Annual Activity Report - 2003

Institute for Transportation Research and Education (ITRE)

North Carolina State University

This report summarizes ITRE's activities for the year 2003. The report first provides background information on the Institute's history, mission, goals and objectives. This is followed by an overview of the status of ITRE finances, personnel and technical activities conducted over the past year. Overall, despite the continuing decline in state support funds in the past few years, ITRE has been able to maintain and expand its programmatic activities and add staff and space. This is a testimony to the level of dedication and work ethic of the entire staff in these difficult economic times.

Center Description

The Institute for Transportation Research and Education (ITRE) is an inter-institutional center of the University of North Carolina System. Chartered by the North Carolina General assembly in 1978, ITRE carries out research, training and technical support activities in the area of surface transportation for a host of national, state, and local clients to address the nation's critical transportation issues. ITRE is committed to leadership in the study of surface transportation issues through the fostering of analytical thinking, integrating technology in education and research, serving as a catalyst for problem solving, and cultivating professionals and students dedicated to excellence in transportation.

Currently, ITRE is organized into six program areas covering highway systems, municipal technical services, North Carolina local technical assistance, public transportation, pupil (school) transportation, and transportation and the environment. A high-level organizational chart is shown in Exhibit I.

Summary of ITRE Goals:

ITRE's 2003 strategic plan has set forth five major institute-wide goals:
1. Increase national visibility
2. Conduct and disseminate research that impacts the transportation community
3. Sustain and enhance educational opportunities to improve the knowledge and skills of transportation professionals
4. Strengthen the relationship and gain recognition within the University System
5. Provide superior technical assistance

These goals are currently being achieved through various objectives, such as increased national exposure through conference presentations, published research and outreach efforts, increased national project awards, continuing training efforts on a national, regional and state level, and promoting collaboration with the department of Civil Engineering faculty at North Carolina State University and the UNC System.

This report provides a glimpse of this year's activities and accomplishments in reaching these goals and objectives. More information about ITRE's programs and staff are available through ITRE's home page: http://www.itre.ncsu.edu
Exhibit I - ITRE High-Level Organization Flow Chart
By Primary Program Areas
Summary of ITRE’s Finances
In the 2002-2003 Academic Year, ITRE had approximately 44 people on staff and generated nearly $6.6M in expenditures. ITRE has maintained and broadened the ongoing research and training activities under the direction of Dr. Nagui Rouphail, who was appointed as a permanent ITRE Director in January 2002. ITRE’s expenditures broken down by funding source are depicted in Exhibit II.

Exhibit II- FY 2003 Share of Expenditures by Funding Source

Overall, about 7% of all expenditures represent State Support appropriations to ITRE related to administration, with additional operations support of 4% coming from Indirect Cost Return. State and Federal Contracts total 46% of all activity, with state expenditures (38%) limited to those projects with North Carolina State Government agencies. Sales and Service activity (8%) is mostly registration fees for training workshops. Pass-Through projects to other departments at NCSU (22%) and other UNC universities (8%) are similar in volume to the previous year. Other Contracts (5%) include project activity primarily for municipalities and also include funding from other states or the private sector.
Exhibit III provides a comparison of ITRE's annual expenditures over the past 5 years. The 10% drop in expenditures in 2002-2003 compared to the previous year is mostly due to a reduction in CTE expenditures as a result of the discontinuation of their federal grant support in 2002. This has led to a 32% decrease in CTE's expenditures in the 2002-2003 FY. This temporary setback is now behind us. With the infusion of new federal dollars to the CTE program last year, the center's expenditures have rebounded by 32% in the first 6 months of FY 2003-2004, compared to the first 6 months of FY 2002-2003. In fact, we anticipate that in the current FY, ITRE will have its best record of expenditures since its inception in 1978.

