



RTI

Nick J. Rahall, II
Appalachian Transportation Institute
"Building Jobs through Transportation"

2003-2004 Annual Report

Center Theme	3
Success Stories	4
Education	10
Research	18
Technology Transfer	29
Management Structure	53
Funding Expenditures and Sources	59
Project List (New, Ongoing, Completed)	60

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CENTER THEME

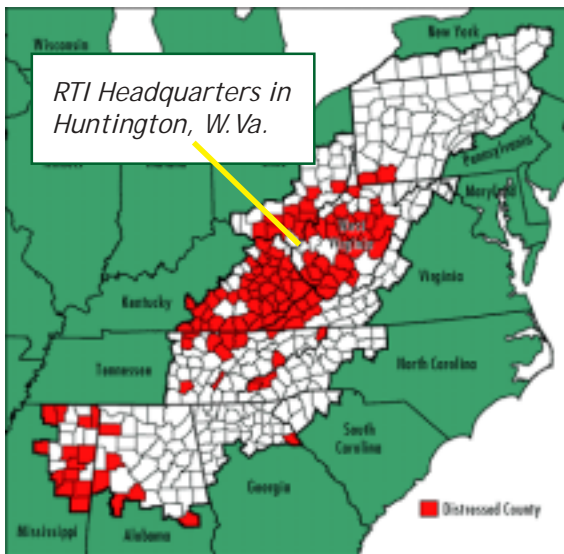
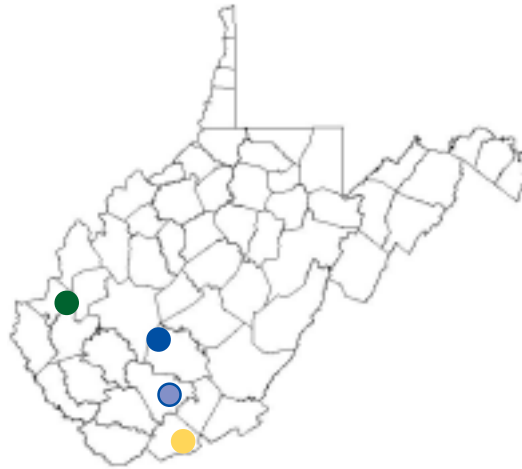
“Transportation and Economic Development in Mountain Regions”

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.

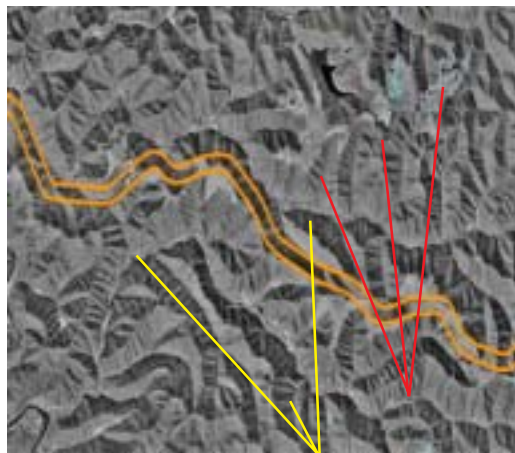
In addition, the implementation of post-mining land use, which can create flat land suitable for economic development in the region, has been hindered by transportation systems inadequate for commercial and industrial purposes.

RTI has been empowered through its designation as a University Transportation Center (UTC) 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.

The UTC at Marshall University may include activities at: Bluefield State College, Bluefield, W.Va.; Mountain State University, Beckley, W.Va.; and West Virginia University Institute of Technology, Montgomery, W.Va.



Above: White shading represents state and county boundaries that comprise the Appalachian Region. Red shading represents counties that are distressed per National Standards (i.e., more than 150% of the National Unemployment Rate). The number of distressed counties in the region can be partially attributed to a costly and incomplete surface transportation system that is under development.



Above: 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 the locations of surface mining activity. Yellow lines show the locations of rural communities.

IDEA Assists RTI Researchers with Commercialization of Railroad Sub-Structure Inspection System



The Institute for Development of Entrepreneurial Advances (IDEA) at Marshall University is assisting Dr. Richard Begley, RTI Associate Director, and Dr. Tony Szwilski, Chair, Division of Environmental Science and Safety Technology, with the commercialization of their invention, a sub-structure inspection system to determine the condition of railroad tracks and beds.

Their substructure inspection system combines a variety of inspection tools including Ground Penetration Radar (GPR) and a high resolution Geographic Positioning System. As a result, the system more accurately identifies potential failures of track structures, further allowing for more precise inspection. Additional benefits include data analysis in real time and the dramatic increase of accuracy in locating the problem to a measurement of less than two centimeters. They are also working on software for a database to coincide with the inspection system. The software would allow testers to enter results that would then be entered into a national database, monitoring railroads across the United States.

During the spring of 2004, the system was tested in the rail yard of NS Railroad Birmingham, Ala.; the second test will take place this fall at the Federal Railroad Administration's Pueblo, Colo. proving grounds. The system, called InSenSys, is already being used in small scale applications for branch lines and will be ready for full commercialization by the end of the year.

Established July 2003, IDEA focuses on the commercialization of technological and scientific advances developed by Marshall faculty, students and staff. One of the missions of IDEA includes assisting inventors in the patent and royalties' process, as well as converting those inventions into new job-creating enterprises for the region. The institute consists of three areas of emphasis: Center for Biotechnology Commercialization (CBC), Center for Business and Economic Research (CBER) and Entrepreneurship Education Program. IDEA has worked on more than 30 projects and assisted the Marshall community by filing eight provisional patents and two grants to help further protect and fund developing projects.

RTI Principal Investigators Receive Award

Congratulations are in order for Dr. Richard Begley and Dr. Tony Szwilski for being awarded “MU Distinguished Artists and Scholars Team Award” (DASA) for 2003-2004.

This award is given annually to three individual faculty members and one faculty team at Marshall University. Winners are selected based on evaluations of projects by committee members representing each of the University’s eligible academic Colleges/Schools.

Begley and Szwilski have collaborated for nearly 10 years, producing a significant body of research that has increased the visibility of Marshall University regionally, nationally and internationally.

They were recognized for helping to support the institutionalization of the RTI grant, research on technologies to assist in railroad track monitoring and for developing student exchange programs with schools in Europe, Mexico and Canada.



RailwayTrack and Structures Magazine Features Article Describing RTI Research for FRA



The March 2004 issue of *Railway Track & Structures* magazine features an article describing Federal Railroad Administration research conducted by RTI Associate Director Dr. Richard Begley and Principal Investigator Dr. Anthony Szwilski. Their research is aimed at linking a number of monitoring and inspection technologies, including Ground Penetrating Radar (GPR) with high-accuracy GPS. The equipment was tested at Norfolk Southern’s Norris Yard in Birmingham, Ala., in January 2004, and further tests were conducted at the Association of American Railroads test facility in Pueblo, Colo., in April 2004. Essentially, the equipment allows them to look inside earth and rock structures that support railroad tracks in order to spot potential problems before they become structural failures. *Railway Track & Structures* is a publication of the American Railway Engineers and Maintenance of Way Employees Association (AREMA).

Four New Employees Join RTI Staff



Juan de Dios Barrios



Bradley Cains



Greg Dudding



Zhibin Sheng

Juan de Dios Barrios, Bradley Cains, Greg Dudding and Zhibin Sheng were all named research associates at RTI in late 2003.

Barrios, who is originally from Durango, Dgo., Mexico, earned his B.S. in Biochemical Engineering from the Instituto de Durango. He has a Master of Science in Physical Science concentrating in Geobiophysical Modeling. He is currently working on a Master of Science in Technology Management with a concentration in transportation. He previously served as a graduate assistant at the Center for International Programs before joining RTI, where he was a research assistant for three years.

Bradley Cains earned a B.S. in Integrated Science and Technology from Marshall University. He is proficient in web development, computer programming, 2 D and 3D graphic art, database administration and geographic information systems programming. He started at RTI in 2001 as a project assistant, and then served as a graduate assistant for a year before becoming a research associate.

Greg Dudding earned his B.S. in Integrated Science and Technology: Information Technology from Marshall University. He is proficient in programming (Visual Basic, C++), Scripting (HTML, ASP, PHP), Application Management (Apache, SQL server, ArcSde) and Database Administration (MS SQL Sever, Oracle, using SQL, database normalization techniques). He had previously served as a graduate assistant and project assistant at RTI.

Zhibin Sheng recently completed a Master of Science in Information Systems from Marshall University Graduate College. He brings nearly ten years of experience in web application and web service development; GIS development; database administration; and systems testing and design to the Appalachian region. He is an alumnus of Beijing University of Astronautics and Aeronautics, where he earned a Bachelor of Science in Electronic Engineering in 1994. Before coming to RTI, he was employed as a web developer with ACER Guanzhou Branch (South China Business) and as an avionics engineer at Guanzhou Aircraft Maintenance Engineering Co.

Barrios and Sheng originally worked at RTI as graduate research assistants. Cains and Dudding began as undergraduate assistants and later served as graduate resesarch assistants.

RTI Offers Operation Respond Emergency Information Systems Training for Transportation Emergencies to First Responders, Emergency Personnel

OPERATION RESPOND

When transportation emergencies happen, first responders including firefighters, emergency medical technicians and police officers, are often put in danger because they are unaware of the magnitude of situations.

To address this issue, Congressman Rahall introduced the Nick J. Rahall, II Appalachian Transportation Institute to Operation Respond, which has recently combined efforts to deploy the Operation Respond software to emergency agencies located along railroad mainlines and highway interstates in West Virginia. The OREIS training was launched March 2, 2004, and is offered online to West Virginia emergency personnel at no cost.

The Operation Respond Emergency Information System works in conjunction with rail and truck carriers to access hazardous materials by container number, trailer number and carrier name. The OREIS system is linked to the Chemical Transportation Emergency Center (Chemtrec), a 24 hour call-in center, and to the databases of motor carriers to provide hazardous materials content verification.

Implementation of the OREIS system throughout West Virginia will afford the state's emergency response personnel the opportunity to quickly access information concerning hazardous loads traveling on West Virginia's highways and railroads. This ensures that in the event of an accident, responding emergency personnel will be able to quickly identify the materials at hand, the safety precautions they must employ and the correct methods to contain the situation.

CSXT to Donate Land to Marshall University for Railroad Related Training

CSXT is planning to donate an 11-acre tract of land to RTI for railroad-related training. The site will house a multi-track facility that can also be used for limited equipment testing. The land is located near CSX's Huntington, W.Va., shop facilities immediately south of Fifth Ave.

RTI, Western Transportation Institute Host Railroad and Highway Safety and Operations Seminar in Helena, Mont.



RTI and the Western Transportation Institute (WTI) hosted the Railroad and Highway Traffic Safety and Operations Seminar March 9-10, 2004, in Helena, Montana.

Senior railroad and highway engineers conducted the seminar which provided an understanding of the key aspects of design, construction, maintenance and temporary traffic control for railway and highway facilities and reviewed operational characteristics of railroad and highway vehicles. Participants completing the course earned 1.4 Continuing Education Units.

The seminar was originally developed with RTI, CSX Transportation and Norfolk Southern (two East Coast Class 1 railroads), the Federal Highway Administration and the West Virginia Department of Transportation. The seminar was presented in Helena, Mont., at the request of the Montana Dept. of Transportation.

RTI, WVTAC HOST FORUM IN WASHINGTON, D.C.

In November 2003, RTI and the West Virginia Technology Advancement Corporation (WV-TAC) sponsored a forum at the United States Capitol in Washington, D.C. to bring together policy makers from the legislative and executive branches of the federal government to identify



and discuss means by which the Unified Communications and Coordination Center Program (U3C) will help reduce risk and operating costs for carriers and surface freight, shippers of hazardous material and insurance carriers, while mitigating the risk and impact of terrorist threats against the United States.

During the forum, attendees discussed the importance of surface freight transportation; accidents and their impact; threat of terrorist caused incidents; the purpose and scope of the U3C; value of the U3C to carriers, shippers and first responders; and moving forward.

