Foreword

Nagui M. Rouphail, PhD
ITRE Director

I am pleased to present ITRE’s annual activity report for 2008 to our students, staff, faculty, sponsors, council members and the university community at large. By all measures, this was a difficult year where the Institute has experienced some contraction in its state-funded activities, and expectations are that this trend will continue in the foreseeable future. Like many of our clients, we are not immune to the economic slowdown that has impacted many of their activities. On the other hand, we continue to make substantial strides toward increasing our national and international recognition and visibility, and we have been successful in identifying partnerships and, in 2008, winning a number of national projects funded by NSF, NCHRP, TCRP and the SHRP-II programs. We are also continuing to work hard towards the establishment of the NextGen Air Transportation (NGAT) Center in Planning at ITRE, a process that will take some time to bear fruit. Along with colleagues from Civil Engineering and many other external partners, we delivered a Statewide Logistics Study to the Office of State Budget & Management, which has received rave reviews. We have also reached out across the oceans and strengthened our partnerships with The University of Aveiro in Portugal and Seoul National University in Korea. During the fall of 2008 we hosted one of the first international PhD students to visit NC State and work at ITRE under the newly established Graduate Training Initiative (GTI) program.

ITRE’s overall expenditures in 2008 were $9.26 million, a 6% decrease from the previous year. This decline is primarily due to a drop of nearly 17% in state-funded activities (i.e. research, training or technical assistance). Our in-house expenditures followed the same pattern. We continue to generate substantial levels of overhead receipts, with over $810K produced in FY 2008. While the trend is slightly downward, ITRE has maintained its stellar track record of effectiveness, with every dollar spent on it by the state of North Carolina generating nearly $18 dollars in total expenditures. We also fulfilled our educational mission by training the next generation of transportation students and professionals, with over 9,200 trainees going through our large menu of short and long courses and workshops.

Of special interest included in this report is the UNC-Tomorrow response report by ITRE. It is attached to this document as Appendix II. The report lays out many of the technical initiatives that we have undertaken over the past few years, discusses governance issues related to the Institute and UNC Office of the President, and shows how our overall mission maps with that of the University System priorities.

In conclusion, while we at ITRE are cognizant of the challenging times ahead in an era of contraction and uncertainties, we also are aware that such periods may be ripe with opportunities that must be seized. This will require us to collectively think of new paradigms by which we try to fulfill our mission, consistent with the new fiscal realities, while taking advantage of new emerging priorities in green, intelligent and multimodal transportation systems. Our dedicated staff is ready and poised to do just that.

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Nagui M. Rouphail
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This report summarizes ITRE’s activities for the year 2008 and provides background information on the Institute’s history, mission, goals, and objectives. It also provides an overview of ITRE’s finances and personnel and technical activities during the year. As in years past, the Institute has maintained and in some instances expanded 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 surface and most recently air 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 transportation issues through fostering 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 1) Highway Systems; 2) Visual Analytics, Modeling and Simulation (VAMS); 3) North Carolina Local Technical Assistance Program (LTAP); 4) Public Transportation; 5) Pupil (school) Transportation; and 6) the Center for Transportation and the Environment (CTE). An updated high-level organizational chart is shown in Exhibit I. Our programs are guided and monitored by an Advisory Council whose membership has recently been increased. The current ITRE Advisory Council make-up is shown in Exhibit II.

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, outreach efforts, and increased national project awards. Additionally, the Institute continues its training efforts on a national, regional, and state level, while promoting collaboration with faculty in the department of Civil, Construction and Environmental 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 (currently undergoing re-organization): http://itre.ncsu.edu
Exhibit I — ITRE High-Level Organization Flow Chart:
Primary Program Groups

Dr. Nagui M. Rouphail
Director and Professor of Civil Engineering

Mr. Robert S. Foyle
Associate Director and Director
Highway Systems

Ms. Linda S. Lancaster
Director
Finance and Contracts

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

Mr. James B. Martin
Director
North Carolina Local Technical Assistance Program

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

Ms. Debra G. Collins
Mr. Thomas J. Cook
Co-Directors
Public Transportation

Mr. Jeffrey C. Tsai
Director
Pupil Transportation
Exhibit II — 2008 ITRE Advisory Council Membership

Mr. Jim Westmoreland  
Council Chair  
NC Department of Transportation

Ms. Stephanie Ayers*  
North Carolina Ports Authority

Dr. Eugene Conti, Jr.  
NC Department of Transportation

Dr. Kathryn Dobie*  
NC A&T State University

Mr. Mark Dunzo*  
Kimley-Horn and Associates, Inc.