With state resources increasingly coming under budget constraints (and lately, reductions), it is of utmost importance that state-supported institutes and centers demonstrate that they are providing a good return on the state investment in them. One way to measure the return on investment is by calculating the ratio of annual expenditures divided by state support dollars. Currently, the UNC Office of the President desires a ratio of 4.0 or higher.
Exhibit IV shows two plots. The top (blue) plot is the ratio of total annual expenditures divided by ITRE’s state appropriation. These expenditures include all pass-through research projects (internal to NCSU and external to other universities) and our portion of collected indirect costs distributed back to ITRE based on the previous year’s expenditures. The lower (red) plot excludes all pass-through projects from annual expenditures when calculating the ratio. In both cases, the ratio varies from 9.5 to 14:1, a clear indication of the Institute’s cost effectiveness from the University and the State of North Carolina perspectives.
Summary of Personnel Activities
In the year 2003, ITRE added four new program areas and created nine new positions. Exhibit V outlines the personnel changes for 2002-03 by program group.

<table>
<thead>
<tr>
<th>Program Group</th>
<th>Number of New positions</th>
<th>Number of new hires</th>
<th>New Program Areas</th>
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<tr>
<td>General Administration</td>
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<td>CTE</td>
<td>5</td>
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<td>Context Sensitive Solutions Training (CSS);</td>
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<td></td>
<td></td>
<td>Environmental Excellence Program (EEP)</td>
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<td>Highway Systems</td>
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<td>NC LTAP</td>
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<td>None</td>
<td>None</td>
</tr>
<tr>
<td>MTS</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Public Transportation</td>
<td>2</td>
<td>2</td>
<td>Bicycle and Pedestrian Program</td>
</tr>
<tr>
<td>Pupil Transportation</td>
<td>None</td>
<td>1*</td>
<td>None</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>9</strong></td>
<td><strong>8</strong></td>
<td><strong>4</strong></td>
</tr>
</tbody>
</table>

* This position was an established position that was vacant.
Summary of Technical Activities
ITRE’s Web site includes research and training directories that enable the user to search for specific ITRE activities. To explore our Web site for these activities go directly to each of these directory pages:
http://www.itre.ncsu.edu/ITREmain/research_directory.html
http://www.itre.ncsu.edu/ITREmain/training_directory.html

ITRE’s current research and education activities at the national, state and local levels are listed below:

National Research and Development
Research efforts at ITRE are quite significant. There are seventeen national-level projects listed below that are carried out by various program groups at the Institute.

Complex Computer Models Evaluation
Sponsors: National Institute for Statistical Sciences and National Science Foundation (N. Rouphail)

Development of a Community Impact Assessment Training Course
Federal Highway Administration (FHWA), (J. Martin)

CONVERGE—Where Transportation and the Environment Meet:
Public Education Project That Chronicles the Transportation/ Environmental Relationship Throughout American History
Sponsors: USDOT, FHWA, USEPA, Office of Transportation and Air Quality (J. Martin and K. McDermott)
http://www.converge.ncsu.edu

Design and Operations of Shared-Use Paths
Sponsor: FHWA (J. Hummer - CE Dept. NCSU; N. Rouphail and J. Milazzo)

Identification of Traffic Control Devices for Mobile Work Zone Operations
Sponsor: New Jersey Department of Transportation and CUNY (N. Rouphail)

International Conference on Ecology and Transportation (ICOET)
Sponsors: Federal Highway Administration (FHWA) in cooperation with other governmental and non-governmental organizations (J. Martin)
http://www.itre.ncsu.edu/cte/icoet

In-Vehicle Energy and Emissions Information Systems
Sponsor: National Science Foundation (N. Rouphail and Chris Frey, CE Dept, NCSU)

Listserv Moderation for the Ohio transit lists
Sponsor: Ohio Department of Transportation, Office of Transit (T. Cook)

Local Technical Assistance Program
Sponsors: Federal Highway Administration (FHWA) and NCDOT (J. Martin)
**Multi-Modal Level of Service for Urban Streets**  
NCHRP 3-70 project in cooperation with Dowling and Associates et al. (N. Rouphail)

**Municipal Technical Service Projects**  
Several projects that help municipal organizations implement, expand, or refine GIS databases.  
Sponsors: Individual municipalities (D. Grantham)

**National Association for State Directors of Pupil Transportation Services (NASDPTS) Web Site**  
Sponsors: NASDPTS (Jeff Tsai, L. Vandiford-Hobbs)