As a result of the U3C Forum, potential opportunities for delivering economic value were subsequently discussed with selected private sector surface freight transportation companies, shippers of hazardous materials and insurance carriers. Information from these meetings will help to ascertain willingness of the companies to actively work for development of the U3C and participate in its development and to corroborate for the federal government the importance of the incentives, for the purpose of subsequently determining a clear path of action.

RTI Co-Sponsors National Off-Highway Vehicle Conservation Annual Conference; New Graduate Courses in OHV Management Reviewed

RTI co-sponsored the annual National Off-Highway Vehicle Conservation Council Annual Conference March 12 - 14, 2004, at Portland, Oregon. During the conference, Dr. Raymond Busbee, professor of exercise science, sport and recreation at Marshall University, addressed the Marshall University OHV Management Curriculum Review Committee's Annual Meeting during an evening session. This committee discussed and reviewed four new graduate and undergraduate courses that are offered at Marshall University as individual courses or as a minor in parks and leisure services curriculum.



The NOHVCC is a publicly supported, educational foundation organized for the sole purpose of promoting safe, responsible, family oriented off-highway recreational experiences. It is a forum for organizations and supporters of OHV recreation, including OHV manufacturers, related businesses, affiliated foundations, OHV dealers, clubs and enthusiasts, to become partners in creating a positive future for the sport.

Transportation Injury Prevention and Safety (TIPS) Program Created by RTI, St. Mary's Regional Medical Center

RTI and St. Mary's Regional Medical Center have partnered to create the "Transportation Injury Prevention and Safety" (TIPS) program, which is designed to deliver safety education and injury prevention training to school-aged youth and parents in Cabell County and Wayne County in West Virginia and Lawrence County in Ohio. The program will focus on motorized and non-motorized recreation equipment (bicycles, motorbikes, all-terrain vehicles, motorized scooters, etc.) and passenger vehicles. The programs will include user behavior, equipment, demonstrations, special events and activities in the community, and education programs delivered to schools within the project area.



Dr. Raymond Busbee of MU Exercise Science, Sport and Recreation, and Christy Franklin, director of St. Mary's Regional Neuroscience Center will coordinate the program. They also plan to prepare and maintain a database of elementary, middle and high schools and school counselors within the project area, and document and categorize available data related to trauma injuries/deaths resulting from ATV accidents.

Education

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 RTI.

- Master of Science in Technology Management with Emphasis in Transportation Systems and Technologies.
- Master of Business Administration with an Emphasis in Transportation and Logistics (Accelerated Executive Program)

A partnership between RTI and Marshall University College of Information Technology and Engineering (CITE) created a new degree emphasis in Transportation Systems and Technologies for the Master of Science Degree in Technology Management. A partnership between RTI and the Marshall University Lewis College of Business (LCOB) also created a new emphasis in Transportation and Logistics for the Master's Degree in Business Administration.

Technology Management combines concepts and methods from management, business, science and engineering with a specific technology emphasis to address organizational needs. The new MBA emphasis offers a variety of course sequences and alternatives that can be completed in two years or less with Friday evening and weekend classes.

Other alternatives can be pursued as needed. Additional transportation graduate and undergraduate programs are under development.

RTI awards a limited number of Graduate Research Assistantships (GRA) to full-time students pursuing the Transportation Systems and Technologies and Transportation and Logistics programs. The GRA provides a tuition waiver and a stipend to fully-admitted students who meet eligibility criteria.

These students also work for RTI principal investigators gaining valuable experiences about transportation and transportation related economic development challenges in the Appalachian region and other rural regions of the United States.

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

Core Courses

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*

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
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)

Master of Business Administration with an Emphasis in Transportation and Logistics

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 Management
MKT 651*	Carrier Management [Replaces: MKT 682 Advanced Marketing Management]
FIN 620	Financial Management
MGT 699	Business Policy (Capstone with Transportation Emphasis)*

**The Marshall University Graduate catalog is the only accurate source for degree requirements.*

Other Courses

Graduate or Undergraduate Minor in Off-Highway Vehicle Recreation:

PLS 540/440 Introduction to Off-Highway Vehicle Recreation

PLS 541/441 Planning Off-Highway Vehicle Recreation

PLS 542/442 Managing for Quality OHV Recreation

These courses may fulfill the specialization requirement for students enrolled in the PLS curriculum. Students enrolled in other majors may pursue a minor in Off-Highway Vehicle Recreation or take individual OHV courses as electives.

Other courses:

IT 283 Special Topics Geographical Information Systems Concepts

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

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 Professor in Geology
Ms. Linda Hamilton Assistant Professor in Mathematics
Dr. Liz Murray Assistant Professor Integrated Science and Technology
Dr. Ashok Vaseashta Assistant Professor in Physics

Other Marshall University Entities

Dr. Larry Arbogast Professor in Geography
Dr. 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 Professor in Teacher Education
Ms. Jennifer Plymale Director, Robert C. Byrd Center for Rural Health,
Joan C. Edwards School of Medicine

Dr. Jim Sottile Associate Professor in Education Foundations
Dr. Robert Walker Chairman, Family and Community Health, Joan C.
Edwards School of Medicine

Mr. James Wolfe Project Engineer, Environmental and Geotechnical Center
Mr. John Willis Project Associate in Rural Health, School of Medicine

RTI Graduate Assistants 2003-2004

Name	Major
Al-khharabshah, Khaled	
Bowe, Nathan	Physical Science
Bueno, Juan	Management Information Systems
Cook, Brandi Compton	Teaching
Donahue, Keith	
Edmonds, Amy	Business Administration
Estel, Nathan	Teaching
Fet, Galina	Physical Science
Good, Celeste	Biological Science
Greene, Michael	
Guerrero, Lorena	
Hanna, Afif	Biological Science
Hilton, Gene	
Hilton, Tiff	Physical Science
Howard, Sarah	Business Administration
Jarupath, Wannaporn "Tee"	Information Systems
Kennedy, Noah	
Kuharich, Paul	Teaching
Lamberson, Lisa	Education
Lewis, Kim	Counseling
Lewis, Rebecca	
Li, Tianning	Information Systems
Litteral, Theresa	Physical Science
Lofgren-Skeide, Eline	Business Administration
Miller, Eric	
Osbourne, Matthew	
Ramirez-Sime, Carlos	Safety Technology
Robirds, Josh	Technology Management
Sanchez, Alejandro	Engineering
Sandu, Cristina	Business Administration
Simental, Maria E.	
Simon, Tiffany	Business Administration
Soder, Paula	Industrial and Employee Relations
Smith, Brian	
Smith, Michelle	Communication Disorders
Smith, Kristin	Biological Science
Stephens, Brian	Business Administration
Totten, Brandon	Journalism/Public Relations
Damon Ward	Teaching
Wang, Huihui	Elementary Education
Ward, Damon	Teaching
Wedge, Jennifer	Journalism/Advertising
Welch, Jennifer	

Wolfe, Ryan
Workman, Jason
Yalniz, Brandy Canady
Ye, Jiehua
Zhang, Fan

Health Care Management
Safety Technology

Business Administration
Information Systems

RTI Undergraduate Assistants 2003-2004

Name	Major
Asbury, Bruce	
Beckett, Matt	Information Technology
Boone, Logan	
Congrove, Kim	Business Administration
Danzer, Joseph	Integrated Science and Technology
Day, Kelley	Nursing
Dowler, Brian	Print Journalism
Gibson, Ashlee	Print Journalism
Harbour, Nicholas	
Mallory, Mark	Integrated Science and Technology
Morse, Emily	Music
Pierce, Elizabeth	Pre-Medicine
Pugh, Michael	Business
Sikula, Alissa	Marketing
Williamson, Claudia	Business Administration

RTI STUDENT OF THE YEAR: PETER J. DAILEY



**2003
Student of the Year
Peter J. Dailey**

Peter J. Dailey, of Charleston, W.Va., was selected as the RTI 2003 Student of the Year for his outstanding contributions to RTI research and education projects. The award was presented to Dailey and 32 other students in Washington, D.C. The award is given to one student from each University Transportation Center and by the United States Department of Transportation at the annual Transportation Research Board conference Jan. 11-15, 2004.

“Pete brings a lot of knowledge as well as ambition to RTI and specifically the ITSAMS project. RTI as well as the transportation industry are fortunate to have him working for them,” RTI director Bob Plymale said.

Dailey has worked exclusively on the Transportation Research Project 00-05, Integrated Track Stability Measurement System (ITSAMS) since he was hired at RTI as a research associate in the Fall of 2003.

Pete seized the initiative in obtaining the knowledge of high accuracy Global Positioning Systems technology to enable this tool to be deployed in the field for railroad track surveying applications. He developed mobile instrument platforms capable of recording continuous rail location data to an accuracy of a half inch, at speeds up to 30 miles per hour.

Part of the results of his field work was accepted for publication at 2003 Symposium on the Application of Geophysics to Engineering and Environmental Problems in San Antonio, as well as the 2003 American Railway Engineering and Maintenance of Way Association meeting in Chicago, Ill.

Pete lives with his wife Anna and son Brendan in Charleston. Before becoming a research associate, he served as a graduate research assistant at RTI working with Dr. Tony Szwilski on the ITSAMS project. The ITSAMS project seeks to reduce railway maintenance cost through noninvasive technologies that measure and sense the railway and track structure and subsurface, providing early detection of potential failure modes. He completed the Master of Science degree in Technology Management from 2002 through the summer of 2003.

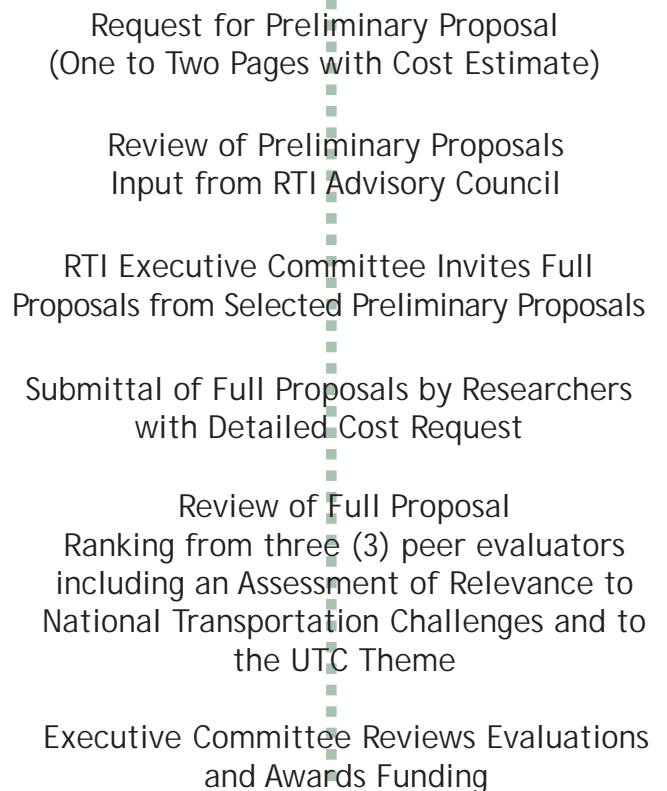
He was the first RTI graduate assistant to be listed as a co-author on papers accepted for publication at peer reviewed conferences. The expertise he gained from his field research was extremely valuable to the development of a new remote sensing laboratory at Marshall University that will support new transportation courses.

Mr. Dailey recently joined the Rahall Transportation Institute as full time Research Associate in Engineering.

The UTC RESEARCH GOALS INCLUDE:

- 1) *An objective process for selecting and re-viewing basic and applied research project applications; and*
- 2) *A process for judging by peers or other experts in the field to advance the body of knowledge in transportation.*

RTI Research Solicitation and Selection Process Flowchart



RTI RESEARCH PROGRAM GOALS

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 cost 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 healthcare, work and education for rural communities through public transit;
- an enhanced trail/scenic byway 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;
- the availability of non-federal funding to resolve local climatic emergencies and/or issues related to the 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

Socio-Economical/Political

Geotechnical/Environmental

Technology/Transportation Mapping Technologies

Transportation Research Initiation

TYPES OF PROJECTS RECENTLY COMPLETED, ON-GOING OR UNDER DEVELOPMENT

- 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

- 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

- Geographical Information Systems/
- 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

- Small start-up grants within the

RTI RESEARCH PROJECT SUMMARIES



RTI TRP 99-00 Commodity Flows and Transportation Inventory for 13 Counties in Southern W.Va.