Dr. Larry Goode  
Transportation Consultant

Dr. David Harkey  
UNC Highway Safety Research Center

Dr. Edd Hauser  
UNC-Charlotte

Mr. David King  
Triangle Transit Authority

Dr. George List  
NC State University  
Department of Civil, Construction and Environmental Engineering

Ms. Catherine McGhee*  
Virginia Transportation Research Council

Mr. Keith Parker*  
Charlotte Area Transit System

Mr. John F. Sullivan, III  
Federal Highway Administration – NC Div.

Dr. C. Michael Walton  
University of Texas-Austin

Mr. Robert R. Wimmer*  
Toyota Motor North America

* Newly appointed members
Summary of ITRE’S Finances

ITRE’s expenditures for the most recent Fiscal Year (2007/2008) are shown by the funding source in Exhibit III below. These figures represent the most recent and complete information available.

Exhibit III – ITRE Expenditures by Funding Source – FY 07/08

Overall, about 5% of all 2008 ITRE expenditures are from State Appropriated Funds related to administration, with additional operations support of 4% expended from Indirect Cost Return. State of North Carolina and Federal Contracts total 48% of all activity. Those figures are down compared to 51% for the FY 06/07 due a significant drop in state contracts by about 17%. Sales and Service activity (8%) is derived mainly from registration fees for workshops. Pass-Through projects to other departments at NCSU (23%) and other UNC universities (8%) are similar in volume to the previous year (30%). Other Contracts (4%) include project activity primarily for municipalities and may include funding from other states.
Exhibit IV tracks ITRE’s annual expenditures over the past six (6) years. The total expenditures figures include all pass-through project dollars to entities outside ITRE.

ITRE’s total expenditures have decreased in FY07/08 compared to the previous cycle (by about 6%). This reduction is due primarily to a substantial drop in our state funded projects (by nearly 17%). Coupled with the sustained federal reduction in the CTE allocation due to its designation as a Tier II Center in the last highway bill, the trend is not surprising. This is likely to continue as the State of North Carolina and ITRE struggle to maintain the level of partnership that we have been accustomed to in the past during the current economic crisis. While we continue to work on a our long term major initiative for securing long-term funding for the NGAT Center in Planning, it has yet to generate significant dollars to offset losses in state contracts. We anticipate expenditures being down for at least the next two years due to fluctuations in the economy.
Exhibit V summarizes ITRE’s productivity trends over the past six years. The top line represents the ratio of total annual expenditures divided by ITRE’s state appropriated funds. Total 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 middle line excludes all pass-through projects from annual expenditures when calculating the ratio reflecting the value of in-house research activities. In both cases, the ratio continues to be well above the indicated 4.0 minimum threshold cited in the UNC Office of the President Report (lower line). While the trend has been on a slight decrease for the past two years, ITRE remains a very productive center by any measure, with each dollar of state support generating nearly $12 dollars of internal expenditures and $18 dollars of total expenditures in Fiscal Year 2008.
Despite the reduction in our in-house expenditures last year, ITRE continues to generate significant F&A funds for its operations, as well as for the University as indicated in Exhibit VI. In the last fiscal year we generated over $810,000 of F&A dollars from our local, state and federal projects. While in the past approximately 33-35% of the F&A funds were returned to ITRE, only 31% were returned this year due to a new allocation formula at the University.
Summary of Personnel Activity

In 2008, ITRE created three (3) new positions and hired seven (7) personnel. ITRE had 46 staff members and 16 student interns at the end of the 2008 calendar year. Exhibit VII outlines the personnel changes for 2008 by program group. The changes reflect the new funding realities in 2008.

