Foreword

Nagui M. Rouphail, PhD
ITRE Director

Another year has come and gone quickly! Happy New Year 2008 to our staff, clients and friends, and I hope next year brings additional success to all our endeavors, whether professional or personal. Like every recent year, there were many positive developments and some setbacks in ITRE’s path towards gaining national recognition, maintaining our cutting-edge research, and providing a state of the art working environment for our staff. We note with some sadness the departure of Katie McDermott as ITRE Communications Manager and CTE Technology Transfer Director so she can spend more time with her family. Katie has served in various positions at ITRE and CTE over the past 20 years. Her unparalleled dedication and contributions to this Institute will be sorely missed.

Year 2007 has seen a few firsts. ITRE, in partnership with the civil, construction and environmental engineering department and with generous financial assistance from many local sponsors, hosted the first formal NC State University Transportation Research Board reception in January in Washington, D.C. The event was so successful that it is planned to be an annual gathering, assuming that financial support continues. In addition, in June of this year, ITRE was a signatory to a formal Memorandum of Understanding between NC State University and the University of Aveiro in Portugal to cooperate in the area of transportation and the environment. This international component is one that we value and hope to expand with other entities around the world, and, of course, is a first for us as an Institute.

ITRE remains on strong financial footing, with total expenditures this past fiscal year nearing $9.86M. While this figure represents a drop of 6.4% from the previous fiscal year, most of the reduction can be attributed to a substantial drop in pass-through funds to other entities outside ITRE, which fell by nearly 20%. Our in-house expenditures dropped by a mere 1.84%. The source of the shortfall was mostly precipitated by a reduction in CTE core federal funding as a Tier-II Center. While we are also making progress on moving forward with our proposed FAA Center of Excellence initiative, it will probably take a year or two to see the fruits of that labor reflected in our accounts. A candid assessment of our short-term financial outlook is that expenditures are likely to be stable over the next couple of years with no significant gains (or losses) unless and until our major initiatives are funded. Despite all of this, ITRE continues to generate record overhead receipts for the University and ITRE’s operations in FY 2007 were approaching $1M. Our outreach programs continue to be strong, with nearly 10,000 participants in the past year.

In conclusion, I would like to again thank our entire staff for their dedication and professionalism in making ITRE what it is today, a well-rounded University-based Institute in service to the national, state and local transportation agendas. We are optimistic that 2008 will bring additional opportunities and challenges that I am confident our ITRE team can collectively meet.

_________________
Nagui M. Rouphail, PhD
ITRE Director
# Table of Contents

Center Description .................................................................................................................. 3  
Summary of ITRE Goals ........................................................................................................ 3  
Summary of ITRE's Finances ................................................................................................. 5-8  
Summary of Personnel Activities ......................................................................................... 9  
Summary of Technical Activities .......................................................................................... 10-25  
  National Research and Development .................................................................................. 10-11  
  National & International Committee and Panel Participation .......................................... 12-13  
  NC and Local Research & Development .......................................................................... 13-16  
  Active Pass-Through Projects ......................................................................................... 17-18  
  Other Projects ................................................................................................................. 18-19  
  TRB Presentations ........................................................................................................... 20-21  
  Published Papers ............................................................................................................. 22-23  
  Conference Attendance, Participation and Exhibits ......................................................... 24-26  
Summary of Education/Training and Outreach .................................................................. 27-28  
Student Support .................................................................................................................. 29  
Post-Doctoral Fellows and Visiting Scholars ......................................................................... 30  
Marketing/Public Relations Outreach .................................................................................. 31  

**Exhibits**

  Exhibit I - ITRE High-Level Organization Flow Chart .................................................... 4  
  Exhibit II - Expenditures by Source, FY 06/07 ................................................................. 5  
  Exhibit III - Comparison of ITRE Expenditures ............................................................... 6  
  Exhibit IV - Tracked ITRE Expenditures/State Appropriated Funds ................................ 7  
  Exhibit V - Tracked F & A Generation in 6-Year Period ................................................. 8  
  Exhibit VI - Personnel Activities in 2007 ....................................................................... 9  
  Exhibit VII - Summary of Training Activities in 2007 .................................................... 27-28  

**Appendix** - Summary of Program Areas ......................................................................... 32-34
Annual Activity Report - 2007

Institute for Transportation Research and Education (ITRE)
North Carolina State University

This report summarizes ITRE’s activities for the year 2007. 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. We are pleased to report that ITRE has been able to maintain and expand its programmatic activities.

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 groups covering highway systems; visual analytics, modeling and simulation (VAMS); North Carolina local technical assistance (LTAP); public transportation; pupil (school) transportation; and the Center for Transportation and the Environment (CTE). An updated high-level organizational chart is shown in Exhibit I.

Summary of ITRE Goals:
ITRE’s strategic plan, developed in 2002, 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 with, and gain recognition within the University System.
5. Provide superior technical assistance.

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

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 Web site: www.itre.ncsu.edu
Exhibit I- ITRE High-Level Organization Flow Chart: Primary Program Groups

Dr. Nagui Rouphail  
Director

Robert Foyle  
Associate Director and  
Director  
Highway Systems

Linda Lancaster  
Director  
Finance and Contracts

Dr. E. Downey Brill  
Director  
Center for Transportation and the Environment

Dr. Ronald Hughes  
Director  
Visual Analytics, Modeling and Simulation (VAMS)

Debra Collins  
Thomas Cook  
Co-Directors  
Public Transportation

James Martin  
Director  
North Carolina Local Technical Assistance

Jeffrey Tsai  
Director  
Pupil Transportation
Summary of ITRE’s Finances
For the most recent Fiscal Year (06/07) for which complete figures are available, expenditures are broken down by the funding source as shown in Exhibit II below.

Exhibit II – ITRE Expenditures by Source – FY 06/07

Overall, about 5% of all expenditures represent State Support appropriations to ITRE related to administration, with additional operations support of 3% coming from Indirect Cost Return. State and Federal Contracts total 51% of all activity, with state expenditures (36%) limited to those projects with North Carolina State Government agencies. Those figures are stable when compared to the 50% share for FY 05/06. Sales and Service activity (7%) is mostly registration fees for workshops. Pass-Through projects to other departments at NCSU (22%) and other UNC universities (8%) are slightly lower than the previous year (32%). Other Contracts (4%) include project activity for local municipalities and funding from other states.
Tracked ITRE Expenditures in 6-year period

Exhibit III tracks ITRE’s annual expenditures over the past six years. The total expenditures include all pass-through projects to entities outside ITRE.

While ITRE’s total expenditures have obviously decreased in FY06/07 compared to the previous cycle (by 6.4%), this reduction is due primarily to a substantial drop in our pass-through project funds (by nearly 20%). Our in-house activities are not substantially different from last years’, dropping by about 1.85%. As indicated in the last annual report, the federal reduction due to the new CTE designation is beginning to be reflected in our expenditures, while our ongoing, and long term, major initiative on the Center of Excellence for Aviation Technology has yet to generate significant dollars. We anticipate this leveling off to continue for the next year or two.

Exhibit III - Comparison of ITRE Expenditures
Exhibit IV shows three trend lines. The top line represents the ratio of total annual expenditures divided by ITRE’s state appropriation. Total expenditures include all pass-through research projects and our portion of collected indirect costs distributed back to ITRE based on the previous year’s expenditures. The middle line excludes all pass-through projects from annual expenditures when calculating the ratio, basically reflecting the value of in-house research activities. In both cases, the ratio continues to be well above the indicated 4.0 target ratio cited in a recent UNC Office of the President Interinstitutional Centers Report (lower line).