**Monitoring, Analyzing, and Reporting on Environmental Streamlining Pilot Projects Environmental Streamlining Pilot Projects**  
NCHRP 25-24 project. Sponsors: Vannasse Hangen Brustlin (prime), National Academy of Sciences (J. Martin and J. Myers)  

**Pedestrian Analysis and Modeling at Roundabouts**  
Sponsor: UNC-CH Highway Safety Research Center, National Institute of Health (NIH)  
(N. Rouphail)

**Strategies to Increase Coordination of Transportation Services for the Transportation Disadvantaged.** TCRP H-30  
Sponsors: Multisystems, Inc. (prime), National Academy of Sciences (T. Cook).

**Web site hosting of the National Association for State Directors of Pupil Transportation Services (NASDPTS)**  
Sponsors: NASDPTS (J. Tsai)

**Web site construction and hosting of the 14th National Conference on School Transportation (NCST)**  
Sponsors: NASDTS (J. Tsai)

**Wildlife, Fisheries, and Transportation Web Gateway**  
Sponsors: USDOT (K. McDermott)  
[http://www.itre.ncsu.edu/cte/gateway/index.html](http://www.itre.ncsu.edu/cte/gateway/index.html)
State of North Carolina Research and Development
Statewide projects in North Carolina were conducted mostly in conjunction with NC Department of Transportation and with local municipalities. This year was a particularly successful year for attracting sponsored research from state agencies. Some of these activities include:

**Annual Update to the Alternative-Fueled, Low Emissions Bus Purchase Plan**  
*Sponsor:* NCDOT PTD (T. Cook)

**Best Practices Managing School Campus Circulation (Carpool)**  
Development that included an interactive web based decision tree system  
*Sponsor:* NCDOT Governor’s Highway Safety Program (J. Tsai)

**Bicycle and Pedestrian Maps**  
*Sponsor:* NCDOT Bicycle and Pedestrian Division (T. Cook)

**Child Transportation Summit**  
*Sponsor:* NCDOT-GHSP (J. Tsai)

**Context Sensitive Solutions Training**  
*Sponsor:* North Carolina Department of Transportation, (J. Martin)

**Developing a proposal to serve as the Service Bureau for the Triangle Regional Model (TRM).**  
The proposal was accepted by the TRM Executive Committee and approved by stakeholder Technical Advisory Committees for implementation July 2003 (R. Foyle).

**Developed conceptual statement for School Transportation Research as one of the major UNC research initiative**  
Combined efforts among ITRE, UNC-Highway Safety Research Center, and UNC-Charlotte-Office for Transportation Policy Studies  
*Sponsor:* NCDOT Governor’s Highway Safety Program, NCDPI (J. Tsai)

**Developing the concept proposal for a UNC Institute for Disaster Studies**  
(N. Rouphail)

**Develop Distance Learning Materials - Phase II**  
*Sponsor:* NCDOT (T. Brown, Jr.)

**Distinguished Speaker Series**  
*Sponsors:* US DOT and NCDOT (K. McDermott)  
[http://www.itre.ncsu.edu/cte/DSS.html](http://www.itre.ncsu.edu/cte/DSS.html)

**Enhancement of web-based interactive School Bus Safety Web site**  
*Sponsor:* NCDPI (J. Tsai)  
[http://www.ncbussafety.org](http://www.ncbussafety.org)

**Effects of Increased U-Turns at Intersections on Divided Facilities and Median Divided versus Five-Lane Undivided Benefits**  
*Sponsor:* NCDOT (J. Hummer – CE Dept. NCSU; R. Foyle and J. Milazzo II)
Expanding the Use of Photo Enforcement to Enhance Traffic Safety in North Carolina
Sponsor: NCDOT GHSP (J. Milazzo II)

Facilitate NCDOT Research Administration
Sponsor: NCDOT (R. Foyle)

False Capacity for Lane Drops
Sponsor: NCDOT (J. Hummer – CE Dept. NCSU; N. Rouphail)