Exhibit VII - Personnel Activities in 2008

<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>
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<td>2</td>
<td>None</td>
</tr>
<tr>
<td>CTE</td>
<td>None</td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td>Highway Systems</td>
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<td>2</td>
<td>None</td>
</tr>
<tr>
<td>NC LTAP</td>
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<td>None</td>
<td>None</td>
</tr>
<tr>
<td>VAMS</td>
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<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Public Transportation</td>
<td>None</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</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Bureau</td>
<td></td>
<td></td>
<td></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>

Staff Honors and Recognitions in 2008

Ann M. Hartell – *Outstanding Public Service Award* (Special Transit Advisory Commission) - *Outstanding Overall Job Performance* (ITRE/NC State University)

Linda S. Lancaster – *Outstanding Overall Job Performance* (ITRE/NC State University)

Dr. Bastian J. Schroder – Young Professional Award (NC Section – Institute of Transportation Engineers)

ITRE team (Thomas J. Cook; Ann M. Hartell; Joseph B. Huegy; Jud J. Lawrie) – NC State University *Pack Leader Award* for Innovation

Kai C. Monast – Achievements in Transit Model Award Nominee (National Transit Institute)
Summary of Technical Activities
The following list summarizes ITRE's research and education projects at the national, state, and local levels for the calendar year 2008. Class information and online registration are available on the Institute Website.

Federal and International Research and Development
National research efforts at ITRE continue to be quite significant in terms of numbers and funding levels. Various program groups at the Institute have been involved in 11 national-level projects, and two that are funded by Korea.

**Blind Pedestrians' Access to Complex Intersections**
Sponsor: Western Michigan State University/Prime Sponsor: National Institute of Health (N.M. Rouphail)

**CTE Tier II UTC**
Sponsor: United States Department of Transportation (J.B. Martin)

**Development & Evaluation of Methodological Framework for Real-World Energy Use & Emissions Estimation at Multiple Temporal & Vehicular Scales**
Sponsor: National Science Foundation (N.M. Rouphail / H.C. Frey)

**FHWA Sponsorship of the 2009 ICOET**
Sponsor: Federal Highway Administration/United States Department of Transportation (J.B. Martin)

**In-Vehicle Energy and Emissions Information Systems**
Sponsor: National Science Foundation (N.M. Rouphail / H.C. Frey)

**NCHRP Project 3-78: Crossing Solutions at Roundabouts and Channelized Turn-Lanes for Pedestrians with Visions Disabilities**
Sponsor: Transportation Research Board, National Academy of Sciences (R.G. Hughes)

**Pedestrian Safety Enhancement on Hillsborough Street Roundabout Corridor Project**
Sponsor: Southeastern Transportation Center -UT/Prime Sponsor: United States Department of Transportation (N.M. Rouphail)

**Regional Development Population Trend and Technology Change Impacts on Future Air Pollution Emissions**
Sponsor: UNC-Chapel Hill / Prime Sponsor: United States Environmental Protection Agency (N.M. Rouphail)

**Support for Development of the Maintenance Academy Course for the National Highway Institute**
Sponsor: Perform Tech/ Prime Sponsor: Federal Highway Administration/National Highway Institute (R.S. Foyle and J.B. Martin)
Ubiquitous Transportation Network Modeling and Simulation - Phase I
Sponsor: Seoul National University, Seoul, South Korea (N.M. Rouphail)

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

Understanding the Contributions of Operations, Technology, and Design to Meeting Highway Capacity Needs
Sponsor: Kittelson and Associates/ Prime Sponsor: Strategic Highway Research Program 2 – C05 Project, National Academy of Sciences (N.M. Rouphail)

USDA Forest Service Sponsorship of the 2009 ICOET
Sponsor: United States Department of Agriculture Forest Service (J.B. Martin / E.E. Murray)