Exhibit IV - Tracked ITRE Expenditures/State Appropriated Funds
Despite the slight reduction in our in-house expenditures last year, ITRE continues to generate substantial F&A funds for its operations, as well as for the University as indicated in Exhibit V. Last year we were only $22,000 short of generating $1 million in annual overhead receipts. We continue to receive between 30-35% of these funds back to enable the operation of the center, and to provide incentives to our staff for improving our national visibility.

**Exhibit V – Tracked F & A Generation in 6-Year Period**
Summary of Personnel Activities

In 2007, ITRE created 3 new positions and hired a total of 7 personnel. ITRE had 43 staff members at the end of 2007. Exhibit VI outlines the personnel changes for 2007 by program group.

### Exhibit VI - Personnel Activities in 2007

<table>
<thead>
<tr>
<th>Program Group</th>
<th>New positions</th>
<th>New hires</th>
<th>New Program Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Administration</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>CTE</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Highway Systems</td>
<td>1</td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td>NC LTAP</td>
<td>None</td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td>VAMS*</td>
<td>1</td>
<td>2</td>
<td>None</td>
</tr>
<tr>
<td>Public Transportation</td>
<td>1</td>
<td>2</td>
<td>None</td>
</tr>
<tr>
<td>Pupil Transportation</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Triangle Regional Model Services Bureau</td>
<td>None</td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3</strong></td>
<td><strong>7</strong></td>
<td><strong>None</strong></td>
</tr>
</tbody>
</table>

*Visual Analytics, Modeling and Simulation

The changes in personnel activities reflect the new funding situation in 2007. With CTE core funding down, no new positions or new hires were made. The VAMS program, on the other hand, has expanded by two new hires reflecting additional funding obtained at both the federal and state levels.
Summary of Technical Activities

ITRE’s active research and education projects at the national, state and local levels are listed below for the calendar year 2007.

Federal Research and Development

Federal Research activities at ITRE are quite significant. There were 21 national-level projects that were carried out by various program groups at the Institute.

- **2007 Eisenhower Graduate Fellowship**  
  Sponsor: USDOT (N. Rouphail)

- **Center for Transportation and the Environment Continuing Operations**  
  Sponsor: USDOT (J. Martin)

- **CTE Tier II UTC**  
  Sponsor: USDOT (J. Martin)

- **EPA Sponsorship of ICOET 2007**  
  Sponsor: EPA (K. McDermott)

- **FHWA Environmental Excellence Awards Support for the ICOET 2007**  
  Sponsor: FHWA/USDOT (K. McDermott)

- **FHWA Sponsorship of the 2007 ICOET**  
  Sponsor: FHWA/USDOT (K. McDermott)

- **FTA RTAP National Program Multi-Part Study and Analysis of Rural Transit Characteristics**  
  Sponsor: RLS & Associates, Inc. (T. Cook)

- **FTA Teleconferences**  
  Sponsor: FTA (J. Martin)

- **Hazmat Truck Security Pilot**  
  Sponsor: Commercial Vehicle Safety Alliance/USDOT (R. Hughes)

- **In-Vehicle Energy and Emissions Information Systems**  
  Sponsor: National Science Foundation (N. Rouphail)

- **Multi-Part Study and Analysis of Rural Transit Characteristics**  
  Sponsor: American Public Works Association (T. Cook and J. Lawrie)

- **NCHRP Project 3-70: Multimodal Arterial Level of Service**  
  Sponsor: Dowling & Associates, Inc. (N. Rouphail)
NCHRP Project 3-78: Crossing Solutions at Roundabouts and Channelized Turn-Lanes for Pedestrians with Visions Disabilities
Sponsor: TRB (R. Hughes)

NCHRP Project 3-83: Low-Cost Improvements for Recurring Freeway Bottlenecks
Sponsor: Dowling & Associates, Inc. (N. Rouphail)

NCHRP Project 8-36 Task 66 – Improved Methods for Assessing Social, Cultural and Economic Effects of Transportation Projects
Sponsor: Cambridge Systematics (L. Lane)

Sponsor: NCHRP (L. Lane)

NCHRP Project 25-30: Temporary Bridging to Avoid or Minimize Impacts to Waters and Wetlands During Highway Construction
Sponsor: Mulkey, Inc. (J. Martin)

Pedestrian Safety Enhancement on Hillsborough Street Roundabout Corridor Project
Sponsor: Southeastern Transportation Center – University of Tennessee (N. Rouphail)

Phase II Blind Pedestrian Crossings at Complex Intersections
Sponsor: Western Michigan State University/NIH (N. Rouphail)

Regional Development Population Trend and Technology Change Impacts on Future Air Pollution Emissions
Sponsor: UNC-Chapel Hill and EPA (N. Rouphail)

Support for Development of the Maintenance Academy Course for the National Highway Institute
Sponsor: Perform Tech/FHWA/NHI (R. Foyle and J. Martin)

Ubiquitous Transportation Network Modeling and Simulation
Sponsor: Seoul National University, South Korea (N. Rouphail)

Web site hosting and maintenance for 4 nationally recognized agencies:

National Association for State Directors of Pupil Transportation Services: http://www.nasdpts.org

National Congress on School Transportation: www.ncstonline.org

North Carolina School Bus Safety: www.ncbussafety.org

North Carolina Section of Institute of Transportation Engineers: www.ncsite.org
2007 National & International Committee and Panel Participation

Committees and Task Force Participation

TRB Committees
- Bicycle Transportation Committee ANF20 (M. Meletiou)
- Committee on Environmental Analysis in Transportation ADC10 (D. Brill)
- Environmental Justice Committee ADD50 (L. Lane)
- Highway Capacity and Quality of Service Committee AHB40 (R. Foyle, B. Schroeder)
- Paratransit Committee AP060 (T. Cook)
- Social and Economic Committee ADD20 (L. Lane)
- Traffic Law Enforcement Committee ANB40 (C. Cunningham)
- Transportation Safety Management Committee ANB10 (J. Tsai)
- TRB Visualization in Transportation, ABJ95 (R. Hughes)
- Work Zone Safety Committee AHB55 (T. Baughman)

TRB Subcommittees
- Community Impact Assessment (L. Lane)
- Freeway and Multilane (N. Rouphail)
- Research Needs (R. Hughes)
- School Transportation (J. Tsai)
- Signalized Intersections (N. Rouphail)

TRB Task Force
- CSS Task Force (L. Lane)
- Roundabouts Task Force (B. Schroeder)

TRB Panel Participation
- NCHRP Project 3-75, Analysis of Freeway Weaving Sections (N. Rouphail)
- NCHRP 15-37: Revising the AASHTO Guide for the Development of Bicycle Facilities (M. Meletiou)
- TCRP Project B-31A: Guidebook for Measuring, Assessing and Improving Demand Response Transportation – Rural Phase (T. Cook)
- TCRP Project G-10: Guidebook for Estimating “Soft Costs” for Major Public Transportation Capital Infrastructure Projects (J. Lawrie)
- TCRP Project J-7, Synthesis SB-17: Innovative Rural Transit Services (J. Lawrie)