This project gathers information that describes commodity flows and the cost of transportation services and identifies intermodal infrastructure improvements that may reduce transportation costs for a 13-county region in southern W.Va.



RTI TRP 99-01 Automated Road Extraction and Using Satellite Imagery

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 identifies branch rail lines most likely to be abandoned in response to diminished coal production in southern W.Va. and evaluates available alternatives to maintaining the branch-line capacity in that region.



RTI TRP 99-03 Lincoln County Transportation Study

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.



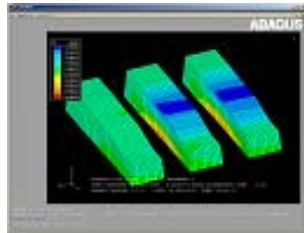
RTI TRP 99-04 An Assessment of Site-Specific Geotechnical, Spatial and Climatic Parameters that Influence the Integrity and Stability of Railroad Track

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 Use of Electroluminescence Technology for Highway Signage

Objectives for this project are to develop a suitable prototype for highway signs based upon electroluminescence 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 develops methodologies for evaluating the safety of rock cuts and slopes.



RTI TRP 99-08

Abandoned Tire Health Risk Survey/Analysis

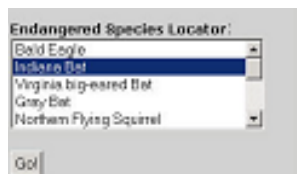
Researchers for this project will locate, identify and inventory abandoned tire sites in Nicholas County, W.Va., and assess the health risks to the citizens from mosquitoes that breed at these abandoned tire dumps. Findings from the project will provide the WVDOT with additional information on the locations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



RTI TRP 99-09

Establishment of Pre-Construction Baseline Data as a Control for Evaluation 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 and Remote Sensing Technologies

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.: A Case Study of the Greenbrier River Trail

This project collects data from trail users surveys and public meetings to determine the economic feasibility of creating a “Rails to Trails” project to 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 W.Va.



RTI TRP 99-14

Drowsy/Fatigued Driving: Prevalence and Under-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 available public vehicles for rural and economically depressed McDowell County in Southern W.Va.



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, interactive navigation mechanism to facilitate the increasing traffic flow in W.Va. and other areas.



RTI TRP 99-19 Public/Private Port Case Studies

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 seeks 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. Further, it reviewed the design of DOH weigh stations for innovations to allow for better use of the surrounding acreage and improvements to the overall facilities.



RTI TRP 99-24 Improving Efficiency of Truck/Rail Intermodal Transportation - The Case of WV

This project will identify 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 Improving Safety and Operational Conditions at Railroad Crossings: An Analysis of Bolt Installations, Designs and Torque Procedures

This project will identify, develop and test procedures for reducing 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 W.Va. 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 en-

hancement projects that will be constructed along this National Scenic Byway related to matching funds determinations and project selection processes.



RTI TRP 99-27
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

This project explores 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 Departments of Transportation and identify steps for the WVDOT to consider for GIS implementation.



RTI TRP 99-33
Major Corridor Financing Options

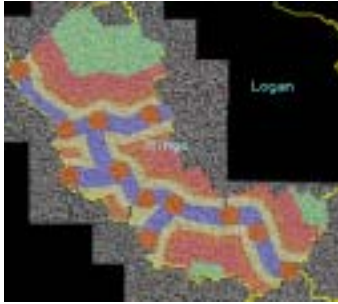
This project identifies options used in the United States to finance major corridor construction and assess the applicability for consideration and implementation in W.Va. The study will provide the most cost effective plan to help acquire critically needed improvements in the transportation infrastructure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



RTI TRP 00-01
Integrated Track Stability Assessment and Monitoring System (ITSAMS): Phase II

The first objective is to continue the development of a remote sensing technology that will rapidly assess the integrity of various track structure and substructure layers, such as the ballast, sub-ballast and subgrade, and to locate, identify and quantify weak track segments. The second objective is to continue the development of a new tech-

nology for the real-time measurement of vertical track deflection, based on the use of the laser interferometer.



RTI TRP 00-02

Land Use Planning Adjacent to Transportation Corridors in WV: A Regional Approach for Six Counties in Southern WV.

The objective of this project is to assist in the development of long-term land use policies with utilization criteria based upon proximity to the current and proposed transportation systems in the region.



RTI TRP 00-04

Expected Flood Damages to Transportation Infrastructures as a Proportion of Total Event Costs: A Methodological Exploration

This project is designed to improve the estimation of flood related transportation infrastructure damages in the Tennessee Valley as a proportion of total event costs. With the overall aim of improving a priori flood damage assessment, RTI and the TVA propose a joint study effort designed to improve the estimation of transportation infrastructure damages as a proportion of total event costs.



RTI TRP 00-05

Integrated Track Stability Assessment and Monitoring System (ITSAMS): Phase III

This project continues to develop of remote sensing technologies that can be integrated and deployed in a mobile inspection vehicle i.e. Integrated Track Stability Assessment and Monitoring System (ITSAMS).



RTI TRP 00-06

Transportation and Market Feasibility Analysis for Innovative Coal Combustion By-products to be Manufactured Adjacent to the I-64 High Tech Corridor in Southern W.Va.

This project is designed to determine the transportation challenges and costs that will be necessary for the successful marketing of a coal combustion product proposed for manufacturing adjacent to the newly designated high technology corridor in Southern W.Va. (Rainelle, Greenbrier County).



RTI TRP 00-07

Opportunities to Improve Transportation Efficiencies through Enhanced Intermodal Capabilities and Increased Utilization of the Appalachian Development Highway System.

This project is a multi-phased intermodal freight transport study that will identify strategic opportunities for enhancing the efficiency of intermodal transportation within Appalachia.



RTI TRP 00-08

Development of a Research Protocol that Relates Culvert Structure to Fish Migration in Southern W.Va.

This project enables the WVDOH to efficiently choose type and site of future culverts, identify watersheds most likely to be adversely impacted by culvert construction and choose cost-effective ways to remediate culverts that are problematic to fish migration.



RTI TTP 00-10

Improving Transportation Access to Rural Health Care in Lincoln County: Process Implementation

This project's objective is to directly implement the results of a previous RTI research project (TRP 99-16) that designed solutions to improving access to health care for the elderly, disabled, chronically ill and poor citizens of a rural W.Va. county through a coordinated effort between health care providers and the public transportation system.



RTI TTP 00-11

Development of a Transportation and Economic Development Information System for the State of West Virginia (TEDIS-WV) Delivered Over the Internet

The objective is to design, develop and test a system for delivering important transportation and economic development information using GIS technology via the Internet for users including governmental agencies and the general public.



RTI TTP 00-12

A Deployment Plan for the W.Va. High Technology Corridor

This project's objective is to support the direct implementation of expanding the "High Tech Corridor" designation for the Southeastern Virginia portion of I-64 into West Virginia between Beckley and White Sulphur Springs.



TTP 00-14

GIS of Major Transportation Corridors along the Kanawha River in West Virginia and along the Ohio River

RTI will provide GIS coverage, including major transportation corridors, for the Kanawha River and portions of the Ohio River. RTI will also link some ORSANCO data to existing coverages. This work will support a second grant that will collect data on fish utilization of bridge abutments and other transportation-related structures near the Kanawha River and the Robert C. Byrd pool of the Ohio River. A series of ORSANCO Data will be linked to these coverages.



RTI TTP 00-15

Harrison, Mingo and Webster County Tax Map Conversion

The methodology for this project will digitize current maps using GIS software. This process will represent a valuable layer of data for transportation planning in the future.

RTI TTP 00-17

Development and Evaluation of a GIS Mapping System for West Virginia's Hatfield McCoy Trail System

The project will implement the deployment of GIS technology into the Hatfield McCoy trail system's operations and will include training of employees in using the GIS system for current and new trail mapping applications. RTI will also assist in creating a database for the system in addition to designing a system for dissemination of the trail system through a web-based Geographic Information System to the general public.

RTI TTP 00-XX

Proposed GIS Mapping System for Appalachian Development Highway System (ADHS) Corridors

This project will provide a more accurate digital map inventory of the ADHS corridors for transportation and economic development issues in Appalachia.

TTP 00-18 West Virginia

TTP 00-19 Tennessee

TTP 00-22 Alabama

TTP 00-23 North Carolina



RTI TTP 00-21

Three-Dimensional Laser Scanner Pilot Project

Primarily, this project seeks to determine the feasibility of utilizing 3-D laser scanned data for identification and enhancement of geological features. This will be accomplished by comparing the scanned data to an independent geological interpretation.

TECHNOLOGY TRANSFER

Technology Transfer Goal:

Availability of research results to potential users in a form that can be directly implemented, utilized or otherwise applied. A variety of technology transfer mechanisms will be used to distribute the findings of the Institute. These will include, but may not be limited to: research papers, technical reports, a quarterly newsletter, workshops, seminars and a website.



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 -- Year 4

Papers Presented or Published

Szwilski, A.B., Begley, R.D., et al, "Multi-Sensor Mobile System to Monitor Rail Track Superstructure and Substructure: Initial Studies with Non-Invasive Technologies," American Railway Engineers (AREMA) Conference, Chicago (October 2003)

Szwilski, A.B., Begley, R.D., et al, "Determining Rail Track Movement Trajectories and alignment Using HADGPS," American Railway Engineers (AREMA) Conference, Chicago (October (2003)

Dailey, P., et al, "Using Geophysical Techniques to Study Rail Track in Area of Ground Movement", Geo-Trans 2004, ASCE, Los Angeles (July 2004).

Transportation Professional Development Activities - Year 4

Transportation professional development courses, transportation 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).

1) Railroad and Highway Safety and Operations Seminar, Cincinnati, Ohio, September 9-10, 2003

Personnel who design, engineer, and maintain West Virginia's infrastructure of railways and roadways provided a basic understanding of the key aspects of design, construction, maintenance and temporary traffic control for each other's facilities during this seminar.

Upon completion of the course participants were:

- Aware of and understood the mission and organization of railroad companies and state highway agencies.
- Understood the physical and operational characteristics of railroad locomotives/cars and highway vehicles.
- Understood the basic criteria for intersection design.
- Understood normal maintenance practices employed by the railroad and state highway.
- Aware of the basic principles of highway traffic control devices and railroad signaling devices.
- Able to identify and establish key communications between the two entities.

2) 2003 Southeastern Association of State Highway and Transportation Officials (SASHTO) Meeting, Sept. 13-17, 2003, Charleston, W.Va.

RTI co-sponsored the 2003 Southern Association of State Highway and Transportation Officials (SASHTO) annual meeting. SASHTO consists of representatives from the highway departments of Puerto Rico and 12 states: Arkansas, Kentucky, South Carolina, Louisiana, North Carolina, Tennessee, West Virginia, Virginia, Georgia, Alabama, Florida and Mississippi.

The 2003 technical portion consisted of 13 sessions, with subject matter ranging from national to local topics such as, "Iraq: A Transportation Perspective: Lessons in Stewardships and Partnerships to Fuel Tax Scam - A Multibillion-Dollar Industry," "West Virginia Smart Roads" and "I-64 Widening."

The purpose/mission of SASHTO is to encourage a balanced transportation system within member states; to study the various materials, methods of construction and maintenance and to discuss common problems experienced with transportation facilities; to exchange ideas and evaluate programs within the aviation, highway, rail, transit and water modes of transportation; to cooperate in every way possible with the U.S. Department of Transportation, the Federal Highway Administration, the Federal Aviation Administration, the Federal Railroad Administration and the Federal Transit Administration in consideration of transportation problems; and to support legislation for the purpose of protecting capital investments in current transportation systems and for improving transportation programs.