2008 National & International Committee and Panel Participation

Committees and Task Force Participation

TRB Committees
- Paratransit Committee AP060 (T.J. Cook)
- Bicycle Transportation Committee ANF20 (M.P. Meletiou)
- Committee on Environmental Analysis in Transportation ADC10 (E.D. Brill)
- TRB Committee on Traffic Law Enforcement ANB40 (C. Cunningham)
- Committee on Ecology and Transportation ADC30 (J.B. Martin)
- TRB Transportation Safety Management (J.C. Tsai)
- TRB Highway Capacity and Quality of Service AHB40 (R. Foyle and B. Schroeder)
- TRB Visualization in Transportation ABJ95 (R.G. Hughes)

TRB Subcommittees
- TRB School Transportation Subcommittee, Chair (J.C. Tsai)
- Signalized Intersection Subcommittee of AHB40 (N.M. Rouphail)
- Freeway and Multi-lane Subcommittee of AHB40 (N.M. Rouphail)

TRB Task Force
- TRB Task Force on Roundabouts ANB75T (B.J. Schroeder)

TRB Panel Participation
- TCRP Project B-31A: Guidebook for Measuring, Assessing and Improving Demand Response Transportation - Rural Phase (T.J. Cook)
- TCRP Project G-10: Guidebook for Estimating “Soft Costs” for Major Public Transportation Capital Infrastructure Projects (J.J. Lawrie)
Other National-International Group Participation

- North Carolina Section ITE (NCSITE) (four staff are members)
- NC Physical Activity Policy Research Center Advisory Committee (M.P. Meletiou)
- GIS in Transit Conference; National Center for Transit Research (G.P. Ferrara, committee member)
- Faculty Affiliate, Center for Mechanical Engineering Technology (TEMA), Department of Mechanical Engineering, the University of Aveiro, Portugal (N.M. Rouphail)

State of North Carolina and Local Research & Development

ITRE administered ongoing, statewide projects mostly in conjunction with the NC Department of Transportation (NCDOT) and local municipalities. See the pages that follow for additional project categories.

Assessing Operational, Pricing, and Intelligent Transportation System Strategies for the I-40 Corridor Using DYNASMART-P
Sponsor: NCDOT (N.M. Rouphail and B. Williams)

Asset Management Conference Support
Sponsor: NCDOT (J.B. Martin)

Context Sensitive Solutions Training NCDOT 2008-2009
Sponsor: NCDOT (J.B. Martin)

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

Development of Local, Regional and Cross-State Bicycle Transportation Systems FY08-09
Sponsors: NCDOT/PTD (T.J. Cook)

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

Ecosystem Enhancement Program (EEP) 2008-2009
Sponsor: NCDENR (J.B. Martin)

Economic Impacts of Access Management
Sponsor: NCDOT (R.S. Foyle and C.M. Cunningham)

GIS-based Pavement Management System projects for the following NC Municipalities: City of Statesville, City of Mount Holly, Town of Indian Trail, Fairfield Harbour Property Owners Association, City of Lenoir, City of Conover (J.R. Oklevitch)
Local Technical Assistance Program 2008
Sponsor: NCDOT/USDOT (J.B. Martin)

Integrated Planning for Schools and the Community OR/Ed Lab
Sponsors: Training & Development Associates, Inc.; Stokes County School Board; Craven County School Board; Harnett County Schools; Rock Hill School District 3; Johnston County Board of Education; Franklin County Schools; Wake County Public Schools; Onslow County Schools Board of Education; Granville County School Board; Elizabeth City/Pasquotank Board of Education; Chatham County School Board; Cleveland County Board of Education; Randolph County Board of Education; Pitt County Board of Education (J.C. Tsai)

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

Motor Carrier Safety Assistance Program (MCSAP) FY 2009
Sponsor: NC Dept. of Crime Control and Public Safety (R.G. Hughes)

Motor Carrier Size and Weight Technical Support to NCSHP FY08-09
Sponsor: NC Dept. of Crime Control and Public Safety (R.G. Hughes)

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

NCDOT Maintenance Technical Assistance Program (2008)
Sponsor: NCDOT (T.B. Baughman)

Pedestrian Operations at Single Point Interchanges
Sponsor: NCDOT (R.S. Foyle and C.M. Cunningham)