Other National-International Group Participation
- Bicycle and Pedestrian Working Group of the NC Executive Committee for Highway Safety Committee (M. Meletiou)
- Coordinator, Modelers Group, Next Generation Simulation (NGSIM), FHWA (N. Rouphail)
- CUTC Review Committee of 2007 Pikarsky Award – Service and Technology (K. Chae)
- Edulog System Development Focus Group (M. Michael)
- NCU/TC Temporary Traffic Control Subcommittee (T. Baughman)
- NC Department of Public Instruction, NCWISE User Advisory Board (M. Michael)
- NC Physical Activity Policy Research Center Advisory Committee (M. Meletiou)
- North Carolina Unintentional Death Committee (J. Tsai)
• North Carolina Special Needs Transportation Committee (J. Tsai)
• Trip Generation Task Force on "Bix Box Centers" – NCSITE (C. Cunningham, D. Findley)
• University Standing Committee on Harrelson Fund (D. Robinson)

State of North Carolina and Local Research & Development

Statewide projects in North Carolina were conducted mostly in conjunction with the NC Department of Transportation (NCDOT) and with local municipalities. These ongoing activities include 53 different projects excluding pass-through projects to other universities.

CTE Year 9 Matching Funds
Sponsor: NCDOT (J. Martin)

Context Sensitive Solutions Graduate Course
Sponsor: NCDOT (J. Martin)

Context Sensitive Solutions Training NCDOT 2006-07
Sponsor: NCDOT (J. Martin)

Development of a Standardized Customer Satisfaction Survey for North Carolina Transit Systems
Sponsor: NCDOT – Public Transportation Division (T. Cook and J. Lawrie)

Development of Local, Regional and Cross-State Bicycle Transportation Systems FY07-08
Sponsor: NCDOT/PTD (T. Cook)

Ecosystem Enhancement Program (EEP) 2005
Sponsor: NCDENR (J. Martin)

EEP Technical and Scientific Support
Sponsor: NCDOT (J. Martin)

Effectiveness of Traveler Information Tools
Sponsor: NCDOT (N. Rouphail)

Sponsor: NCSHP (R. Hughes, G. Ferrara, J. Scott)

FHWA/AASHTO CSS Strategic Planning Research
Sponsor: NCDOT/FHWA (L. Lane)

FHWA CSS Activities
Sponsor: NCDOT/FHWA (J. Martin)

Gathering and Applying Information to Assess Potential Intercity Bus Services for FTA Section 5311 (f) Funding
Sponsor: NCDOT – Public Transportation Division (T. Cook and J. Lawrie)
GIS-based Pavement Management System projects for the following NC Municipalities:
Town of Louisburg, Town of Holly Springs, Town of Chapel Hill, Town of Banner Elk, City of Mebane, City of Hickory, Town of Mooresville, Town of Clayton
(J. Oklevitch)

I-95 Corridor Coalition Study: Feasibility Study for Wireless Inspections of Commercial Motor Vehicles (Phase I)
Sponsor: Crime Control and Public Safety (R. Hughes)

Implementing a Benchmarking Process at North Carolina Transit Systems
Sponsor: NCDOT – Public Transportation Division (T. Cook and J. Lawrie)

Intercity Bus Program Assessment
Sponsor: NCDOT – Public Transportation Division (T. Cook and J. Lawrie)

Integrated Planning for Schools and the Community
Sponsor: OR/Ed lab (J. Tsai)

Integrating Systems Planning and Project Development
Sponsor: NCDOT (J. Martin)

Local Technical Assistance Program 2007
Sponsor: NCDOT (J. Martin)

Motor Carrier Safety Assistance Program (MCSAP) FY 2007
Sponsor: NC Dept. of Crime Control and Public Safety (R. Hughes)

Motor Carrier Safety Assistance Program (MCSAP) FY 2008
Sponsor: NC Dept. of Crime Control and Public Safety (R. Hughes)

Motor Carrier Size and Weight Technical Support to NCSHP FY07
Sponsor: NC Dept. of Crime Control and Public Safety (R. Hughes)

Motor Carrier Size and Weight Technical Support to NCSHP FY08
Sponsor: Crime Control and Public Safety (R. Hughes)

NCDOT Maintenance Technical Assistance Program (2005-2006)
Sponsor: NCDOT (T. Baughman)

NCDOT Maintenance Technical Assistance (2007)
Sponsor: NCDOT (T. Baughman)

North Carolina Truck Network Model
Sponsor: NCDOT (B. Mei)

North Carolina United We Ride State Coordination Implementation
Sponsor: NCDOT/PTD (T. Cook, J. Lawrie)
Pedestrian Operations at Single Point Interchanges  
Sponsor: NCDOT (R. Foyle and C. Cunningham)

Performance-Based Budgeting for North Carolina Public Transportation Systems  
Sponsor: NCDOT (T. Cook and J. Lawrie)

Professional Enhancement Program 2006-2007  
Sponsor: NCDOT/HWY (T. Brown)

Professional Enhancement Program 2007-2008  
Sponsor: NCDOT/HWY (T. Brown)

PTD TOG/UTAP & Technology Implementation – FY 2006/2007  
Sponsor: NCDOT/PTD (D. Collins)

PTD TOG/UTAP Technology Implementation and Research FY 2007/2008  
Sponsor: NCDOT/PTD (D. Collins)

Public Transportation Division Transit Operations Group/Urban Transit Assistance Program and Technology Implementation 2007-2008  
Sponsor: NCDOT – Public Transportation Division (D. Collins)

Rail Intern Program FY 2007 & 2008  
Sponsor: NCDOT – Rail Division (T. Cook)

Research Implementation and Technical Assistance 2006-2007  
Sponsor: NCDOT (R. Foyle)

Research Implementation and Technical Assistance 2007-2008  
Sponsor: NCDOT (R. Foyle)

Shortage of Long-Haul Heavy-Duty Truck Drivers in North Carolina  
Sponsor: NCDOT – North Carolina Trucking Association (T. Cook and J. Lawrie)

STAA Dimensioned Vehicles off the National Network (2001-2005)  
Sponsor: NCDOT (R. Hughes)

Support for the NCDOT Safe Routes to School Program  
Sponsor: NCDOT (T. Cook)

Teach Fundamental Engineering Principles (FEP) Program 2006-2007  
Sponsor: NCDOT (T. Brown and C. Cunningham)

Teach Fundamental Engineering Principles (FEP) Program 2007-2008  
Sponsor: NCDOT (T. Brown and C. Cunningham)

Technical Support for the Safe Routes to School Program FY08  
Sponsor: NCDOT/PTD (T. Cook)
Technical Support Services for the NCDOT Division of Bicycle and Pedestrian Transportation FY 2006
Sponsor: NCDOT/PTD (T. Cook)

Technical Support Services for the NCDOT Division of Bicycle and Pedestrian Transportation FY 07-09
Sponsor: NCDOT (T. Cook)

The Benefits of Public Transportation in North Carolina
Sponsor: NCDOT – Public Transportation Division (T. Cook and J. Lawrie)

Three-Point Restraint School Bus Seats in North Carolina
Sponsor: NC Department of Public Instruction (J. Tsai)

TIMS 2006-2007
Sponsor: NCDPI (J. Tsai)

TIMS 2007-2008
Sponsor: NCDPI (J. Tsai)

Traffic Signal Inspection Course Presentation and Update
Sponsor: NCDOT (C. Cunningham)