3) Image Mapbase GPS and Survey Integration with GIS, Huntington, W.Va., November 13, 2003

Instructors of this course focused on integrating multiple types of aerial and satellite imagery into image processing and GIS software systems focusing on transportation systems.



The workshop also provided hands-on techniques to incorporate surveys over types of data such as:

- imagery and digital elevation models
- imagery and social demographic data
- browser image web 3-D models available from government and non-government agencies.

Participants learned different geographic datums and projections to overlay survey data on the imagery for proper georegistered data files.

4) Railroad and Highway Traffic Safety and Operations Seminar, Helena, Mont., March 9-10, 2004

The Rahall Transportation Institute of Marshall University and the Western Transportation Institute (WTI) sponsored this seminar in Helena, Montana. Instructors at the two-day event presented modules on the key aspects of design, construction, maintenance, and temporary traffic control of both highway and railroad facilities. The seminar served as a continuing education course for current transportation practitioners. Additional sponsors included: BNSF Railroad, FHWA, Federal Motor Carrier Safety Administration, Montana Department of Transportation, Montana Rail Link, Operation Lifesaver, and Union Pacific Railroad.

5) Image Mapbase GPS and Survey Integration with GIS, Huntington, W.Va., May 12, 2004

Instructors of this course focused on integrating multiple types of aerial and satellite imagery into image processing and GIS software systems focusing on transportation systems.

The workshop also provided hands-on techniques to incorporate surveys over types of data such as:

- imagery and digital elevation models
- imagery and social demographic data
- browser image web 3-D models available from government and non-government agencies.

Participants learned different geographic datums and projections to overlay survey data on the imagery for proper georegistered data files.



6) Endangered Species Act Federal Coordination Training Course, Huntington, W.Va., July 28-29, 2004

Developed by the Federal Highway Administration (FHWA), the Endangered Species Act 7 - Federal Coordination training course focused on transportation. The course provided a basic understanding of the Endangered Species Act and the procedures and responsibilities associated with Section 7 of the act. Follow-

ing the completion of the course, students were capable of explaining key sections of the Act, defining key ESA terms, describing the roles and responsibilities under Section 7 and outlining the Section 7 consultation process.

7) Rock Slopes: Geotechnical and Foundation Engineering: Module 5, University of Kentucky, Lexington, KY, August 5-6, 2003

This course was the fifth in a series of 11 modules constituting the 4-week advanced level NHI Course 132016 -- Geotechnical and Foundation Engineering. The course focused on the following:

- geological investigation techniques
- shear strength theories and determination of rock strength
- design methods for rock slopes with different failure mechanisms
- rock slope stabilization methods
- contracting issues
- sample problems and case histories involving rock slope analyses and design.

Transportation Seminar Series - Year 4

RTI has created a Transportation Seminar Series that enables Marshall University faculty, principal investigators for RTI funded projects, to present their research findings. The seminars are free and often include guest speakers.

1) United States Secretary of Transportation visits Huntington, W.Va., March 29, 2004

On March 29, 2004, United States Secretary of Transportation Norman Mineta and Rep. Nick J. Rahall, II, representatives from the Appalachian Regional Commission, the USDOT's Research and Special Programs Administration and members of the transportation industry met in Huntington, W.Va. The group congregated to participate in transportation and safety roundtables, as well as receive a briefing of RTI research and education activities.



RTI conducted two concurrent, half-day roundtable sessions during the morning. One session, "Mobility and Economic Development in Appalachia: Connecting Business to Markets and People to Opportunity in the Global Economy of the 21st Century," brought together transportation experts from throughout the Appalachian region to explore critical transportation mobility issues in Appalachia

as they relate to economic health, quality of life and workforce opportunities for the region in the 21st century.

During the other concurrent session, members of the Rural Transportation Safety Roundtable met with RTI representatives and others to discuss rural transportation safety issues. Rahall and Mineta served as keynote speakers during each session's luncheons.

Mineta also served as the keynote speaker at the Huntington Regional Chamber of Commerce's Annual Dinner, during which he emphasized the role of transportation in stimulating economic development in the Appalachian region.



Year 4 Conferences

1) Operation Lifesaver Region 2 Workshop “Laying Tracks for Safety,” Dublin, Ohio, August 12-14, 2003

RTI Research Associate John Ball, along with Research Assistant LeAndria Reed, attended the Operation Lifesaver Region 2 Workshop in Dublin, Ohio, August 12-14, 2003. Themed “Laying Tracks for Safety,” both Reed and Ball volunteer with Operation Lifesaver, a non-profit public awareness program aimed at ending collisions, fatalities, trespassing and injuries at highway-rail grade crossings and properties.

While attending the conference, Ball and Reed provided resources and expertise to conference participants regarding RTI’s availability for future collaborations, including research and training opportunities for public benefit.



2) The National OHV Program Managers & NOHVCC Conference, Portland, Ore., March 10-14, 2004

On March 10-14, 2004, RTI co-sponsored the National Off-Highway Vehicle Conservation Counsel (NOHVCC) conference in Portland, Oregon. Designed to bring together the off-highway vehicle community, the conference focused on sharing ideas, addressing issues and enhancing opportunities, and above all, finding ways to provide safe and responsible outdoor recreation for all off-highway vehicle recreation enthusiasts.

3) RTI Representative Conference, Huntington, W.Va., March 29, 2004

On March 29, 2004, a tour of RTI’s facilities took place, during which distinguished guests, including United States Secretary of Transportation Norman Mineta, Rep. Nick J. Rahall, II, representatives from the ARC and RSPA, Marshall University faculty and staff and several Cabell and Wayne county delegates, were briefed about RTI’s research and education programs, watched a demonstration of RTI’s prototype Transportation and Economic Development Information System (TEDIS) and were informed of four new West Virginia companies under development as a result of the RTI research program.



4) Geohazards in Transportation in the Appalachian Region, Columbus, Ohio, August 4-5, 2004



This was the fourth annual technical forum, an activity of the Appalachian States Coalition for Geohazards in Transportation. The forum was co-sponsored by the Ohio Department of Transportation.

Some of the topics the forum covered include geological hazard investigations, GIS applications in geotechnical issues, mine shaft grouting, Karst inventory and vulnerability assesment of roadways, and rockfall control measures.

Other Year 4 Technology Transfer Activities

1) Electronic Town Hall Meeting Meeting on Regional Development, West Virginia, June 28, 2004



The Nick J. Rahall, II High Technology Corridors Program made ground-breaking progress June 28, 2004, by hosting the first Electronic Town Hall Meeting.

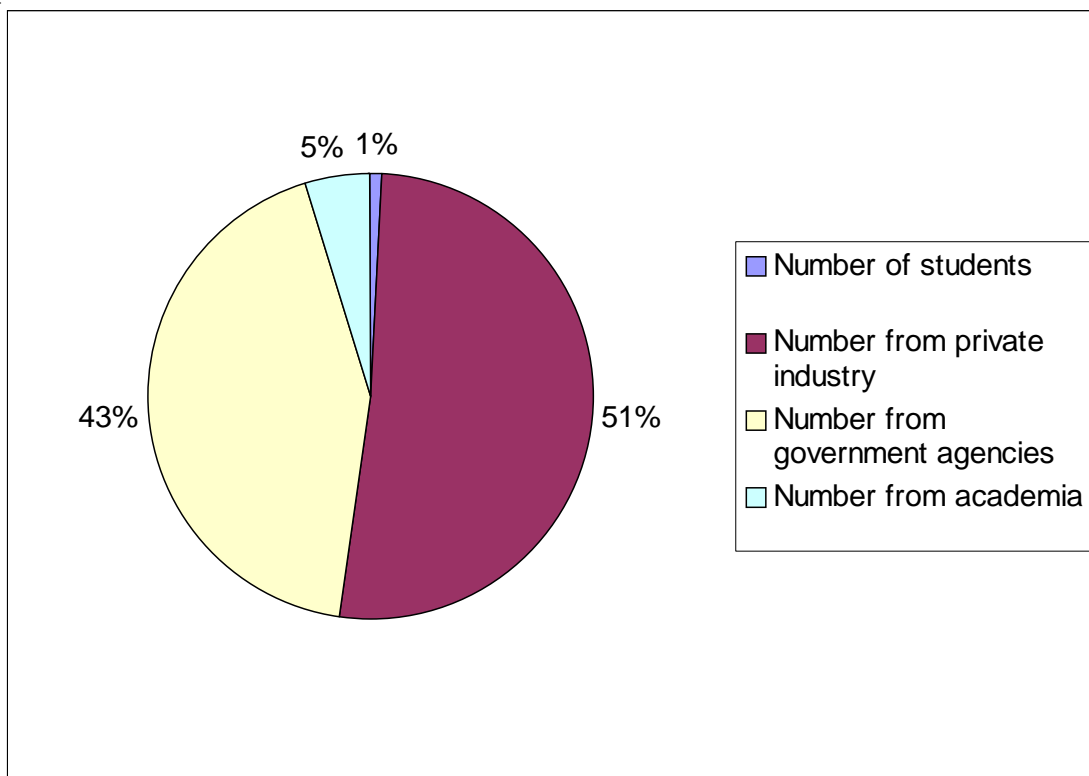
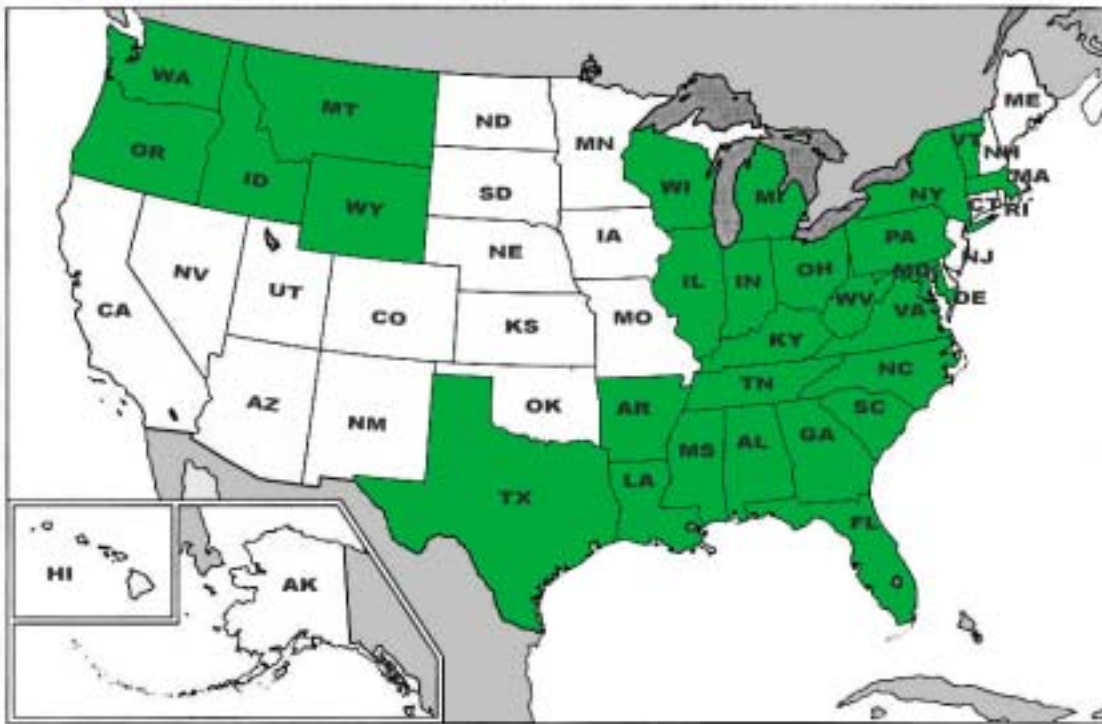
The meeting took place from 1-3 p.m. following a noon luncheon and was moderated by Beth Vorhees of West Virginia PBS. Transmitted via closed-circuit network, the meeting took place at a variety of West Virginia locations including the Beckley PBS Studio, Bluefield State College, Concord College, Fayette County Courthouse, McDowell County Courthouse, New River Community & Technical Center, Pocahontas County Courthouse and West Virginia School of Osteopathic Medicine. Administrator of the Rural Utilities Service for the US Department of Agriculture, Hilda Gay Legg, served as keynote speaker. Guest speakers included Bobby Lewis, Community Development Director of the WV Development Office, and Mary Hunt-Lieving, Program Officer of the Claude Worthington Benedum Foundation.