Procedure for Identification and Investigation of Horizontal Curves with Insufficient Superelevation Rates
Sponsor: NCDOT (R.S. Foyle)

Professional Enhancement Program 2008-2009
Sponsor: NCDOT/HWY (T.H. Brown)

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

Public Transportation Division Transit Operations Group/Urban Transit Assistance Program and Technology Implementation 2008-2009
Sponsor: NCDOT - Public Transportation Division (D.G. Collins)

Public Transportation Division Transit Operations Group/Urban Transit Assistance Program and Technology Implementation 2007-2008
Sponsor: NCDOT - Public Transportation Division (D.G. Collins)
Rail Intern Program FY 2008-2010  
Sponsor: NCDOT – Rail Division (T.J. Cook)

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

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

Research Administration Facilitation in Transition and Technical Assistance  
Sponsor: NCDOT (J.B. Martin)

Statewide Logistics Plan for North Carolina  
Sponsor: NC Office of State Budget and Management (R.S. Foyle and G. List)

Superstreet Benefit and Capacities  
Sponsor: NCDOT (R.S. Foyle and J.E. Hummer)

Teach Fundamental Engineering Principles (FEP) Program 2008-2009  
Sponsor: NCDOT (T.H. Brown, and C.M. Cunningham)

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

Technical Support for the NextGen Center  
Sponsor: NCDOT (R.S. Foyle)

Technical Support for the Safe Routes to School Program FY08  
Sponsor: NCDOT/PTD (T.J. Cook)

Technical Support for the Safe Routes to School Program FY09-10  
Sponsor: NCDOT/PTD (T.J. Cook)

Technical Support Services for the NCDOT Division of Bicycle and Pedestrian Transportation FY 09-10  
Sponsor: NCDOT/PTD (T.J. Cook)

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

TIMS 2008-2009  
Sponsor: NCDPI (J.C. Tsai)

TIMS 2007-2008  
Sponsor: NCDPI (J.C. Tsai)
Active Pass-Through Projects to Other Universities

**Determining Vehicle Miles of Travel (VMT) for Statewide, County, Urban and Local Areas**
Sponsor: NCDOT (UNC-Charlotte, Wang) (R.S. Foyle)

**Development of Performance Measures for the Assessment of Rural Planning**
Sponsor: NCDOT (Elizabeth City State University) (R.S. Foyle)

**Evaluation of Manufactured Stormwater Best Management Practices**
Sponsor: NCDOT (UNC-Charlotte, Allan & Wu) (R.S. Foyle)

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

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

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

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

**Median Barrier Placement on Six-lane, 46-foot Median Divided Highways**
Sponsor: NCDOT (UNC-Charlotte, Fang) (R.S. Foyle)

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

**Performance Improvement from Deep Layers of Subgrade Stabilization**
Sponsor: NCDOT (UNC-Charlotte, Ogunro) (R.S. Foyle)

**Relevancy of Data Entered into Riskmaster**
Sponsor: NCDOT (ECU, Behm) (R.S. Foyle)

**Subgrade Stabilization Alternatives to Lime and Cement**
Sponsor: NCDOT (UNC-Charlotte, Janardhanam) (R.S. Foyle)

**Traffic Operational and Safety Evaluation of Access Management Case Studies**
Sponsor: NCDOT (UNC-Charlotte, Pulugurtha) (R.S. Foyle)
Additional Projects

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

ITE 2008-08 Manual of Transportation Engineering Studies
Sponsor: Institute of Transportation Engineers
(B.J. Schroeder, J.C. Tsai, and C.M. Cunningham)

Hillsborough Street Roundabout Modeling and Simulation
Sponsor: Kimley-Horn and Associates and City of Raleigh (N.M. Rouphail)

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

Triangle Regional Model Proposed 2007-2008 Scope of Work for Model Development (DCHC-MPO)
Sponsor: City of Durham (J.B. Huegy)

Triangle Regional Model Proposed 2008-2009 Scope of Work for Model Development (DCHC-MPO)
Sponsor: City of Durham (J.B. Huegy)