Guidebook for Bike and Pedestrian Policies, Procedures, and Laws
Sponsor: NCDOT Bicycle and Pedestrian Division (T. Cook)

Graduate Research Fellowship Program
Sponsors: US DOT and NCDOT (J. Martin)
http://www.itre.ncsu.edu/cte/CTEFELLOWSHIP99.html

Highway Safety Research Center (HSRC) Heavy Vehicle Crash Study
Partnered with HSRC, UNC-CH
Sponsors: NCDOT-DMV (D. Grantham)

Hillborough Street Roundabout Modeling and Visualization
Sponsor: NCDOT (N. Rouphail)

Identification of School Related Injuries
Sponsors: NCDOT Governor’s Highway Safety Program (J. Tsai)

Incident Management Assistance Patrols: Assessment of Investment Benefits and Costs
Sponsor: NCDOT (A. Khattak – Dept. of City and Regional Planning UNC-Chapel Hill; N. Rouphail)

Integrated Planning for School and Community
For 9 of the counties in the North Carolina School System
Sponsor: individual school districts (J. Tsai, M. Miller)

Listserv Moderation for the Ohio transit list
Sponsor: Ohio Department of Transportation, Office of Transit (T. Cook)

NCDOT Maintenance Technical Assistance Program
Sponsor: NCDOT (T. Baughman)

NCDOT Technical Training Needs Research and Implementation Support
Sponsor: NCDOT (R. Foyle)

North Carolina Air Quality Roundtables
Sponsors: US DOT and NCDOT (J. D’Ignacio)
http://www.itre.ncsu.edu/cte/NCAirQuality/index.html

North Carolina Level of Service Program
Sponsor: NCDOT (Bob Foyle and N. Rouphail)

North Carolina School Bus Safety Web Enhancement (J. Tsai, L. Vandiford-Hobbs)
Operational Evaluation of Emissions and Fuel Cell Use of B20 versus Diesel Vehicles.
Sponsor: NCDOT (H. C. Frey and N. Roupail)

Outreach Support Activities for NCDOT Research Program
Sponsor: NCDOT (R. Foyle)

Pedestrian Safety Roadshows
Sponsor: NCDOT Bicycle and Pedestrian Division (T. Cook)

Phase IV Planning Assistance and Support Services to the NCDOT Rail Division
“Highway-Railroad Crossing Hazard Elimination Program of the North Carolina Department of Transportation”
Sponsor: NCDOT Rail Division (T. Cook)

Phase VI Planning Assistance and Support Services to the NCDOT Rail Division
Attitudinal, traffic intercept and business surveys of possible Raleigh-Wilmington passenger rail service.
Sponsor: NCDOT Rail Division (T. Cook)

Private Sector Partnerships with Pavement Management
Developing Pavement Management Systems, including the implementation of a pen-top computer application for field data collection inventories and a pavement condition and ranking system. ITRE offers a GIS-linked pavement survey system.
Sponsors: State of North Carolina municipalities (D. Grantham)

Professional Enhancement Program
Sponsor: NCDOT (T. Brown, Jr.)

Rail Intern Program
Sponsor: NCDOT Rail Division (T. Cook)

Recruitment, Selection, and Retention of Community Transportation System Personnel
Development of toolkit of recommended human resources management policies and procedures for local transit systems
Sponsor: NCDOT PTD (T. Cook)

“Regionalizing Public Transportation Services”
Conducted research and public involvement activities to start development of regional transit systems, based on findings from study conducted in previous year.
Sponsor: NCDOT Public Transportation Division (T. Cook)

Southern Region Workshop on Community Impact Assessment
Sponsors: Federal Highway Administration, Transportation Research Board, NCDOT (K. McDermott)
http://www.itre.ncsu.edu/cte/CIA/index.html

Technical support for the Transportation Information Management System (TIMS)
Sponsor: NCDPI (A. Michael, J. Tsai)

Teach Fundamental Engineering Principles Program
Sponsor: NCDOT (R. Foyle)

Technical Assistance services for NCDOT
Sponsor: NCDOT (R. Foyle)
Technology Transfer of NCDOT Environmental Research
*Sponsors:* US DOT and NCDOT (K. McDermott)
http://www.itre.ncsu.edu/cte/cterip.html