Traffic Operational Impacts of Contemporary Multi-Pump Island Fuel Centers
Sponsor: NCDOT (R. Foyle and C. Cunningham)

Triangle Regional Model Service Bureau at ITRE 2006-2007
Sponsor: NCDOT (J. Huegy)

Triangle Regional Model Service Bureau at ITRE 2007-2008
Sponsor: NCDOT (J. Huegy)
Active Pass-Through Projects to Other Universities

Development of an Earth Pressure Model for Design of Retaining Structures in Piedmont Soils  
Sponsor: NCDOT (UNC-Charlotte, Anderson and Agunro)

Development of Performance Measures for the Assessment of Rural Planning  
Sponsor: NCDOT (Elizabeth City State University, Bradshaw)

Economic Impact of Traffic Incidents on NC’s Interstate Facilities  
Sponsor: NCDOT (UNC-Chapel Hill, Rodriguez)

Evaluation of Manufactured Stormwater Best Management Practices  
Sponsor: NCDOT (UNC-Charlotte, Allan & Wu)

Evaluation of Nutrient Loading Rates and Effectiveness of Roadside Vegetative Connectivity for Managing Runoff from Secondary Roadways  
Sponsor: NCDOT (UNC-Charlotte, Wu and Allan)

Finite Element Evaluation of Two Retrofit Options to Enhance the Performance of Cable Median Barriers  
Sponsor: NCDOT (UNC-Charlotte, Fang and Weggel)

Injury, Illness and Accident Analysis for Historical Trends and Development of Standard Reports  
Sponsor: NCDOT (NC A&T State University, Cho)

Material Property and Quality Specifications for Elastomeric Concrete Used at Bridge Deck Joints  
Sponsor: NCDOT (UNC-Charlotte, Ogunro)

Monitoring, Prioritization, and Assessment of Ocean Outfalls of Stormwater in Dare County, North Carolina  
Sponsor: NCDENR (UNC-Chapel Hill, Noble)

Sponsor: NCDOT (ITRE, Hughes, and HSRC, Thomas)

Relationship Between Pavement Macrotexture and Crash Incidence for NHS Routes  
Sponsor: NCDOT (UNC-Charlotte, Pulugurtha)

Signal Replacement with an Interchange  
Sponsor: NCDOT (UNC-Charlotte, Kane)

Subgrade Stabilization Alternatives to Lime and Cement  
Sponsor: NCDOT (UNC-Charlotte, Janardhanam)
Transportation and Cost Impacts of School Locations and School Travel  
Sponsor: NCDOT (UNC-Charlotte, Kane)

Other Projects

2007 LTAP Non-Program Workshops  
Sponsor: Rutgers University (T. Baughman)

Assessing Indirect and Cumulative Effects (ICE) of Transportation Projects in NC  
Sponsor: Louis Berger Group (J. Martin)

Hillsborough Street Roundabout Modeling and Simulation  
Sponsor: Kimley Horn and Associates (N. Rouphail)

Logistics and Technical Support for the Joint MPO Special Transit Advisory Commission  
Sponsor: Triangle Transit Authority (B. Foyle)

NJ Division of Highway Traffic Safety 2007 Program  
Sponsor: Rutgers University (T. Baughman)

Ohio Technical Assistance Program (OTE) PT-05-1  
Sponsor: RLS & Associates, Inc. (T. Cook)

Research and Equipment for Coastal Environment Engineering Related to Coastal Highways and Bridges  
Sponsor: University of Alabama (J. Martin)

Shortage of Long-Haul, Heavy Duty Truck Drivers in North Carolina  
Sponsor: North Carolina Trucking Association (T. Cook, J. Lawrie)

Testing the Feasibility of a Video-Image Processing System for Tracking Signalized Arterial Traffic  
Sponsor: University of Idaho (N. Rouphail)

Triangle Regional Model Service Bureau at ITRE 06-07  
Sponsor: Chapel Hill-Carrboro MPO, City of Raleigh/Capital Area MPO (L. Huntsinger)

Triangle Regional Model Service Bureau at ITRE 07-08  
Sponsor: Chapel Hill-Carrboro MPO, City of Raleigh/Capital Area MPO (J. Huegy)

Triangle Regional Model Service Bureau at ITRE 2006-2007  
Sponsor: Triangle Transit Authority (L. Huntsinger)

Triangle Regional Model Service Bureau at ITRE 2007-2008  
Sponsor: Triangle Transit Authority (J. Huegy)
University of California – Davis Sponsorship of the 2007 International Conference on Ecology and Transportation
Sponsor: University of California – Davis (K. McDermott)

**URS Merger 01 Training**
Sponsor: URS Corporation/NCDOT (J. Martin)

**Work Zone Safety Training for South Carolina Department of Transportation**
Sponsor: Fisher Communications, Inc./SCDOT (T. Baughman)
TRB Presentations
13 presentations and a workshop will be made at the January 2008 Meeting of the Transportation Research Board (TRB). Many of the papers will also be considered for publication in an upcoming Transportation Research Record.

Analysis and Modeling of Automobile Users’ Perceptions of Quality of Service on Urban Streets (08-0648)
TRB, Washington, DC, 2008
Aimee Flannery, George Mason University
Nagui M. Rouphail, North Carolina State University*
David B. Reinke, Dowling Associates Inc.

Analysis of Automated Speed Enforcement Cameras in Charlotte, North Carolina (08-1844)
TRB, Washington, DC, 2008
Chris Cunningham, North Carolina State University*
Joseph E. Hummer, North Carolina State University
Jae-Pil Moon, North Carolina State University

Best of Both: Combining the Benefits of Agency-Dedicated Vehicle Transportation and Coordinated Transportation (08-1715)
TRB, Washington, DC, 2008
Kai Crawford Monast, North Carolina State University*

Empirical Study of Pedestrian-Vehicle Interactions in the Vicinity of Single-Lane Roundabouts (08-2898)
TRB, Washington, DC, 2008
KoSok Chae, North Carolina State University*
Nagui M. Rouphail, North Carolina State University*

Framework for Analysis of Recurring Freeway Bottlenecks (08-3113)
TRB, Washington, DC, 2008
Alexander Skabardonis, University of California, Berkeley
Nagui M. Rouphail, North Carolina State University*
Karl Petty, Berkeley Transportation Systems
Richard G. Dowling, Dowling Associates Inc.

Improved Methods for Quantitatively Assessing Social and Community Well-Being as Part of Transportation Planning and Project Development (P08-0956)
TRB, Washington, DC, 2008
Leigh Blackmon Lane, Louis Berger Group, Inc. *
Ann Hartell, Center for Transportation and the Environment*
John H. Suhrbier, Cambridge Systematics, Inc.

Is Inadaquate Transportation a Barrier to Community Involvement? Evidence from Social Capital Benchmark Survey (08-1104)
TRB, Washington, DC, 2008
Ann Hartell, Center for Transportation and the Environment*
Link-Based Emission Factors for Heavy-Duty Diesel Trucks Based on Real-World Data (08-1311)
TRB, Washington, DC, 2008
H. Christopher Frey, North Carolina State University
Nagui M. Rouphail, North Carolina State University*
Haibo Zhai, North Carolina State University*

Multimodal Level of Service for Urban Streets (08-0119)
TRB, Washington, DC, 2008
Richard G. Dowling, Dowling Associates Inc.
Aimee Flannery, George Mason University
Bruce W. Landis, Sprinkle Consulting Inc.
Theodore Anton Petritsch, Sprinkle Consulting, Inc.
Nagui M. Rouphail, North Carolina State University*
Paul Ryus, Kittelson & Associates, Inc.