Triangle Regional Model Proposed 2007-2008 Scope of Work for Model Development (Raleigh MPO)
Sponsor: City of Raleigh (J.B. Huegy)

Triangle Regional Model Proposed 2008-2009 Scope of Work for Model Development (Raleigh MPO)
Sponsor: City of Raleigh (J.B. Huegy)

Triangle Regional Model Service Bureau at ITRE 2008-2009
Sponsor: Triangle Transit Authority (J.B. Huegy)

Triangle Regional Model Service Bureau at ITRE 2007-2008
Sponsor: Triangle Transit Authority (J.B. Huegy)

URS Merger 01 Training
Sponsor: URS Corporation and NCDOT (J.B. Martin)
2009 Annual Transportation Research Board Activities

ITRE staff made presentations and presided at various meetings of the Transportation Research Board (TRB) at the 2009 Annual Meeting (January 11-15). Many of the papers will also be considered for publication in upcoming issues of the Transportation Research Record.

From Prioritizing Research Needs to Promotion, Sponsorship, and Funding of Research Programs and Projects (P09-0809)
Wayne W. Kober, Wayne W. Kober, Inc.
Nancy Chinlund, California Department of Transportation
Shari M. Schaeftlein, Federal Highway Administration
James B. Martin, North Carolina State University *

School Transportation Subcommittee, ANB10(6)
Jeffrey C. Tsai, North Carolina State University; presiding *

Visual Analytics to Spatially Target Motor Carrier Enforcement Resources for Crash Reduction and Infrastructure Preservation (P09-1667) - D10
Ronald G. Hughes, North Carolina State University *
Theresa-Marie Rhyne, North Carolina State University

Regional On-Road Vehicle Tailpipe Emissions Modeling and Evaluation for Conventional and Alternative Vehicle Technologies (09-1481)
H. Christopher Frey, North Carolina State University
Haibo Zhai, Carnegie Mellon University **
Nagui M. Rouphail, North Carolina State University *

Tough School Transportation Choices: Balancing Costs, Funding Cuts, and Mode Shift While Maintaining Child Safety (Session 449)
Jeffrey C. Tsai, North Carolina State University, presiding *

Observational Study of Pedestrian Behavior Along a Signalized Urban Corridor (09-2018) - B4
Bastian J. Schroeder, North Carolina State University *
Nagui M. Rouphail, North Carolina State University *
Brendan A. Lehan, North Carolina State University **

Modeling the Role of Transportation Information in Mitigating Major Capacity Reductions in a Regional Network (09-1992)
Hyejung Hu, North Carolina State University **
Billy M. Williams, North Carolina State University
Nagui M. Rouphail, North Carolina State University *
Asad J. Khattak, Old Dominion University
Xuesong Zhou, University of Utah

* ITRE staff   ** ITRE students
**Seat Belts in School Buses: Real-World Experience and State of the Nation (P09-0261)**
Jeffrey C. Tsai, North Carolina State University *

**Billing for Performance: Determining Billing Methods That Encourage Performance in Community Transportation (09-2010)**
Kai C. Crawford Monast, North Carolina State University *
Darcy B. Downs, North Carolina State University *

**Findings from HAWK Signal and Raised Crosswalk Research on Roundabout in Golden, Colorado (NCHRP Project 3-78A) (P09-1286)**
Bastian J. Schroeder, North Carolina State University *

**A Working Concept of Accessibility: Performance Measures for the Usability of Crosswalks for Pedestrians with Vision Impairments (09-1982)**
Bastian J. Schroeder, North Carolina State University *
Nagui M. Rouphail, North Carolina State University *
Ronald G. Hughes, North Carolina State University *

**Published Refereed Journal Papers**


Flannery, Aimee; N.M. Rouphail, and D.B. Reinke (2008), “Analysis and Modeling of Automobile Users Perceptions of Quality on Urban Streets”, *Transportation Research Record: Journal of the Transportation Research Board, No. 2071*