By the completion of the electronic town hall meeting, individuals, businesses and communities were provided with an understanding of the advantages of regional collaboration through the Corridors Program, familiarized with ongoing initiatives and able to plan for the next steps in regional collaboration.

Consisting of several steering committee members, including RTI, the High Technology Corridors program is a regional private/public collaboration promoting economic development through the growth and expansion of small businesses and entrepreneurial enterprises. Using high technology, information technology and high speed telecommunication networks, the collaboration addresses three main objectives: creating a critical mass of people and ideas; creating a regional voice that will be heard and listened to; and bringing resources to people and communities.

The first area to undertake the collaboration is the I-64 Corridor between Beckley and White Sulphur Springs. The project developed an integrated website for resource management and collaboration, networked with local communities to identify infrastructure needs and provided access to resources in response to specific inquiries by working with local partners from both the public and private sectors.

Since RTI's inception, participants from 28 states and Washington, D.C., attended RTI Transportation Professional Development Activities. Participants represented government agencies, private industries and academia as indicated in the following graph.



Year 4 Newsletters

RTI publishes *Transportation Focus*, a quarterly newsletter, to inform the transportation community of research, educational programs, technology transfer activities and upcoming events at RTI. Researchers, professionals, government leaders, educators and students receive *Transportation Focus* four times each year. The newsletter is available on RTI's website, and readers can request printed copies to be sent to them via mail or electronic mail.

Nick J. Bahall, II Appalachian Transportation Institute at Marshall University

TRANSPORTATION FOCUS

Building jobs through Transportation

NEWS and information from the Marshall Transportation Institute

RTI to Create 911 Data Warehouse for WVSAMB
 by Nick J. Bahall, II
 Emergency 911 calls need to be able to locate their source more quickly and easily thanks to an agreement between the Marshall Transportation Institute (RTI) and the West Virginia Statewide Emergency and Shipping Board (WVSAMB).
 The goal is to provide a ten-year archive for real-time 911 data to be used to create a data warehouse to store the information to create the same-level of support as a major emergency center received by the software.
 "In order for maintenance, fire, law enforcement, police, utility and other emergency personnel to locate issues in real time, they need to be alerted and the steps need to be stored in a form that is easily accessible from emergency command centers," Bob Bryant, RTI Director and WVSAMB Executive Director, said.
 The new system will be developed by RTI and WVSAMB.

Engineering Academy Introduces High School Students to Opportunities, Careers in High-Tech Professions
 by Nick J. Bahall, II
 Practicing engineers led 11 high-level students through connectivity and programming technology exercises, supporting 1070 projects, building robots, assembling 1000 resistors and other activities during the "Exploring Engineering Academy of Excellence" camp at Marshall University June 22-27.
 Twenty-three high school students from Virginia, Maryland and Indiana attended the three-week camp which was hosted by the College of Information Technology at Marshall University.

ESC's "Viable" Wins Intelligent Robot Contest
 by Nick J. Bahall, II
 A team of students and engineering technology students from Marshall University at ESC's annual contest, won a contest with the placement of the world's smartest robot, the intelligent robot competition at Oakland (CA) University.
 The team, partially led by RTI Graduate student, won the contest with the "Viable" intelligent robot. The team, partially led by RTI Graduate student, won the contest with the "Viable" intelligent robot. The team, partially led by RTI Graduate student, won the contest with the "Viable" intelligent robot.

Partner Schools: [Logos for various schools]

Spring 2004

Nick J. Bahall, II Appalachian Transportation Institute at Marshall University

TRANSPORTATION FOCUS

Building jobs through Transportation

NEWS and information from the Marshall Transportation Institute

Terry Retires after 40+ Years Service to Transportation Industry
 by Nick J. Bahall, II
 The Appalachian Regional Commission (ARC) will miss a valued member of its team January 2004 when James Thompson, Executive Director of the ARC, retires after more than 40 years of service to the transportation industry.
 The ARC is a federal state partnership that works with the people of Appalachia to create opportunities for self-sustaining economic development and improved quality of life.
 The Nick J. Bahall, II Appalachian Transportation Institute (RTI) has worked with the ARC and has an annual budget agreement since 1999.

James E. Clyburn LTC Reps Visit RTI
 by Nick J. Bahall, II
 Members of the James E. Clyburn University Transportation Center (UTC) at Marshall University visited RTI on October 26, 2003, to tour headquarters and RTI labs located at Marshall University's West Virginia campus.
 UTC is on the preliminary stage of planning a university transportation center headquarters at the campus of South Carolina State University.

Winter 2004

Nick J. Bahall, II Appalachian Transportation Institute at Marshall University

TRANSPORTATION FOCUS

Building jobs through Transportation

NEWS and information from the Marshall Transportation Institute

High Tech Corridors to Link Mountains to Jobs
 by Nick J. Bahall, II
 A partnership between the Nick J. Bahall, II High Technology Corridor Program and the Center for Appalachian Network Access (CANA) at George Mason University has made the link between high-tech jobs and Southern West Virginia a step closer.
 The success of the partnership, which was driven by U.S. Rep. Nick Rahall, is to create jobs that link on high-tech corridors to the infrastructure of high-tech and more Southern West Virginia closer to a technology-based economy. Business and transportation are local business networks to expand a network's economic base.

National Maritime Funding Increased
 by Nick J. Bahall, II
 An additional \$100 million in funds designated for marine safety job training has been allocated to RTI. RTI was designated as a National Maritime Education Center (NMEC) in 2002.
 "Our ports can be the source of those who wish to bring America to new great nations. The money can help train those that we need to create our ports and our lives are safe as well," U.S. Rep. Nick J. Bahall, II (D-WV) said.
 In accordance with Bahall's request the U.S. Congress authorized the Marine Administration of the U.S. Department of Transportation to make possible professional marine safety training in coordination with RTI.
 NMEC is an institution by the U.S. Transportation Secretary to undertake a variety of activities in coordination with RTI.

Spring 2004

TECHNOLOGY TRANSFER

Pre-K-12 Outreach

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. Pre-K-12 Outreach activities include: Transportation Outreach on Wheels, Transportation Outreach on the Web and other workshops and activities at Marshall University and partner schools.



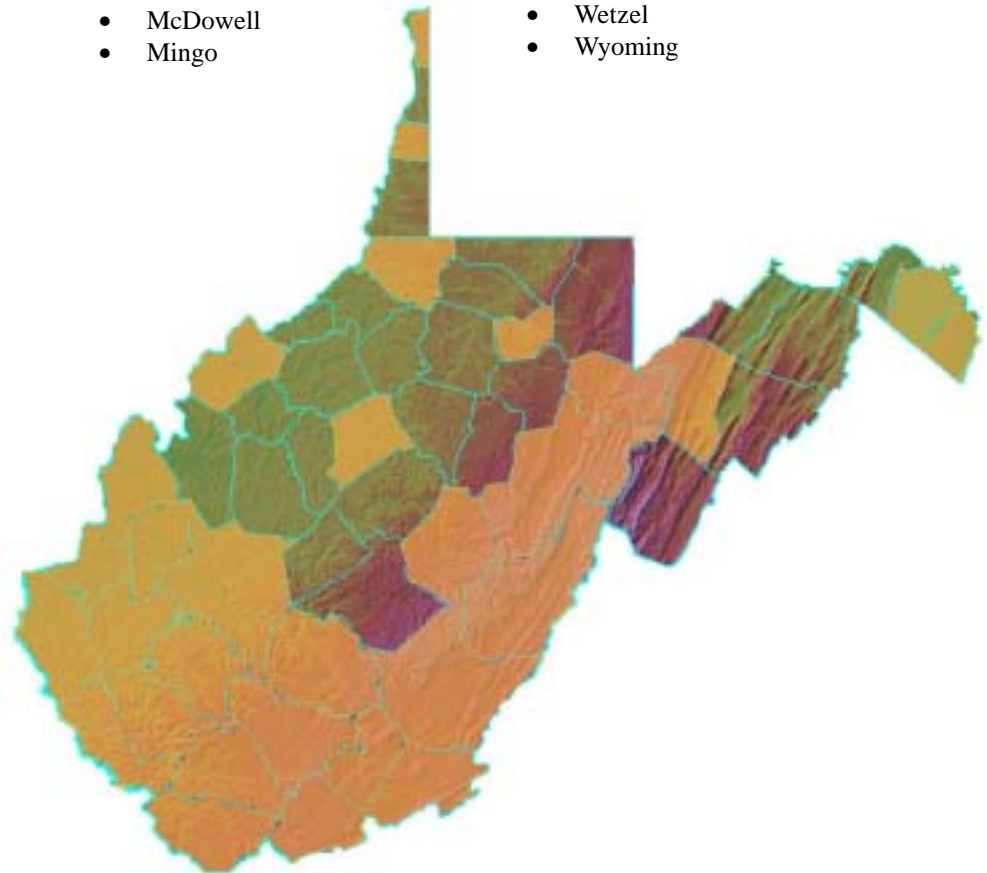
PRE-K-12 OUTREACH

Transportation Outreach n WHEELS

Since 2000, graduate and undergraduate education students from RTI's Transportation Outreach on Wheels (TO²W) program have traveled to schools, libraries and civic organizations throughout Appalachia. During the 2003-2004 academic year and summer term, approximately 2,800 pre-kindergarten through high school students at approximately 50 schools have benefitted from this program's activities. Workshops vary in length from one-half a day to five days.

Students who have participated in RTI's Transportation Outreach on Wheels have come from many states. These include: West Virginia, Kentucky, Ohio, Virginia, Pennsylvania, Indiana and Montana. More specifically, students from West Virginia who have benefitted from the program come from many counties including:

- Boone
- Cabell
- Fayette
- Gilmer
- Grant
- Greenbrier
- Jefferson
- Kanawha
- Lincoln
- Logan
- Mason
- Mercer
- McDowell
- Mingo
- Monroe
- Ohio
- Pleasants
- Pocahontas
- Putnam
- Randolph
- Raleigh
- Summers
- Taylor
- Tucker
- Wayne
- Webster
- Wetzel
- Wyoming



RTI Partners with Early Education Center



RTI and the Marshall University Early Education Center (MUEEC) have created an early childhood Outreach Program that provides assistance to early childhood professionals who are located in rural communities where access to alternative resources is restricted.



Above: Taking an unconventional approach to operating a crane.

The MUEEC has developed extensive curriculum support in transportation related education focused on early childhood education. In the past few semesters, children at MUEEC have explored topics such as trains, coal, fire trucks, the Ohio river, buses, bridges, mapping, barges and coal mines.

Clayton Burch, MUEEC director, said Appalachian communities, environments, and infrastructure are extremely valuable topics that are often overlooked because many are confused about real learning at an early age.

“Kids are capable of much more than simply learning their ABC’s. Our kids build and design houses and vehicles. You just have to tap into what most interests the kids,” Burch said.

Burch said one of the most important progressions made through the grant was the website update, which allows parents and teachers to look at children’s projects and get information on the center. The site also features a bi-weekly newsletter with the latest projects. A link dedicated to the Outreach program is still under construction.

The Outreach website will include an archive of the hands-on projects, database of articles on the curriculum as well as books and text currently used at MUEEC.

A portion of the funding goes toward purchasing transportation materials so the kids can build their projects. The most recent construction was of designing boats to see what materials make for the best sailing.



Above: Students learn about transportation in many different ways, including learning how to read maps.