Planning for Enrollment Growth: Using Land Use Data to Determine Future School Sites (08-2379)
TRB, Washington, DC, 2008
Michael Miller, North Carolina State University*

Recent Superstreet Implementation and Research (08-1255)
TRB, Washington, DC, 2008
Joseph E. Hummer, North Carolina State University
Jae-Pil Moon, North Carolina State University
Bastian J. Schroeder, North Carolina State University*
Ramanujan Jagannathan, Vanasse Hangen Brustlin, Inc.

Roundabouts: Shared Use by Pedestrians and Drivers Workshop 139G
TRB, Washington, DC, 2008
Ron Hughes, North Carolina State University, presiding*
Bastian Schroeder, North Carolina State University*

Synthesized Through Trip Models for Small and Medium-Sized Urban Areas (08-0707)
TRB, Washington, DC, 2008
Yang Han, HNTB Corporation (formerly student with ITRE)*
John R. Stone, North Carolina State University

Traveler Information Delivery Mechanisms: Impacts on Consumer Behavior (08-0776)
TRB, Washington, DC, 2008
Asad J. Khattak, Old Dominion University
Xiaohong Pan, University of North Carolina, Chapel Hill
Billy M. Williams, North Carolina State University
Nagui M. Rouphail, North Carolina State University*
Yingling Fan, University of Illinois, Chicago
Published Refereed Journal Papers

Coelho, M., T. Farias and N. Rouphail (2007), *Avaliacao do Desempenho do TrafegoRodovario em Interrupcoes de Trafego e seu Impacte ao Nivel das Emissioes de Poluentes* (in Portuguese) Accepted for Publication in Ingenium, Portuguese Association of Engineering


Other Publications, Conference Presentations and Scholarly Activities


Invited Presentation, National Conference on Disaster Planning for the Carless Society, New Orleans, LA, February 8-9, 2007 (M. Michael)


Invited Presentations, TIMS Symposium, North Carolina Pupil Annual Transportation Conference, Greensboro, NC, March 2007 (M. Michael, B. Sluder, M. Perez)


Invited Presentation, Annual North Carolina Pupil Transportation Association Conference, Asheville, NC, June 2007 (M. Michael)


Invited Presentation, School Transportation Safety Summit, Washington, DC, July 2007 (J. Tsai)

Auto Level of Service Model for Multimodal Arterial Level of Service, Presentation at the Midyear Meeting of the Highway Capacity and Level of Service Committee, Charlotte, NC, July 31-August 2, 2007. (N. Rouphail)


Conference Attendance, Participation and Exhibits in 2007

Center for Transportation and Environment

- AASHTO Standing Committee on the Environment, Asheville, NC, June 2007
- ASCE Web/Teleconference Seminar on Improving Pedestrian Crossing Safety at Uncontrolled Locations; Raleigh, NC, June 2007 (E. Murray)
- North Carolina Association of Metropolitan Planning Organizations, Greensboro, NC, October 2007 (L. Lane, A. Hartell, participated)
- State of Environmental Justice America, Washington, DC, March 2007 (A. Hartell, participated)
- TRB National Asset Management, New Orleans, LA, November 2007 (J. Martin, attended)
- TRB Transportation Planning and Air Quality, Orlando, FL, July 2007 (J. Martin, N. Rouphail, participated)
- Western Governors’ Association Wildlife Corridors Meeting, Salt Lake City, UT, December 2007 (J. Martin, attended)
- University of North Carolina Teaching and Learning with Technology Conference, Raleigh, NC, March 2007 (E. Murray, attended)

Highways

- American Society of Civil Engineers Annual Meeting, Wilmington, NC, September 2007 (C. Cunningham, participated)
- National Committee on Uniform Traffic Control Devices, Washington, DC (T. Baughman, participated)
- National Traffic Management and Work Zone Safety Conference, Ft. Lauderdale, FL (T. Baughman, participated)
- NCSITE Annual Meeting, Raleigh, NC, November 2007 (R. Foyle, participated)
- NCSITE Mid-Year Meeting, Asheville, NC, June 2007 (R. Foyle, participated, C. Cunningham, D. Findley, attended)
- Plantmix Asphalt Industry of Kentucky Annual Meeting, Louisville, KY (T. Baughman, participated)
- Transportation Research Board Annual Meeting, Washington, DC, January 2007 (R. Foyle, T. Baughman, C. Cunningham, participated)

ITRE Director

- 11th World Congress for Transportation Research (WCTR), Berkeley, CA, June 2007 (N. Rouphail, participated)
- Midyear Meeting of the Highway Capacity and Level of Service Committee, Charlotte, NC, July/August 2007 (N. Rouphail, participated)
- Pre XV Congreso Argentino de Vialidad y Transito, Buenos Aires, Argentina, August 2007 (N. Rouphail, participated)
- “Regional ITS and Energy and Emissions Impacts” Symposium, Aveiro, Portugal, December 20, 2007 (N. Rouphail, participated)
- Transportation, Land Use, Planning and Air Quality 2007 Conference, Orlando, FL, July 2007 (N. Rouphail, participated)
NC Local Technical Assistance Program
- APWA National Congress, San Antonio, TX, September 2007 (J. Martin, attended)
- International Conference on Ecology and Transportation (J. Martin, L. Collier, B. Woods, participated)
- LTAP National Conference, Chicago, IL (J. Martin, L. Collier, B. Woods, attended)
- LTAP Region 4 Meeting, Gainesville, FL (J. Martin, L. Collier, B. Woods, participated)
- NC APWA Annual Meeting, Winston-Salem, NC, June 2007 (J. Martin, L. Collier, attended; B. Woods, participated)
- NCAPWA Streets Maintenance Meeting, Hickory, NC, October 2007 (L. Collier, B. Woods, participated)

Public Transportation Group
- American Public Transportation Association Annual Meeting, Charlotte, NC, October 2007 (D. Collins, K. Monast, attended)
- Community Transportation Conference, High Point, NC, September 2007 (D. Collins, K. Monast, T. Cook, J. Lawrie, participated)
- NC American Planning Association Conference, Chapel Hill, NC, September 2007 (K. Monast, attended)
- North Carolina Public Transportation Conference, Wilmington, NC, June 2007 (D. Collins, K. Monast, participated)
- North Carolina Pupil Transportation Association Conference, Asheville, NC, June 2007 (S. O’Brien, participated)
- Safe Routes to School State Coordinators National Meeting, Denver, CO, May 2007 (S. O’Brien, attended)
- Transportation Research Board Annual Meeting, Washington, DC, January 2007 (T. Cook, M. Meletiou, participated)

Pupil Transportation Group
- Annual North Carolina Pupil Transportation Association Conference, Asheville, NC, June 2007 (M. Michael, participated)
- National Conference on Disaster Planning for the Carless Society, New Orleans, LA, February 2007 (M. Michael, participated)
- School Transportation Safety Summit, Washington, DC, July 2007 (J. Tsai, participated)
- Transportation Research Board Annual Meeting, Washington, DC, January 2007 (J. Tsai)
- TIMS Symposium, North Carolina Pupil Annual Transportation Conference, Greensboro, NC, March 2007 (M. Michael, B. Sluder and M. Perez, participated)

Triangle Regional Model Service Bureau
- 11th National Transportation Planning Applications Conference, Daytona Beach, Florida, May 2007 (M. Ingram, B. Mei, attended)
- North Carolina Metropolitan Planning Organization Conference, Greensboro, NC, October 2007 (M. Ingram, participated, J. Huegy, B. Mei, attended)

Visual Analytics, Modeling and Simulation
- Commercial Vehicle Safety Alliance (CVSA) (R. Hughes, attended)
- GIS in Transit Conference – Tampa, FL, November 2007 (G. Ferrara, attended)
- NCAPWA Streets Division Conference, Hickory, NC, October 2007 (J. Oklevitch)
• Transportation Research Board Annual Meeting (R. Hughes, participated)

Degree Program Courses

The following were degree program courses taught by ITRE staff at North Carolina State University in calendar year 2007.