Frey, H. Christopher; N.M. Rouphail, and H. Zhai (2008), “Link-Based Emission Factors for Heavy-Duty Diesel Trucks Based on Real-World Data”, *Transportation Research Record: Journal of the Transportation Research Board, No. 2058*


**Other Publications, Presentations, and Scholarly Activities**


Hummer, J.E.; D.J. Findley, and C.M. Cunningham, “Comparison of Automated and Manual Data Collection for Roadside Elements”; Highway Asset Inventory and Data Collection National Workshop; Durham, N.C. (September 24-26, 2008)


Hughes, R.G., “Transportation Visualization: Where Does it Fit within the Bigger Picture of Things?” SIGGRAPH International Meeting, Los Angeles, Calif. (August 11-15, 2008)


Hughes, R.G., “Toward a Sustainable Concept of Pedestrian Accessibility: Outside the Box Thinking, of ‘Beyond the Splitter Island’” TRB National Roundabout Conference, Kansas City, Mo. (May 18-21, 2008)

Hughes, R.G., “ITRE Suggestions for Improving the Effectiveness of the TACT Program”, FMCSA TACT T-SPEN Conference, Las Vegas, Nev. (July 15-17, 2008)


Conference Attendance, Participation, and Exhibits in 2008

**Center for Transportation and Environment**
- AASHTO Standing Committee on the Environment; Monterey, Calif.; June 2008
- ADCID, ADC30 TRB Summer Meeting; Denver, Colo.; July 2008
Highways

- TRB Annual Meeting; Washington, D.C.; January 2008 (five staff attended)
- Southern District ITE Annual Meeting; Charleston, S.C.; March 2008, (R.S. Foyle participated; C.M. Cunningham attended)
- NC Association of Rehabilitation and Education (NCAER); Raleigh, N.C.; April 2008, (C.M. Cunningham participated)
- NHTSA Strategic Meeting on Speed and Other Unsafe Behaviors, Bethesda, Md., April 2008 (C.M. Cunningham attended)
- NC Association of Airports Annual Meeting; Asheville, N.C.; May 2008, (R.S. Foyle participated)
- TRB Committee on Highway Capacity and Quality of Service Midyear Meeting, Newport Beach, Calif.; July 2008 (R.S. Foyle and B.J. Schroeder participated)
- Highway Asset Inventory & Data Collection National Workshop; Durham, N.C., September 2008; “Comparison of Automated and Manual Data Collection for Roadside Elements.” (C.M. Cunningham participated)
- 2008 ACEC/NC DOT Transportation Conference; Raleigh, N.C., October 2008, (D.J. Findley participated)
- NCSITE 2008 Annual Meeting; Raleigh, N.C.; December 2008 (D.J. Findley participated)
- Luso-American Transportation Impacts Study Group, Lisbon, Portugal, October 2008

ITRE Director

- NC State University – Institute for Emerging Issues, Raleigh, N.C., Feb. 2008
- Workshop on Traffic Modeling: Traffic Behavior and Simulation, Graz, Austria, June 29-July 2, 2008
- Luso-American Transportation Impacts Study Group, Lisbon, Portugal, October 2008

Public Transportation

- Community Transportation Conference; Raleigh, N.C.; October 2008 (T.J. Cook attended)
- 2009 APTA Expo; San Diego, Calif.; October 2008 (K.C. Monast attended)
NC Local Technical Assistance Program
- LTAP Region 4 Annual Meeting, Asheville, N.C.; May 2008 (J.B. Martin, L.D. Collier, W.E. Woods attended)
- NCAPWA State Chapter Annual Conference and Equipment Show; New Bern, N.C., June 2008 (J.B. Martin, L.D. Collier, W.E. Woods attended)
- LTAP National Conference, Breckenridge, Colo.; July 2008 (L.D. Collier, W.E. Woods attended)
- National Conference on Highway Asset Inventory and Data Collection; Raleigh, N.C., September 2008 (L. D. Collier attended)
- NCAPWA Streets Division Annual Conference; New Bern, N.C.; October 2008 (J.B. Martin, L.D. Collier, W.E. Woods attended)