The MUEEC also plans to run a mock institute for in-service teachers for one week in July. This preliminary session will lead to the development of multiple institutes that will take place during the summer of 2005. Burch said he hopes this will be a statewide initiative.

Other Outreach projects include renovation of the support office (Room 302 Corbly Hall), computer lab, literature reviews and new public relations material such as brochures and CDs.

LEGO DUPLO WORKSHOPS

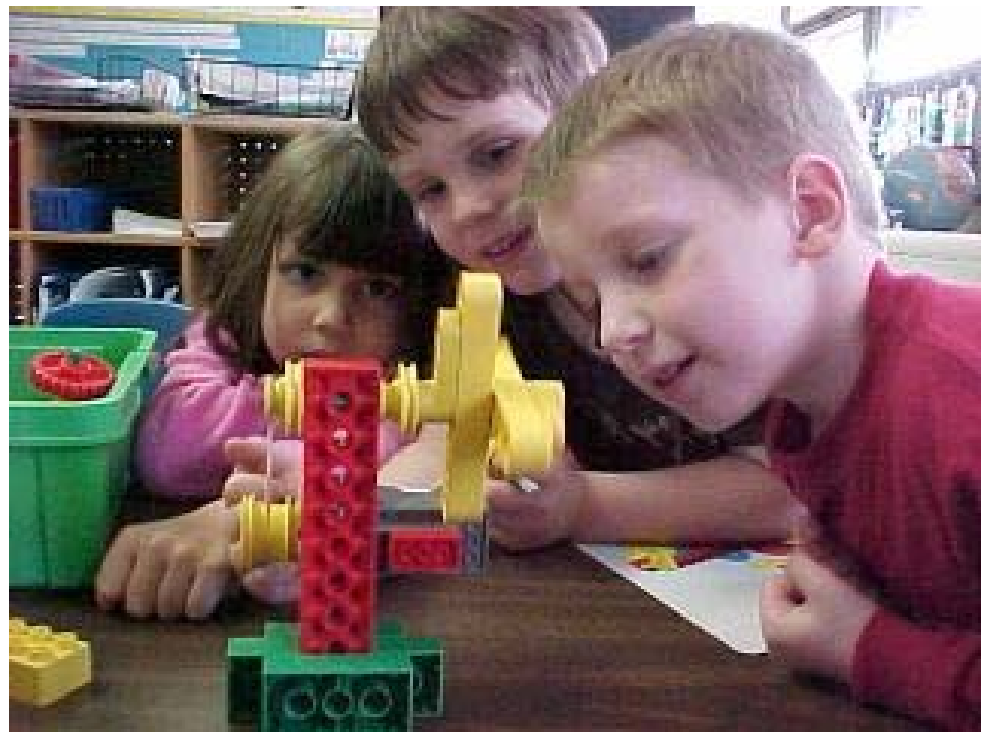


Above: A student assembles a LEGO model of a house.

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.”



Right and Below: Groups of elementary students use LEGO pictorial charts to complete their several rides in a LEGO amusement park.



Intelligent Transportation Systems with LEGO Robotics Workshops



Above: Two students program commands via a microphone into their LEGO robotic vehicle.



Above: Students set up the area to test their LEGO robotics vehicles.

Right: The LEGO robotics vehicles travel along the path programmed by the students.



Middle school students learn to assemble and program intelligent vehicles and automated traffic control and monitoring devices at workshops sponsored by RTI.

Pre-service teachers and graduate assistants from Marshall University guide students in assembling vehicles and traffic control components from LEGO DACTA kits and installing RCX microcomputers, light sensors, digital timing devices and motors.

Using ROBOLAB software, middle school students write computer programs and download them to the RCX equipped vehicles and traffic control devices, which include cars, gates, signals and speed measuring devices.

High school students also explore careers in automobile assembly, engineering, manufacturing, computer programming, education, transportation and robotics while learning the basics of LEGO CAD, ROBOLAB and RCX programming. The students are also exposed to Transportation Outreach on the Web.

National Engineering Week Activities



Above: Graduate research assistant Carlos Ramirez adjusts an infrared camera, which has recorded an image of a student's hand as indicated on the computer screen.

More than 120 top sophomores from local high schools attended the 11th Annual Engineering Career Day, which took place Feb. 26, 2004, as part of National Engineers Week.

The purpose of Engineering Career Day is for high school students to meet working engineers to learn about science and technology subjects, which are required in high school to prepare for college courses and engineering careers.

Research associate Pete Dailey and graduate research associates Carlos Ramirez, Dbesh Shrestha, Pierre Cure and Tianing Li explained the use of infrared technologies in engineering and railroad research during the half-day event. After guiding students in photographing infrared images of objects of varying temperatures, such as their hands, pencils or cups, Dailey and Ramirez showed them how to graph the varying temperatures on a computer. Then Dailey and Ramirez explained how they use the infrared camera in the field while conducting research for

Federal Railroad Administration projects.

Dr. Betsy Dulin and Dr. Bill Pierson of MU's College of Information Technology and Engineering, also hosted a booth to inform students of this summer's Exploring Engineering: Academy of Excellence. RTI co-sponsors the week long camp, which is designed to encourage students entering their junior year of high school to explore engineering as a career by participating in hands-on engineering activities, touring engineering-related facilities and interacting with practicing engineers. Engineering Career Day was sponsored by the Society of American Military Engineers and took place at MU's Memorial Student Center.

Professional Engineer John Ball guided 12 children from the Marshall University Early Education Center (MUEEC) through a hands-on warning session about bridge structure, barges, railroads and the connection among these modes of transportation.

Ball spoke with the children in participation with the National Engineers Week.

"Children see and use transportation infrastructure everyday, only from the back seat of the car," Ball said. "When you explain what they see and the role transportation plays in their lives, they really start asking questions and learning."

Students built bridges and barges from blocks prior to Ball's arrival. They also told their instructors what the barges were designed to carry and the instructors labeled the barges.

"They demonstrated how goods, such as coal, food and vehicles are loaded onto barges from docks and are transported on rivers until they reach their designated port," Ball said.

After Ball visited the students last year, they prepared a list of questions. "The students showed a lot of interest, and the students who were at the center last year retained a lot of what we told them," he said.



Above: A student from MUEEC displays a "barge" constructed from wooden blocks that carries coal, livestock and people.

Exploring Engineering Academy of Excellence

Practicing engineers led 34 high school students through constructing and programming intelligent vehicles, constructing trebuchets, mapping GPS points and assembling CO2 racers and other activities during the “Exploring Engineering Academy of Excellence” camp at Marshall University June 20-25.

Juniors from high schools in West Virginia, Kentucky and Ohio attended the fourth annual camp, which was hosted by the College of Information and Technology and Engineering (CITE) and co-sponsored by RTI and other engineering, transportation and technology organizations.

Dr. Betsy Ennis Dulin, Dean of CITE; Dr. William Pierson, Interim Division Chair; and Dr. Richard McCormick coordinated the camp and served as instructors. RTI research associate Asha Puttaiah, an environmental engineer, assisted as a counselor.

Participants explore engineering as a career by engaging in hands-on engineering activities, touring engineering facilities, and interacting with engineers and students from all major engineering disciplines, including civil, chemical, electrical, mechanical and environmental engineering.



Above: Students were taught proper safety precautions when conducting an experiment at Beech Fork Lake.

The program also focused on skills important for success in the study and practice of engineering, such as problem solving, team-building, project management and communications.

Students were split into design teams to provide a more intimate learning environment and develop teamwork while completing the exercises. Field trips to Beech Fork Lake, the Toyota plant at Eleanor, W.Va., Heritage Farms, and the Clay Center allowed them to take a hands-on approach to practical engineering principles, such as seeing examples of environmental, automotive and civil engineering.

“We have a great group of kids from all over the state, with more female students in attendance than in the past,” Dulin said.

Students were selected based on their performances in college preparatory courses and letters of recommendation from guidance counselors.



Above: An aspiring engineer gets the chance to use a survey camera.



Above: 2004 EEA Participants

A webpage is currently being developed by RTI to accompany instructor and student experiences from the SEDA workshop.

The website will showcase five areas:

- SEDA Summer 2004 Workshop
- Engineering Design Overview
- Career Explorations
- Student Projects
- Teacher Lesson Plans

The Nick J. Rahall, II Appalachian Transportation Institute hosted the Summer Engineering Design Academy (SEDA) at Marshall University in June and July to give middle school and high school students a chance to learn the processes of engineering design.

The three-week course was free and focused on how the processes are applied to transportation oriented projects. Students presented their completed projects at the conclusion of the course. The middle school SEDA will run for 2 weeks in June and the high school will run for 3 weeks in July. The classes will last 2 hours each day in the Morrow Computer Laboratory, room 119, at Marshall University.

Some of the projects included mechanical desktop software training, basic engineering analysis, 3D part creation and manipulation and detailed drawing creation. The students were exposed to the engineering design process, computer aided design, outlining ideas using concept mapping software.

Students in attendance also benefited from math, science and communication skills including geometry, physics, report writing and oral communications.

The Summer Engineering Design Academy was successfully launched as a pilot program for RTI. Eight middle school students attended the first session and 16 students attended the high school session.

Five college students were trained to carry out computer aided design, concept mapping, and hands-on projects with the students. They are now documenting the summer program preparing for next year's program.



Clockwise from top: 1) David Cartwright, an RTI Research Associate, instructs the class on the mathematical and engineering concepts they need to know to successfully complete their projects. 2) & 3) Students work on constructing projects using the engineering principles taught at SEDA.

Operation Lifesaver Presentations and & Railroad Safety Camp

Research Associate John Ball, along with Research Assistant LeAndria Reed, has been traveling the Huntington area providing presentations to groups on the topic of railroad safety. Both Reed and Ball volunteer with Operation Lifesaver, a non-profit public awareness program aimed at ending collisions, fatalities and injuries at highway-rail grade crossings and properties.



Above: Campers line up for a group picture in front of the WVOL bus.

The first RTI Operation Lifesaver presentation to be given to pre-service professionals took place at the Marshall Community and Technical College Railroad Conductor Training School at the Cabell County Vocational and Technical School. The presentation

focused on railroad worker safety. Tailored to fit the needs of the class, Ball and Reed targeted the lecture on the basics of railroad crossing safety from a conductor's viewpoint.

A second presentation took place at the monthly Cabell County School Bus Drivers required in-service. As with the first presentation, Ball and Reed tailored the seminar to fit the needs of the county bus drivers. Concentrating on the impending dangers to bus drivers at crossings, in addition to the presentation, an informational video was shown.

RTI and the West Virginia Operation Lifesaver (WVOL) gave kids an alternative to the lazy days of summer with the WVOL Rail Camp June 27-July 1 at Camp Echo in Petersburg, W.Va. Twenty-five 12-17 year olds from West Virginia, Maryland and Minnesota participated in the camp. Ball and Reed also served as instructors/counselors for the camp.

The primary focus of the camp is to target this particular age group to encourage them to form rail-safe lifestyles. WVOL attempts to reduce injuries and fatalities at highway-rail grade crossings and railroad rights-of-way in West Virginia.

Throughout the week, campers were exposed to Operation Lifesaver instruction in addition to their daily activities which included swimming at Moorefield City Park and motorcar trips through Smokehole Caverns and Seneca Rocks. They also had an opportunity to operate antique hand carts in races coordinated by the Southern Branch Valley Railroad.



Above: Four students who attended West Virginia Operation Lifesaver's Rail Camp operate a hand car to reinforce railroad safety concepts.

For the past four years, RTI has partnered with CSX, Norfolk Southern and the West Virginia State Public Service Commission in Operation Lifesaver, which operates on volunteer labor—mostly from transportation professionals throughout the state.

WVOL volunteers are readily available to present to schools, civic groups, organizations, clubs, public transportation companies and trucking companies.

Transportation outreach on the WEB



As part of the Transportation Outreach on the Web, RTI has developed and hosts three interactive websites:

- **West Point Bridge Design Contest and Design a Future Vehicle Teacher's Corner Website**
 - **Intelligent Transportation Systems - LEGO Robotics City**
 - **Science and Engineering NASA Site of Remote Sensing (SENSORS City)**
- in addition to direct video links with several elementary schools in the Huntington area.