Spring 2007

CE 214 – Engineering Mechanics: Statics (T. Brown) – 70 students
CE 214 – Engineering Mechanics: Statics (C. Cunningham) – 60 students
CE 305 – Traffic Engineering (B. Foyle) – 48 students

Fall 2007

CE 214 – Engineering Mechanics: Statics (T. Brown) – 70 students
CE 305 – Traffic Engineering (B. Schroeder) – 45 students
CE 702 – Traffic Flow Theory (N. Rouphail) – 9 students
Summary of Continuing Education/Training and Outreach

ITRE’s combined training activities reached nearly 10,000 individuals in 2007. Some of the education opportunities included Work Zone Safety, offering 195 workshops; the Center for Transportation and the Environment’s (CTE) National Teleconference Series and Context Sensitive Solutions Design classes; the Local Technical Assistance Program, offering the popular Road Scholar and Advanced Road Scholar Program courses to local government employees; and training classes through the Public Transportation Group, Pupil Transportation Group, and Visual Analytics, Modeling and Simulation (VAMS) Program. The Public Transportation Group and Highway Systems Group conduct courses at ITRE as well as 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. The Transportation Founders Fund offered a well-attended seminar in the Spring of 2007. Training areas are depicted in Exhibit VII.

### Exhibit VII - Summary of Training Activities in 2007

<table>
<thead>
<tr>
<th>Program Area</th>
<th>Training/Workshops in 2007</th>
<th>Instruction Hours per Session</th>
<th>Sessions Offered</th>
<th>Total Hours</th>
<th>Attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ITRE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transportation Founders Fund Speaker Series</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Smedes York (4/10/2007)</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Seminar – Professor Gracio (Portugal)</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DynaSmart P Workshops</td>
<td>10.25</td>
<td>2</td>
<td>20.5</td>
<td>50</td>
</tr>
<tr>
<td><strong>CTE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Community Impact Assessment</td>
<td>21</td>
<td>1</td>
<td>21</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Context Sensitive Solutions</td>
<td>21</td>
<td>4</td>
<td>84</td>
<td>146</td>
</tr>
<tr>
<td></td>
<td>Merger 101 Training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Executive Training</td>
<td>4</td>
<td>2</td>
<td>8</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Practitioner Training</td>
<td>15</td>
<td>9</td>
<td>135</td>
<td>261</td>
</tr>
<tr>
<td></td>
<td>Teleconference</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1,300</td>
</tr>
<tr>
<td><strong>Highways</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Asphalt Pavement Maintenance</td>
<td>7</td>
<td>12</td>
<td>84</td>
<td>174</td>
</tr>
<tr>
<td></td>
<td>Drainage</td>
<td>7</td>
<td>11</td>
<td>77</td>
<td>223</td>
</tr>
<tr>
<td></td>
<td>FEP Program for NCDOT Employees</td>
<td>29</td>
<td>26</td>
<td>739</td>
<td>322</td>
</tr>
<tr>
<td></td>
<td>Fundamentals of Engineering (FE) Review</td>
<td>140</td>
<td>1</td>
<td>140</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>FE Review Night</td>
<td>3</td>
<td>1</td>
<td>72</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Flagger Training</td>
<td>4</td>
<td>42</td>
<td>168</td>
<td>634</td>
</tr>
<tr>
<td></td>
<td>Flagging – Instructor</td>
<td>12</td>
<td>8</td>
<td>96</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>Guardrail</td>
<td>7</td>
<td>7</td>
<td>49</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td>HEC</td>
<td>7</td>
<td>2</td>
<td>284</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Professional Engineering (PE) Review</td>
<td>112</td>
<td>1</td>
<td>112</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>PE Review – Wednesday Night</td>
<td>3</td>
<td>1</td>
<td>57</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>PE Review – Thursday Night</td>
<td>3</td>
<td>1</td>
<td>57</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Traffic Control Certification (TCC)</td>
<td>21</td>
<td>1</td>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Traffic Signal Inspection Workshops</td>
<td>12</td>
<td>5</td>
<td>60</td>
<td>98</td>
</tr>
<tr>
<td><strong>VAMS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Day 1 – Traffic Signal Fundamentals</td>
<td>8</td>
<td>1</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Day 2 – Signal Systems Fundamentals</td>
<td>8</td>
<td>1</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Site Development &amp; Highway Access</td>
<td>12</td>
<td>5</td>
<td>60</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td>Work Zone Safety – Basic</td>
<td>6</td>
<td>45</td>
<td>270</td>
<td>1,005</td>
</tr>
<tr>
<td></td>
<td>Work Zone Safety – Intermediate</td>
<td>7</td>
<td>36</td>
<td>252</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>Work Zone Safety – Advanced</td>
<td>7</td>
<td>30</td>
<td>210</td>
<td>605</td>
</tr>
<tr>
<td></td>
<td>Work Zone Traffic Control Supervisor</td>
<td>21</td>
<td>4</td>
<td>84</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>WZ Safety Refresher</td>
<td>4</td>
<td>3</td>
<td>12</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>SC Master Instructor Course</td>
<td>20</td>
<td>1</td>
<td>20</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Intertraffic Conference</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Introduction to ArcGIS</td>
<td>24</td>
<td>4</td>
<td>96</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Intermediate ArcGIS</td>
<td>16</td>
<td>2</td>
<td>32</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Integrating GIS/GPS</td>
<td>16</td>
<td>1</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Working with the Geodatabase</td>
<td>16</td>
<td>2</td>
<td>32</td>
<td>9</td>
</tr>
<tr>
<td>Program Area</td>
<td>Training/Workshops in 2007</td>
<td>Instruction Hours per Session</td>
<td>Sessions Offered</td>
<td>Total Hours</td>
<td>Attendees</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------</td>
<td>-------------------------------</td>
<td>------------------</td>
<td>------------</td>
<td>-----------</td>
</tr>
<tr>
<td><strong>NC LTAP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Work Zone</td>
<td>7</td>
<td>6</td>
<td>42</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>Asphalt Pavement Maintenance</td>
<td>6</td>
<td>2</td>
<td>12</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Asphalt Roller Operator Training</td>
<td>6</td>
<td>3</td>
<td>18</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>Backhoe Operator Training</td>
<td>6</td>
<td>2</td>
<td>12</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Basic Drainage/Roadway Drainage Maintenance</td>
<td>7</td>
<td>1</td>
<td>7</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Basic Work Zone Safety</td>
<td>7</td>
<td>7</td>
<td>49</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>Concrete: What, When and How</td>
<td>7</td>
<td>3</td>
<td>21</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>Confined Space Entry Lockout and Tagout</td>
<td>7</td>
<td>2</td>
<td>14</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Excavation Safety</td>
<td>6</td>
<td>2</td>
<td>12</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Flagger Training</td>
<td>4</td>
<td>6</td>
<td>24</td>
<td>101</td>
<td></td>
</tr>
<tr>
<td>Flagger Instructor Training</td>
<td>12</td>
<td>1</td>
<td>12</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Heavy Equipment Safety Training</td>
<td>18</td>
<td>1</td>
<td>18</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>Intermediate Work Zone Safety</td>
<td>7</td>
<td>6</td>
<td>42</td>
<td>119</td>
<td></td>
</tr>
<tr>
<td>Maintenance &amp; Repair of Utility Cuts</td>
<td>6</td>
<td>3</td>
<td>18</td>
<td>91</td>
<td></td>
</tr>
<tr>