**TOG/UTAP 2002-2003**
Provides technical assistance, preparation and implementation of NC Technology Plan, and technical support to NC transit systems using scheduling software, a continuation of program efforts started in Fiscal Year 93-94. ITRE currently works with 103 systems on different levels of technology.
*Sponsor:* NCDOT Public Transportation Division (D. Collins)

**Traffic Signal Training and Testing Center-Site Development**
*Sponsor:* NCDOT GHSP (R. Foyle)

**Traffic Signal Training and testing Center- Curriculum Development**
*Sponsor:* NCDOT GHSP (R. Foyle)

**Transit Grant Information System (TGIS)**
Redesign and improvements to grant management database
*Sponsor:* Ohio Department of Transportation, Office of Transit (T. Cook)

**Transportation Demand Management (TDM)**
A statewide TDM plan is being developed for the urban and rural commute-to-work activities. This effort is in response to Senate Bill 953 and the air quality reductions expected by Fiscal 2009.
*Sponsor:* NCDOT Public Transportation Division (D. Collins)

**Work Zone Safety Training for SC DOT**
*Sponsor:* SCDOT (T. Baughman)
Recent Presentations
Presentations have been made at various conferences and at the January meeting of the Transportation Research Board (TRB).

“Analysis of North Carolina Guidelines and Criteria for Establishing School Walk Zones,”
Jeff Tsai, T. Rhoulac, A. Henry, B. Hall

“Assessing Uncertainties in Traffic Simulation: Key Component in Model Calibration and Validation,”
M. J. Bayarri, University of Valencia, Spain, James O. Berger, Duke University, German Molina, Duke University, Nagui M. Rouphail, North Carolina State University, Jerome Sacks, National Institute of Statistical Sciences

Best Practices in Managing School Campus Carpool Traffic (04-3953).
*TRB, Washington, D.C., 2004*
Jeffrey C. Tsai, North Carolina State University, Joel C. Cranford, North Carolina Department of Transportation, Jae-Joon Lee, North Carolina State University

Integrated Planning for Schools and Community
*2004 N.C. Educational Facility of Planners Conference, Charlotte, N.C., January 2004*
Mike Miller, North Carolina State University

“Methodology for Prioritizing and Expanding Freeway Service Patrols,”
*TRB, Washington, D.C., 2004*
Asad Jan Khattak, University of North Carolina, Chapel Hill, Nagui M. Rouphail, North Carolina State University, Karl Monast, University of North Carolina, Chapel Hill, Jason Havel, North Carolina State University

“Simulation of Pedestrian Crossing in Roundabout Areas Using Arena,”
*TRB, Washington, D.C., 2004*
Baohong Wan, North Carolina State University, Nagui M. Rouphail, North Carolina State University

Student Enrollment Projection and Demographics
*2004 N.C. Educational Facility and Planners Conference, Charlotte, N.C., January 2004*
Jeff Tsai, North Carolina State University

The True Costs and Risks of School Transportation
*National Association of School Business Officers 2003 Conference, Charlotte, N.C., 2003*
Jeff Tsai, North Carolina State University

“Consolidation of Rural Single-County into Multi-County Regional Transit Systems,”
*TRB, Washington, D.C., 2003*
Tom Cook, North Carolina State University
Referred Papers (published or in press)

Comparison of Capacity Models for Two-Lane Roundabouts (03-4525)
Ola Hagring, Lund University, Sweden
Nagui Rouphail, North Carolina State University
Henning Axel Sorensen, Denmark Road Directorate

Effect of Arterial Signalization and Level of Service on Measured Vehicle Emissions (03-884)
Alper Unal, North Carolina State University
Nagui Rouphail, North Carolina State University
Christopher Frey, North Carolina State University

Measured Distributions of Control Delay on Signalized Arterial (03-2084)
James Colyar, Federal Highway Administration
Nagui Rouphail, North Carolina State University