West Point Bridge Design Contest and Design a Future Vehicle Teacher's Corner Website

During Engineering Week, students at Student Aspect Preparatory School learned what it took to build bridges using West Point Bridge Designer. West Point Bridge Designer is a software tool that takes a student through the process of building truss bridges. Students at Student Aspect learned the basics of trusses, and then used the software to build and improve upon their designs.

The fundamentals of trusses were taught to the Student Aspect students by David Cartwright, an engineer at RTI. The students learned about how to make a truss structure that would not collapse, what geometry makes a truss, the algebraic equations that define a truss, and the nature of the forces in the members that make

up a truss structure. After the initial instruction, the students were taught the basics of the software program.

Once the students familiarized themselves with the program, teams of students started building bridges almost immediately. The program took the students through a set of choices about a bridge. For example, they could determine the type of truss with which they want to start, length of the bridge span, whether to use pillars in their bridge structures or not, and the materials in which the bridge would be made. Each choice had an effect on the strength and the final price of the bridge. Two completed bridges that the students made are shown below.



About 9 students participated in the project, with 4 of them planning to enter their designs in a bridge building contest sponsored by West Point. More information about the contest can be found at www.bridgecontest.usma.edu.

Left: Two Student Aspect Preparatory pupils work together to construct the most cost efficient bridge design.

RTI's Design a Future Vehicle (DFV) 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 DFV Teacher's corner.

Lesson plans for the following activities are available on the DFV Website. Children can build these projects with items that may be purchased at discount and electronic stores.



- Aluminum Foil Boats
- Hovercraft
- Simple Motor
- Newton's Law Car
- Remote Control Vehicle
- Production Line
- Seat Belt Egg Vehicle
- Solar Energy Collector
- Balloon-Powered Vehicles
- Bridge Experiment
- Magnetic Street Board

LEGO Robotics City

LEGO Robotics City is located in the information technology laboratory at RTI headquarters. This small, robotic city has two web cameras that provide live views of a simulated LEGO city with an oval track, two monorails, a traffic gate and an autonomous, line-following vehicle.

Middle school students learn the concept of teleoperation through this system, which is usually integrated into an Intelligent Transportation Systems LEGO Robotics workshop at RTI headquarters or through site visits to elementary schools by RTI staff.

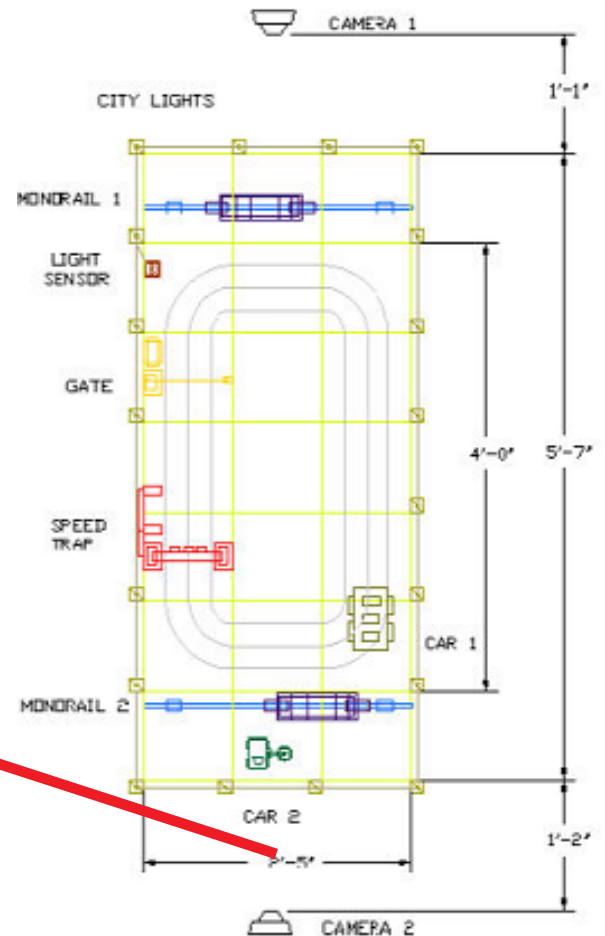
LEGO Robotics City can be operated through the web and viewed with a live web camera after viewers download Red Rover Operating System software from the RTI site.



Right: 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 advanced operations such as opening the traffic gate or moving the monorail.



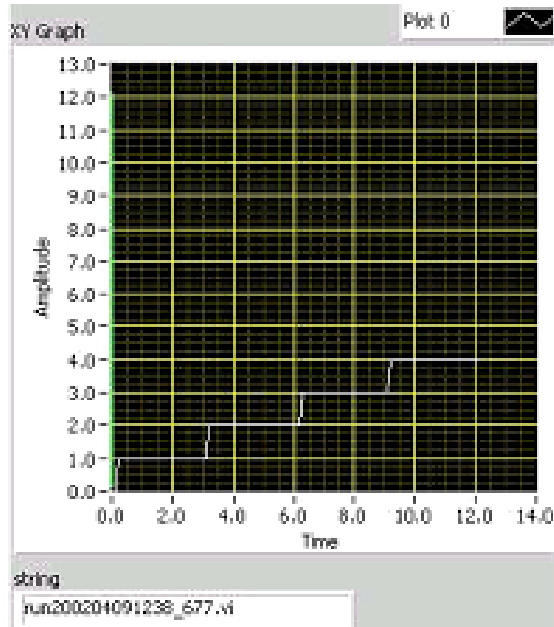
Top right: The red line shows an ITS monorail as seen from AppaLEGO City (viewed from web camera 2) and indicated on a schematic drawing.



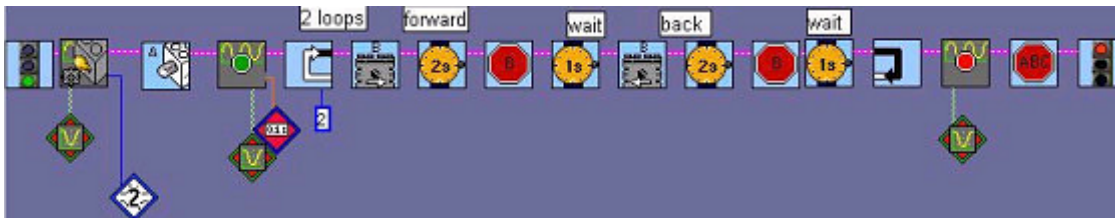
Science and Engineering NASA Site of Remote Sensing (SENSORS City)

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.

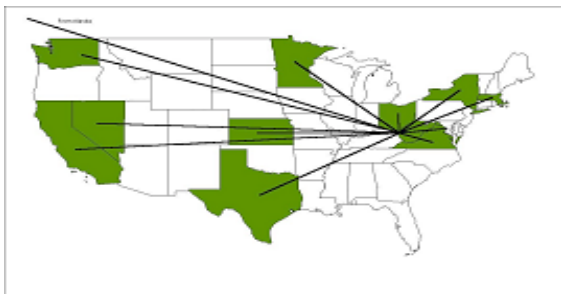
After a program or “mission” is submitted, the system returns results, which include graphs that illustrate data collected by the sensors, such as changes in direction, temperature, light or elevation. Computer programming challenges and competitions for students who have ROBO-LAB software are also posted on the SENSORS Site at www.sensorscity.marshall.edu.



Above: Shows the resultant graph that is returned to the sender if the program was executed properly. In this case, the graph shows four steps over time indicating that the monorail sensed it came into contact with 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.



Above: 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 strung together as opposed to written computer commands.



Above: Shows the location of SENSORS City “mission submitters.” The educational levels of the students range from middle school to high school.



Adopt-a-School Program

As part of RTI's Adopt a School program, RTI instructors use Robolab Cities and Transportation sets along with LEGO designed teacher curriculum to spark an interest in math and science among local students. The program takes place twice a month during the academic year.



Experiments conducted during Adopt a School sessions include:

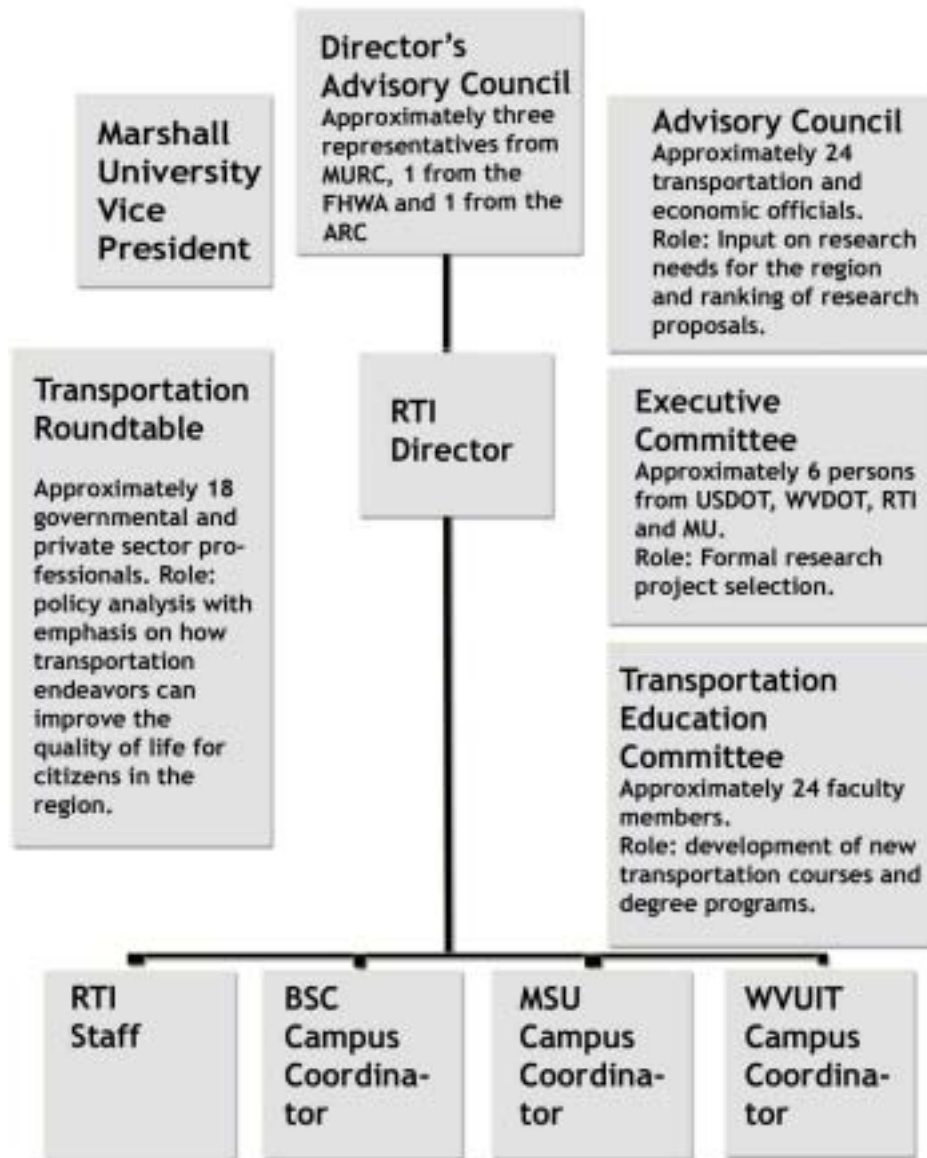
- Building 3-D objects using 2-D drawings
- Measuring speed using light sensors
- Learning about friction using LEGO cars
- Constructing rubber band powered cars
- Using LEGO CAD to design LEGO vehicles
- Programming LEGO Robotics one-turn vehicle
- Creating chain and pulley drive vehicles
- Operating a Robotic Arm
- Telecommunicating with LEGO RCX's
- Building a small transportation system using LEGO Robotics sets
- Gearing experiments using LEGO DUPLO
- Building a Snail Car
- Simulating a Cross Country Adventure
- Driving Bumper Cars
- Exploring gear trains: teaching ratios and proportions
- Programming cars to go into and out of a tunnel
- Building a snowplow
- Learning about "The Little Blue Engine"