<td>Manage Conflict with Employees and the Public</td>
<td>3</td>
<td>7</td>
<td>21</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Mgt. and Supervisory Skills - First Time Managers</td>
<td>7</td>
<td>2</td>
<td>14</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>Mgt. and Supervisory Skills - Experienced Managers</td>
<td>7</td>
<td>3</td>
<td>21</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td>Managing Conflict with the Public</td>
<td>7</td>
<td>2</td>
<td>14</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>Motorgrader Operator Safety Training</td>
<td>6</td>
<td>2</td>
<td>12</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>OHSA 10-Hour Safety Training</td>
<td>10</td>
<td>2</td>
<td>20</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Road Safety Fundamentals</td>
<td>7</td>
<td>1</td>
<td>7</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Snow &amp; Ice Control</td>
<td>7</td>
<td>2</td>
<td>14</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>Soils Fundamentals</td>
<td>6</td>
<td>2</td>
<td>12</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Stormwater Hydrology and Drainage Design</td>
<td>7</td>
<td>1</td>
<td>6</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Trenching &quot;Competent Person&quot; Training</td>
<td>7</td>
<td>3</td>
<td>21</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Traffic Calming</td>
<td>7</td>
<td>1</td>
<td>7</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Writing Skills for Transportation Professionals</td>
<td>6</td>
<td>3</td>
<td>18</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td><strong>Public Transportation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicycle Planning and Design</td>
<td>6.5</td>
<td>3</td>
<td>19.5</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>Designing Pedestrian Facilities for Accessibility</td>
<td>10</td>
<td>2</td>
<td>20</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>Paratransit Scheduling &amp; Dispatch</td>
<td>8</td>
<td>2</td>
<td>16</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Pedestrian Safety Action Plan Workshop</td>
<td>10</td>
<td>2</td>
<td>20</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td>Route Match Activities: User Groups</td>
<td>1</td>
<td>10</td>
<td>10</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>(ECCOG) Specialized Training Coordination Implementation Trainings</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Transportation Leadership Development Program</td>
<td>120</td>
<td>2</td>
<td>240</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>TriP Maker</td>
<td>12</td>
<td>2</td>
<td>85</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>RouteMatch User Group</td>
<td>2</td>
<td>9</td>
<td>18</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>Americans with Disabilities Act</td>
<td>7</td>
<td>4</td>
<td>28</td>
<td>159</td>
<td></td>
</tr>
<tr>
<td>Webinars</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>127</td>
<td></td>
</tr>
<tr>
<td>Maximus User Group</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>GFI User Group</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>NC Safe Routes to School Program</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitator Training</td>
<td>16</td>
<td>2</td>
<td>32</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Community Workshops</td>
<td>8</td>
<td>12</td>
<td>96</td>
<td>273</td>
<td></td>
</tr>
<tr>
<td>Webinar</td>
<td>1.5</td>
<td>3</td>
<td>4.5</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Regional Workshops</td>
<td>3</td>
<td>8</td>
<td>24</td>
<td>193</td>
<td></td>
</tr>
<tr>
<td><strong>Pupil Transportation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beginner Edulog NT</td>
<td>6</td>
<td>2</td>
<td>24</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>GEBNDPLAN</td>
<td>6</td>
<td>2</td>
<td>24</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Special Training and Open Labs</td>
<td>6</td>
<td>8</td>
<td>48</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>GPS Demo and Roundtable</td>
<td>6</td>
<td>1</td>
<td>6</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>MARIS</td>
<td>6</td>
<td>1</td>
<td>12</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>TDTIMS</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Reports</td>
<td>6</td>
<td>1</td>
<td>6</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>UPSTU</td>
<td>6</td>
<td>1</td>
<td>6</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Intermediate EduLog</td>
<td>6</td>
<td>2</td>
<td>24</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>Boundary Creation</td>
<td>6</td>
<td>2</td>
<td>12</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>GPS Users Meeting</td>
<td>6</td>
<td>2</td>
<td>12</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>System Admin &amp; EMU</td>
<td>6</td>
<td>1</td>
<td>6</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,029</td>
<td>744</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4,699</td>
<td>9,955</td>
</tr>
</tbody>
</table>
Student Support
ITRE projects continue to involve and support a large number of students from various disciplines and universities. The table below summarizes our track record on student support, indicating continued graduate student participation in ITRE’s research and other programs.

<table>
<thead>
<tr>
<th>Year</th>
<th>Undergraduate</th>
<th>Graduate</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997-98</td>
<td>6</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>1998-99</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>1999-00</td>
<td>10</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>2000-01</td>
<td>21</td>
<td>10</td>
<td>31</td>
</tr>
<tr>
<td>2001-02</td>
<td>14</td>
<td>9</td>
<td>23</td>
</tr>
<tr>
<td>2002-03</td>
<td>11</td>
<td>15</td>
<td>26</td>
</tr>
<tr>
<td>2003-04</td>
<td>11</td>
<td>19</td>
<td>30</td>
</tr>
<tr>
<td>2004-05</td>
<td>11</td>
<td>23</td>
<td>34</td>
</tr>
<tr>
<td>2005-06</td>
<td>15</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>2006-07</td>
<td>14</td>
<td>11</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>117</td>
<td>117</td>
<td>234</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2007 Undergraduate</th>
<th>2007 Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hunter Brown</td>
<td>Hyung-Wook Choi*</td>
</tr>
<tr>
<td>Tien Cheng</td>
<td>Zachary Clark</td>
</tr>
<tr>
<td>Richard Cranfill</td>
<td>Jin Ki Eom*</td>
</tr>
<tr>
<td>Erin Doss</td>
<td>Nicholas Georgiade</td>
</tr>
<tr>
<td>Alissa Gill</td>
<td>Hyejung Hu*</td>
</tr>
<tr>
<td>Dylan Liverman</td>
<td>Jae Pil Moon*</td>
</tr>
<tr>
<td>Christopher Lovitt</td>
<td>William Reynolds</td>
</tr>
<tr>
<td>Lauren Moeller</td>
<td>Liza Runey</td>
</tr>
<tr>
<td>Matthew Sautter</td>
<td>Bastian Schroeder*</td>
</tr>
<tr>
<td>Jon Skinner</td>
<td>Eshah Shaw</td>
</tr>
<tr>
<td>Geoffery Sloop</td>
<td>Haibo Zhai*</td>
</tr>
<tr>
<td>Brian Statler</td>
<td>David Keilson</td>
</tr>
<tr>
<td>Graham Strother</td>
<td>Laurel Pierpont</td>
</tr>
<tr>
<td>Chris Vaughan</td>
<td>Emily Zechman</td>
</tr>
</tbody>
</table>

* PhD Students

In 2007, students have come from the following degree programs:

- Civil Engineering
- Economics
- Graphic Communications
- International Affairs
- Landscape Design
- Machining Technology
- Poultry Science
- Social Work
- Transportation Engineering
Post-Doctoral Fellows and Visiting Scholars

ITRE and CTE have recently made a conscious effort to recruit, engage and support post-doctoral fellows in research activities. For example, in 2007 ITRE provided full-time support for Dr. Kosok Chae, a recent NC State Graduate who is currently working on projects funded by the National Institutes of Health (NIH) and the National Science Foundation (NSF). Dr. Emily Zechman, another NC State graduate, was partly supported by CTE for a post-doctoral position.

