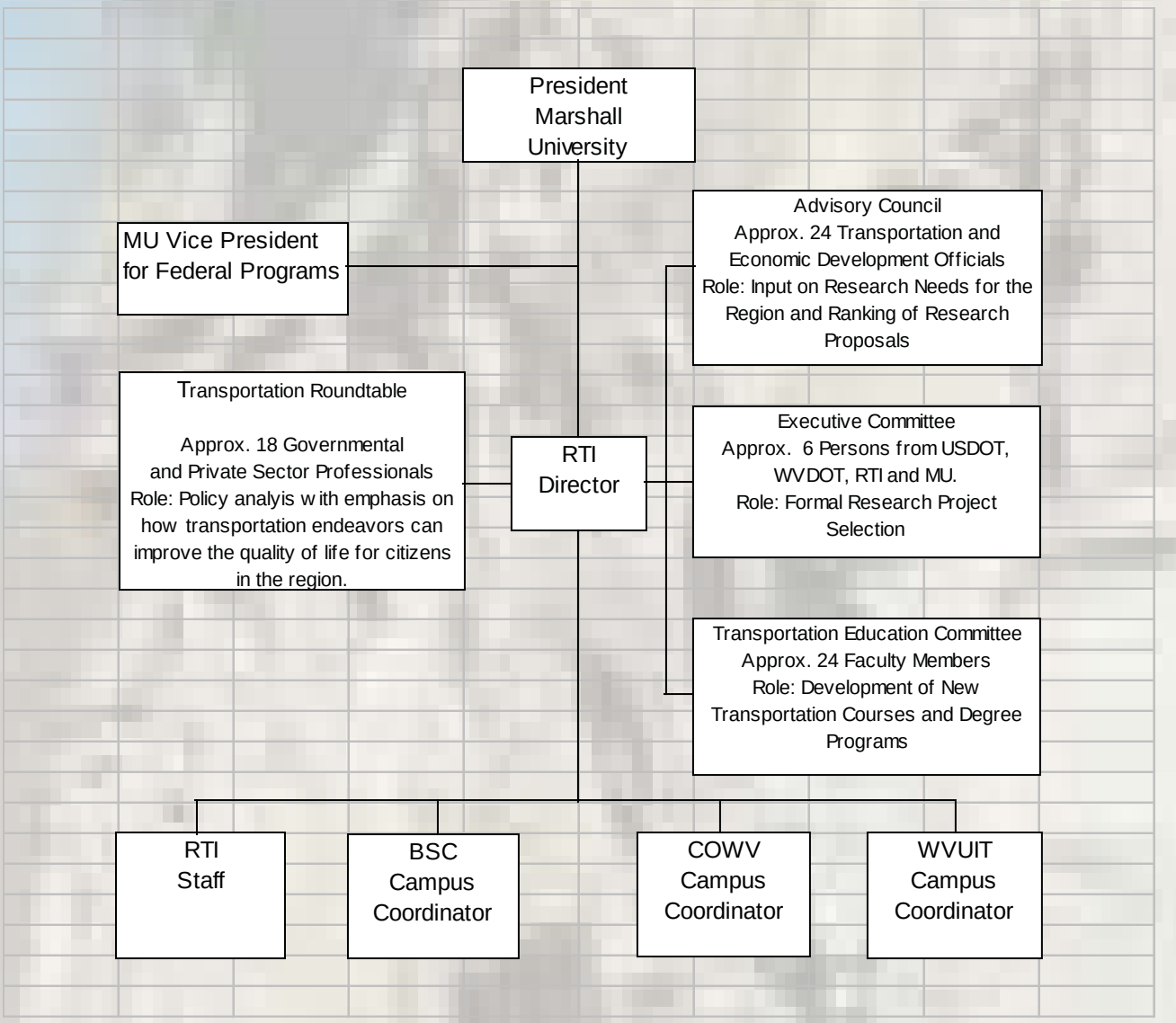


Left: This program can be downloaded and submitted to the SENSORS City web site to tell the monorail to move back and forth two times. Note: the computer programming process is identical to some high level professional programming software packages i.e. objects or icons representing computer commands are stringed together as opposed to written computer commands.

Above: Shows the resultant graph that is returned to the sender if the program executed properly. In this case, the graph shows four steps over time indicating that the monorail sensed it came into contact to the end of the monorail track four times.For example, if the monorail did travel back and forth two times it would have come into contact a total of four times with the end of the track.
Below: Shows the location of SENSORS City "mission submitters." The ages of the students range from middle school to high school.



Management Structure



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Project Listing

Number	Title	Principal Investigator
ONGOING		
99-01	Automated Road Extraction Using Satellite Imagery	Dr. Herbert Tesser
99-02	Preserving Branch Line Railroads	Dr. Mark Burton
99-03	Lincoln County Transportation Study	Dr. Mark Burton
99-04	Integrated Track Stability Assessment and Monitoring	Dr. Richard Begley
99-05	Use of Electroluminescne Technology for Highway Signage	Dr. Richard Begley
99-06	Potential Uses of Fly Ash and Other Recoverable Materials in New Transportation Infrastructure Components	Dr. Anthony Szwilski
99-07	A Rockfall Rating System for Slopes along Highways in W.Va. and Ky.	Dr. Anthony Szwilski
99-09	Pre-Construction Assessment of Wetlands to be Built along the Tolsia Highway	Dr. Mike Robinson
99-10	Endangered Species Identification along Corridors Using GIS	Dr. Mike Little
99-13	Commodity Flows in Northern W.Va.	Dr. Mark Burton
99-14	Drowsy Driving Problems in W.Va.	Dr. Robert Walker
99-15	Impacts of the Appalachian Corridors on Small Businesses	Dr. Michael Hicks
99-16	McDowell County Transportation Study	Ms. Jennifer Plymale
99-17	Magnetic Levitation Planning for W.Va.	Dr. Richard Begley
99-18	ITS Research Initiation Project	Dr. Ashok Vaseashta
99-19	Public/Private Port Case Study	Dr. Mark Burton
99-23	Survey of Truck Parking Places (Private) in W.Va.	Ms. Jennifer Plymale
99-24	Railroad Tunnel Size Restrictions	Dr. Mark Burton
99-26	Beckley Exhibition Mine Expansion: Project Management and Evaluation for a Transportation Enhancement Project to be Built along a National Scenic By-way in W.Va.	Dr. Richard Begley
99-27	Using FLI-MAP Technology for Transportation Applications: Research Initiation Project	Mr. Bruce Mutter
32	GIS Implementation Strategy for	Dr. Herbert Tes-

Project Listing

99-33	Highway Program Finance Options and Strategy	Dr. Michael Hicks

COMPLETED

99-00	Commodity Flows and Transportation Inventory	Dr. Mark Burton
99-08	Abandoned Tire Health Risk Survey/ Analysis	Dr. James Joy
99-11	Maxamizing Economic Benefits from a Rails to Trails Project in Southern W.Va.: A Case Study of the Greenbrier River Trail	Dr. Raymond Busbee
99-25	Improving Safety and Operational Conditions at Railroad Crossings: An Analysis of Bolt Installations, Designs and Torque Procedures	Dr. Richard Begley
99-29	Development of a Plan for a Non-Motorized Transportation Corridor in Southern W.Va.: Case Study for Alternate Sources of Transportation between Huntington and Charleston	Dr. Raymond Busbee