Consolidation of Rural Single-County into Multi-county Regional Transit Systems (03-4041)
Thomas J Cook, North Carolina State University
Judson J. Lawrie, North Carolina State University
Andrew J. Henry, North Carolina State University

Analysis of North Carolina Guidelines and Criteria for Establishing School Walk Zones (03-2665)
Jeffrey C. Tsai, North Carolina State University
Andrew J. Henry, North Carolina State University
Tori Rhoulac, North Carolina State University
**Summary of Education/Training and Outreach**

ITRE's combined training activities educated more than 9,300 individuals this year. Some of the education opportunities included Work Zone Safety, offering 208 workshops; the Center for Transportation and the Environment's (CTE) National Teleconference Series and Context Sensitive Solutions Design; the Local Technical Assistance Program, offering more than 54 workshops to local government employees; and training classes through the Public Transportation Group, GIS and Pupil Transportation Group. The Public Transportation Group conducts approximately 30 courses at ITRE and additional classes off-site. The Highway Systems Group provides training on Maintenance Technical Assistance, Professional Enhancement and Fundamentals of Engineering Principles program. These programs have always had a good track record and operate close to capacity. Software has been purchased in hopes of providing more distance education opportunities in the future. Several groups are learning the software now to prepare classes for next year. Training areas are depicted in Exhibit VI.

**Exhibit VI. Summary of Training Activities in 2003**

<table>
<thead>
<tr>
<th>PROGRAM AREA</th>
<th>TRAINING/ WORKSHOPS IN 2003</th>
<th>HOURS</th>
<th>ATTENDEES*</th>
</tr>
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<tbody>
<tr>
<td><strong>CTE</strong></td>
<td>Context Sensitive Solutions</td>
<td>360</td>
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<td>Teleconference Series</td>
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<td><strong>Highway Systems</strong></td>
<td>AASIDRA</td>
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<td></td>
<td>Construction Stakeout</td>
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<td>Drainage Maintenance</td>
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<td></td>
<td>FEP Program for NC DOT Technicians</td>
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<td>Flagger Training and Certification</td>
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<td>Fundamentals of Engineering FE Review Course</td>
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<td>Highway Capacity Manual Workshops</td>
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<td>Highway Engineering Concepts (HEC)</td>
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<td>Design of Modern Roundabouts</td>
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<td>Professional Engineering PE Review</td>
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<td>Traffic Analysis Software Workshops</td>
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<td>Traffic Signal Timing</td>
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<td></td>
<td>Work Zone Safety</td>
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<td><strong>Municipal Technical Services</strong></td>
<td>Advanced Arc GIS (New)</td>
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<td>Database Design/Editing Geographic data in ARCGIS</td>
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<td>Introduction to ArcGIS</td>
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<td>Introduction to ArcPad 6.0</td>
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<td>Migrating from ArcView 3.x to Arc GIS</td>
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<td>Visualizing Data with ArcView 3x</td>
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<td><strong>NC LTAP</strong></td>
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<td>Americans with Disabilities Act (ADA)</td>
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<td>Asphalt Pavement Maintenance</td>
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<td>Basic Drainage/Roadway Drainage Maintenance</td>
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<td>Basic Work Zone Safety</td>
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<td>Excavation Safety</td>
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<td>Experienced Supervisors</td>
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March 16, 2004
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<tr>
<th>PROGRAM AREA</th>
<th>TRAINING/ WORKSHOPS IN 2003</th>
<th>HOURS</th>
<th>ATTENDEES*</th>
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<tr>
<td>First Time Managers</td>
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<tr>
<td>Flagger Training</td>
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<td>Flagging Instructor Training</td>
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<td>Geotextiles in Soil Structures &amp; Pavement</td>
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<tr>
<td>Guardrail Design, Installation &amp; Maintenance</td>
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<tr>
<td>How to Deal with Difficult People</td>
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<tr>
<td>Inspection &amp; Construction of Asphalt Pvmt.</td>
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<tr>
<td>Intermediate Work Zone Safety</td>
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<tr>
<td>Maintenance &amp; Repair of Utility Cuts</td>
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<td>Risk Management &amp; Tort Liability</td>
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<tr>
<td>Snow &amp; Ice Control</td>
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<td>Soils Fundamentals</td>
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<td>Trenching “Competent Person” Training</td>
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<td>Vegetation Management</td>
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<td>What’s New in Asphalt Paving</td>
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<td><strong>Pupil Transportation</strong></td>
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*Attendees to be updated
Student Support

ITRE projects have supported a large number of students from various disciplines and universities over the past five years. The table below summarizes our track record on student support, indicating a surge in graduate student involvement at ITRE.