Further, ITRE hosted Dr. Margarida Coelho from the University of Aveiro in Portugal in April of this year. Dr. Coelho is collaborating with ITRE in organizing a transportation and environment conference in Lisbon to be held in March 2008. Dr. Coelho was accompanied by Dr. Jose Gracio, director of TEMA, an automotive research center at Aveiro, who gave a seminar on nano-technology applications in transportation in the Spring of 2007.
Marketing/Public Relations Outreach in 2007
Press releases/advisories/stories communicated to media:

- Total news releases sent including 3 media advisories: 13

- Press releases concerning research studies or activities at ITRE have resulted in a variety of media interest including top television news broadcasts, newspapers, online news periodicals, radio programs, Web sites, transportation magazines, and eNewsletters and Web logs.

- At least 61 news stories or articles were published citing ITRE, ITRE research, or an ITRE program/staff member. Not all reports correctly reported the facts, but ITRE was cited. More articles are likely to have been published citing ITRE that were not found or tracked.

- At least 22 news stories resulted directly from press releases sent from our office or information from our Web sites.

In 2007, ITRE was cited in the following 24 media outlets and publications:

The Sun Journal       The News & Observer Blog
The Courier Tribune   ABC 11-TV
Clayton News-Star     The Carrboro Citizen
News & Observer       Oroville Mercury-Register (CA)
The New Bern Sun-Journal Greenville Daily Reflector
The Delaware Center for Transportation TransSearch Wilmington Star-News
NC State Civil Engineering News North Carolina Farm Bureau
The Chatham Journal Weekly
NBC-17
WRAL-TV
School Transportation News
Carolina Parent
The Daily Record
Rep. David Price News Release
www.occovi.gov.ar
Independent Weekly
News 14 Carolina
Appendix – Summary of Program Groups

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. The federal transportation bill, signed into law by President George W. Bush in 2005, includes funding for CTE. The new bill, which finances the nation's surface transportation programs, names CTE as a Tier II University Transportation Center.

Highway Systems Group

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: Highway Safety, Transportation Policy, Traffic Operations, Work Zone Safety, Maintenance Operations, Professional Development Training, and Professional Engineering Review.

• Triangle Regional Model Service Bureau

The purpose of the Triangle Regional Model Service Bureau is to provide transportation modeling expertise to the Capital Area Metropolitan Planning Organization, the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization, the Triangle Transit Authority, and NCDOT to support each agency’s needs in meeting the requirements in Section 134, Title 23, U.S. Code, NC General Statutes 136-66, and the 1990 Clean Air Act. This work includes, but is not limited to: (1) design and development of multimodal travel demand models; and (2) integration of GIS technologies into supply side forecasting, demand side forecasting, and transportation plan development.

Visual Analytics, Modeling and Simulation Group

The Visual Analytics, Modeling and Simulation (VAMS) Group is a new name of a group which includes previously named programs of Commercial Vehicles and Safety, GIS, Pavement Management, Municipal Technical Services and incorporates data, visual simulation and modeling. It is the parent ITRE group for programs specializing in Spatial Data: Research, Training, and Technical Assistance, Commercial Vehicles Enforcement, Safety, and Security and Visual Simulation and Modeling. This program provides specialized expertise in the areas of 3D/4D visualization as well as research on the performance needs of visually impaired pedestrians.

• Spatial Data Program

The Spatial Data, Research, Training, and Technical Support Program represents the area formerly under ITRE’s Municipal Technical Services Program. It provides Geographic Information Systems (GIS) technical support to other ITRE projects in addition to outside customers. It is also a source of ESRI-certified GIS training. This program has been given broader program responsibilities in terms of expectations for the development of a more research-oriented program group.
• **Commercial Vehicle Enforcement, Safety, and Security Program**

The Commercial Vehicle Enforcement, Safety, and Security Program provides data analysis and program evaluation support to the Motor Carrier Safety Assistance Program (MCSAP) of the NC State Highway Patrol (NCSHP). Staff in this area are involved in collaborative research and development efforts with government, industry, and domain specific organizations.

• **Visual Simulation and Modeling Program**

The Visual Simulation and Modeling Program represents a new and emerging thrust for ITRE, made possible largely through the addition of Dr. Hughes to the staff. Its present work is primarily through the TRB Visualization Task Force, modeling and simulation work being conducted on the NIH grant and NCHRP 3-78 project, and on efforts to establish an NCSU Visualization Center of Excellence in Transportation.

**NC Local Technical Assistance Program**

The Federal Highway Administration established the North Carolina Local Technical Assistance Program (LTAP) 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, and Quarterly Newsletters.

**Public Transportation Group**

The Public Transportation Group is responsible for research, training, and technical assistance in the area of public transportation. Activities focus on the following transportation modes: urban fixed-route and paratransit, rural demand-responsive transit, bicycle and pedestrian, trucking, taxicab and livery, and passenger rail. This group pursues practical applications that can have immediate benefits to increasing efficiencies in transit operations and positively impact service and transportation choices for the passenger.

• **Bicycle and Pedestrian Program**

The Bicycle and Pedestrian Program has the distinction of long-standing working partnerships with NCDOT’s Division of Bicycle and Pedestrian Transportation, one of the oldest comprehensive bike programs in the country. This partnership works closely together on research and technical assistance projects.

**Pupil Transportation Group**

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.

• **OR/Ed. Lab Program**

The Operations Research/Education Laboratory (OR/Ed. lab) has developed a system of Integrated Planning for School and Community (IPSAC), which fully integrates community and regional data, 10-year economic and demographic forecasts, demographic and land use studies, digitized pupil and school location files, and mathematical optimization algorithms. The lab uses the modern tools of
management science helping educators and public administrators to make decisions wisely, to evaluate policy alternatives thoroughly, and to allocate resources efficiently.

2007 sponsors for IPSAC research include the following school 17 systems: Alamance County, Craven County, Chatham County, Franklin County, Granville County, Harnett County, Johnston County, Moore County, Nash-Rocky Mount, Onslow County, Pitt County, Randolph County, Stokes County, Wake County, Base Realignment and Closure (BRAC); Rock Hill South Carolina School District #3, SC; Tupelo Public Schools, MS.

• **Transportation Information Management Systems Program (TIMS)**

The TIMS Program provides support and consulting for the Computer Assisted Routing Program used in every secondary school system in North Carolina. The Transportation Information Management System is a joint project activity among the North Carolina Department of Public Instruction, Institute for Transportation Research and Education, and the Urban Institute at UNCC.