Sponsored Schools

Barboursville Elementary
Davis Creek Elementary
Highlawn Elementary
Miller Elementary
Spring Hill Elementary
Student Aspect
Preparatory School
West Middle
Big Creek High
Village of Barboursville
Elementary
Martha Elementary
Salt Rock Elementary
Our Lady of Fatima
St. Joseph Grade School
Meadows Elementary



Management Structure



RTI Nick J. Rahall, II Appalachian Transportation Institute
 ARC Appalachian Regional Commission
 BSC Bluefield State University (formerly Bluefield State College)
 FHWA Federal Highway Administration
 MURC Marshall University Research Corp.
 MSU Mountain State University
 WVUIT West Virginia University Institute of Technology

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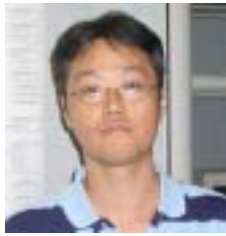
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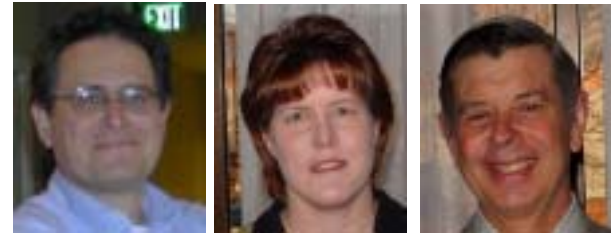
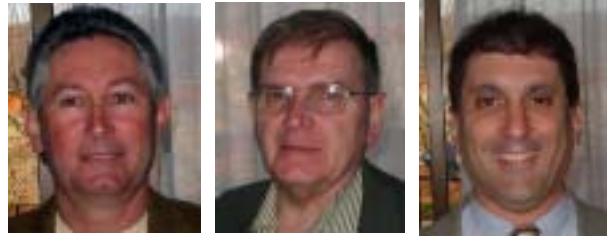
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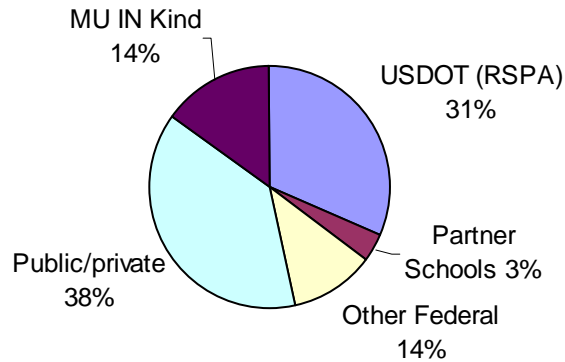
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 Appalachian Regional Commission
 Assumption College
 British Petroleum
 Business & Industrial Development Corporation
 CSX
 Cabell County Schools
 Cabell County Career Technology Center
 Federal Railroad Administration
 Greenbrier Valley Economic Development Corp.
 Great Kanawha Resource Conservation and Development Area
 Hatfield-McCoy Regional Recreation Authority
 Huntington Area Development Council
 KYOVA Interstate Planning Commission
 Lincoln County Economic Development Authority
 Marshall Community and Technical College
 Meadow River Enterprises, Inc.
 Mid-Ohio Valley Regional Planning and Development Council
 NOVHCC
 Norfolk Southern
 North Carolina Department of Transportation
 Ohio Department of Transportation
 Ohio Rail Development Commission
 Ohio River Valley Water Sanitation Commission (ORANSCO)
 Putnam County Development Authority
 Tennessee Department of Transportation
 Tennessee Valley Authority
 United States Department of Energy
 Wayne County Commission
 West Virginia Department of Natural Resources
 West Virginia Development Office
 West Virginia Disaster Recovery Board
 West Virginia Division of Highways
 West Virginia Geological and Economic Survey
 West Virginia Governor's Office
 West Virginia Housing Development Fund
 West Virginia Operation Lifesaver
 West Virginia Public Port Authority
 West Virginia Public Service Corp.
 West Virginia Trails Coalition



*Cash

NOTE: Expenditures include funds encumbered for the categories shown.

Number	Title	Principal Investigator
NEW		
TRP 00-02	Master Land Use Plans for Six Southern W.Va. Counties: A Regional Approach for Six Counties in Southern W.Va.	Mr. Bob Plymale
TRP 00-04	Expected Flood Damages to Transportation Infrastructures as a Proportion of Total Event Costs: A Methodological Exploration	Dr. Mark Burton
TRP 00-05	Integrated Track Stability Assessment and Monitoring System (ITSAMS) Phase III	Dr. Tony Szwilski
TRP 00-06	Transportation and Market Feasibility Analysis for Innovative Coal Combustion Byproducts to be Manufactured Adjacent to the I-64 High Tech Corridor in Southern W.Va.	Dr. Mark Burton
TRP 00-07	Opportunities to Improve Transportation Efficiencies through Enhanced Intermodal Capabilities and Increased Utilization of the Appalachian Development Highway System	Dr. Tony Szwilski
TRP 00-08	Development of a Research Protocol that Relates Culvert Structure to Fish Migration in Southern W.Va.	Dr. Mike Little
TTP 00-10	Improving Transportation Access to Rural Health Care in Lincoln County: Process Implementation	Dr. Mark Burton
TTP 00-11	Development of Transportation and Economic Development Information System (TEDIS) Delivered over the Internet for W.Va.	Mr. Sean Litteral
TTP 00-12	A Deployment Plan for the W.Va. High Technology Corridor	Dr. Michael Hicks
TTP 00-14	GIS of Major Transportation Corridors along the Kanawha River in West Virginia and along the Ohio River	
TTP 00-15	Harrison, Mingo and Webster County Tax Map Conversion	Mr. James Wolfe
TTP 00-17	Development and Evaluation of a GIS Mapping System for West Virginia's Hatfield and McCoy Trails System	Mr. Sean Litteral
TTP 00-18	Proposed GIS Mapping System for West Virginia's Appalachian Development Highway System (ADHS) Corridors	Mr. Sean Litteral
TTP 00-19	Proposed GIS Mapping System for Tennessee's Appalachian Development Highway System (ADHS) Corridors	Mr. Sean Litteral
TTP 00-21	Three-Dimensional Laser Scanner Pilot Project	Dr. Tony Szwilski
TTP 00-22	Proposed GIS Mapping System for Alabama's Appalachian Development Highway System (ADHS) Corridors	Mr. Sean Litteral
TTP 00-23	Hatfield-McCoy Trails Kentucky Expansion	Dr. Raymond Busbee
TTP 00-24	Proposed GIS Mapping System for Maryland's Appalachian Development Highway System (ADHS) Corridors	Mr. Sean Litteral
TTP 00-27	Proposed GIS Mapping System for Kentucky's Appalachian Development Highway System (ADHS) Corridors	Mr. Sean Litteral
TTP 00-28	Proposed GIS Mapping System for North Carolina's Appalachian Development Highway System (ADHS) Corridors	Mr. Sean Litteral
TTP 00-31	Proposed GIS Mapping System for Mississippi's Appalachian Development Highway System (ADHS) Corridors	Mr. Sean Litteral
TTP 00-32	Proposed GIS Mapping System for Pennsylvania's Appalachian Development Highway System (ADHS) Corridors	Mr. Sean Litteral
TTP 00-34	Proposed GIS Mapping System for Ohio's Appalachian Development Highway System (ADHS) Corridors	Mr. Sean Litteral
TTP 00-35	Proposed GIS Mapping System for New York's Appalachian Development Highway System (ADHS) Corridors	Mr. Sean Litteral
TTP 00-37	Proposed GIS Mapping System for Georgia's Appalachian Development Highway System (ADHS) Corridors	Mr. Sean Litteral
TTP 00-38	Proposed GIS Mapping System for South Carolina's Appalachian Development Highway System (ADHS) Corridors	Mr. Sean Litteral

ONGOING

TRP	99-01	Automated Road Extraction Using Satellite Imagery	Dr. Herbert Tesser
TRP	99-02	Preserving Branch Line Railroads	Dr. Mark Burton
TRP	99-06	Potential Uses of Fly Ash and Other Recoverable Materials in New Transportation Infrastructure Components	Dr. Tony Szwilski
TRP	99-09	Establishment of Pre-Construction Baseline Data as a Control for Evaluation of the Long-Term Success of a Mitigated Constructed Wetland Site (Case Study along the Tolsia Highway)	Dr. Mike Robinson
TRP	99-10	Endangered Species Identification along Corridors Using GIS	Dr. Mike Little
TRP	99-13	Commodity Flows in Northern W.Va.	Dr. Mark Burton
TRP	99-15	Impacts of the Appalachian Corridors on Small Business Development	Dr. Michael Hicks
TRP	99-16	McDowell County Transportation Project	Ms. Jennifer Plymale
TRP	99-18	ITS Research Initiation Project	Dr. Ashok Vaseashta
TRP	99-19	Public/Private Port Case Study	Dr. Mark Burton
TRP	99-23	Survey of Truck Parking Places (Private) in W.Va.	Ms. Jennifer Plymale
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.	Dr. Richard Begley
TRP	99-27	Using FLI-MAP Technology for Transportation Applications Research Initiation Demonstration Project	Mr. Bruce Mutter
TRP	99-32	Development of a GIS Implementation Strategy for WVDOT	Dr. Herbert Tesser
TRP	99-33	Major Corridor Financing Options	Dr. Michael Hicks
TRP	99-05-2	Use of Electroluminescence Technology for Highway Signage - Phase II Demonstration Highway Sign	Dr. Richard Begley
TRP	99-06-2	Potential Uses of Fly Ash and Other Recoverable Materials in New Transportation Infrastructure Components (Phase 2)	Dr. Tony Szwilski
TRP	99-10-2	Endangered Species Identification along Corridors in W.Va. Using GIS (Phase 2)	Dr. Mike Little
TRP	99-24-2	Improving the Efficiency of Truck/Rail Intermodal Transportation- The Case of W.Va. (Phase 2)	Dr. Mark Burton
TRP	00-01	Integrated Railroad Track Stability and Monitoring System: Phase II	Dr. Tony Szwilski

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TRP	99-00	Commodity Flows and Transportation Inventor for 13 Counties in Southern W.Va.	Dr. Mark Burton
TRP	99-03	Lincoln County Transportation Study	Dr. Mark Burton
TRP	99-04	An Assessment of Site-Specific Geotechnical, Spatial and Climatic Parameters that Influence the Integrity and Stability of Railroad Track	Dr. Richard Begley
TRP	99-05	Use of Electroluminescence Technology for Highway Signage	Dr. Richard Begley
TRP	99-07	Rockfall Rating, Evaluation and Data Management Systems for Highway and Railway Rockslopes	Dr. Tony Szwilski
TRP	99-08	Abandoned Tire Health Risk Survey/Analysis	Dr. James Joy
TRP	99-11	Maximizing Economic Benefits from a Rails to Trails Project in Southern W.Va.: A Case Study of the Greenbrier River Trail	Dr. Raymond Busbee
TRP	99-14	Drowsy/Fatigued Driving: Prevalence and Under-Reporting in W.Va.	Dr. Robert Walker
TRP	99-17	Magnetic Levitation Transportation and Economic Development Opportunities for W.Va.	Dr. Richard Begley
TRP	99-24	Railroad Tunnel Size Restrictions	Dr. Mark Burton

RESEARCH PROJECT DESCRIPTIONS

TRP 99-25	Improving Safety and Operational Conditions at Railroad Crossings: An Analysis of Bolt Installations, Designs and Torque Procedures	Dr. Richard Begley
TRP 99-29	Development of a Plan for a Non-Motorized Transportation Corridors in Southern W.Va.: Case Study for Alternate Sources of Transportation between Huntington and Charleston	Dr. Raymond Busbee

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