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<td>47</td>
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</table>

As seen above, the past three fiscal years have seen a significant increase in the students we are supporting through our projects. This is a result of our making a conscious effort in seeking ways to involve students in our activities. Many of the students are seeking careers in transportation, and we are glad we provide an environment where transportation research and education is seen as a rewarding career.

Students have come from the following 17 degree programs:

- Biology
- Business
- Civil Engineering
- Communication
- Computer Science
- Ecology
- English
- Environmental Management
- Forestry
- Graphic Design
- Management
- Natural Sciences
- Political Science
- Public Administration
- Sociology
- Transportation Planning
- Wetland Ecology
Appendix - Summary of Program Areas

Center for Transportation and the Environment

- As a U.S. Department of Transportation university transportation center of excellence, the Center for Transportation and the Environment (CTE) conducts research, education, and technology transfer activities that seek to mitigate the impacts of surface transportation on the environment. CTE's mission is national in scope, although CTE co-sponsors activities and makes its services available at the local, state, and regional levels as well. CTE has provided over a decade of service to transportation and environmental professionals and has played a pivotal role in developing the next generation of professionals who will be charged with meeting future mobility needs in an environmentally sound manner.

Highway Systems

- The Highway Systems Group developed out of the early research and development efforts in the 1980’s on projects for the Division of Highways of NCDOT. Today’s efforts expand upon that base of knowledge to include focus areas such as: Transportation Policy, Traffic Operations, Work Zone Safety, Maintenance Operations, Professional Development Training, and Professional Engineering Review.

Municipal Technical Services

- The Municipal Technical Services Program (MTSP) at ITRE is comprised of 4 technical staff members that provide a wide range of technical services to state and local governments throughout the Mid-Atlantic region.

NC Local Technical Assistance Program

- The Federal Highway Administration (FHWA) established the North Carolina Local Technical Assistance Program in 1982. The NC LTAP center plays a leading role in helping state and local government agencies assess and apply new transportation technologies through a broad spectrum of highway research, training and transportation planning activities. North Carolina’s LTAP Program offers four primary types of assistance:
  - Training Workshops
  - Technical Materials
  - Technical Information Services
  - Quarterly Newsletters
Public Transportation

- Overall Public Transportation activities have been conducted for public transit, passenger rail, and bicycle and pedestrian sponsors at the national and state levels. Planning activities have encompassed:
  - Transit: organizational coordination/consolidation, operations, technology implementation, financial, and human resource management
  - Rail: service expansion/improvement

Operations activities have involved:
- Transit: scheduling and dispatch, maintenance, policies and procedures
- Rail: policies and procedures
- Taxicab: excellence in customer service
- Bicycle and Pedestrian: regulations, policies and procedures

Training activities include:
- Transit: scheduling and dispatching software, effective management using database and spreadsheet techniques
- Taxicab: effective use of technologies, maintenance, marketing, and risk management

Applied research has resulted in the development of products including:
- Transit: software to assist in scheduling, billing, and reporting
- Rail: assessment of state safety programs now in place
- Taxicab: educational videos promoting effective regulatory practices and benefits to independent contractor drivers for providing excellent customer service
- Bicycle and Pedestrian: compilation of best practices in state laws and regulations, and educational seminars on developing effective local bicycle and pedestrian practices

Pupil Transportation

- The mission of the Pupil Transportation Group is to apply transportation engineering principles and technology to the operation and management of multi-modal school transportation in order to provide for safe and efficient transportation of school children. The key to the success of the pupil transportation group is its partnership with local education agencies, state agencies, universities, national associations, and private industries.