Pupil Transportation Group
- North Carolina Transportation Information Management System (TIMS) Spring Conference; Charlotte, N.C.; March 2008 (A.D. Michael, M.D. Perez, B.D. Sluder attended)
- Transportation Research Board Annual Meeting; Washington, D.C.; January 2008, (J.C. Tsai participated)
- Educational Logistics (Edulog, Inc.) – vendor for computerized routing and scheduling for the State of North Carolina; ongoing (A.D. Michael participated)
- North Carolina Department of Public Instruction (NCDPI) – NCWISE (statewide student management information system; ongoing (A.D. Michael participated)
- North Carolina Department of Public Instruction (NCDPI) – NCWISE. Ongoing. (A.D. Michael participated)
- Educational Logistics (Edulog, Inc.) 30th National Conference; Las Vegas, Nev., April 2008 (A.D. Michael, M.D. Perez, B.D. Sluder attended)
- School Bus Education Exhibit at the North Carolina State Fair; Raleigh, N.C., October 2008 (A.D. Michael participated)
- National Association for Pupil Transportation (NAPT), 34th Annual Conference and Trade Show; Myrtle Beach, S.C.; October 2008 (J.C. Tsai; A.D. Michael; M.D. Perez; B.D. Sluder attended)
- Carolina Urban and Regional Information System Association Annual Conference; Charlotte, N.C.; September 2008 (M.A. Miller attended)
- Carolina Urban & Regional Information Systems Association; 2008 Carolina URISA and Carolina GITA Conference; Concord, N.C.; September 2008 (M.A. Miller attended)

Triangle Regional Model Service Bureau
- TRB Federal Surface Transportation Requirements in Statewide and Metropolitan Transportation Planning: A Conference; Atlanta, Ga.; September 2008 (B. Mei)
Visual Analytics, Modeling and Simulation (VAMS)

- FMCSA TACT T-SPEN Forum; Las Vegas, Nev., 2008 (R.G. Hughes participated)
- ACM SIGGRAPH International Conference; Los Angeles, Calif. (R.G. Hughes)
- National Science Foundation C-PATH Conference; Greensboro, N.C. (R.G. Hughes)
- MCDOT Conference on Engineering, Safety, and Mobility; Wilmington, N.C., (R.G. Hughes participated)
- NCAPWA Conference; New Bern, N.C. (G.P. Ferrara; J.R. Oklevitch attended)
- LIKES (Learning in the Knowledge Society); Greensboro, N.C., (R.G. Hughes, G.P. Ferrara attended)
- Highway Asset Inventory and Data Collection Workshop; Durham, N.C., (J.R. Oklevitch attended)

Degree Program Courses in Calendar Year 2008

ITRE staff in the calendar year 2008 taught the following degree program courses at North Carolina State University:

**Spring 2008**

- CE 214 — Engineering Mechanics, Statics (T. Brown) - 60-65 students
- CE 509 — Traffic Safety (Guest Lecturer, C.M. Cunningham) - 25-30 students
- CE 706 — Advanced Traffic Control (Guest Lecturer, B.J. Schroeder) - 15-20 students

**Fall 2008**

- CE 502 — Traffic Operations (N.M. Rouphail) - 14 students
- CE 504 — Airport Design (Guest Lecturer, R.S. Foyle) - 18 students
- CE 506 — Transportation Studies (B.J. Schroeder) - 15-20 students
### Summary of Continuing Education/Training and Outreach

More than 9,000 transportation professionals – from flaggers to Professional Engineers – received the benefit of ITRE’s education/training and outreach activities. ITRE staff provided 4,774 course hours – equal to more than half-a-year of 24-hour, non-stop training, on- and off-site. These programs continue to have a strong track record and operate close to capacity. The Transportation Founders Fund also offered a well-attended seminar in April 2008 on automotive technology. Exhibit VIII lists training areas and summary statistics.

### Exhibit VIII – Training / Continuing Education Activities in 2008

<table>
<thead>
<tr>
<th>Program Area</th>
<th>Training/Workshops in 2008</th>
<th>Instruction Hours per Session</th>
<th>Sessions Offered</th>
<th>Total Hours</th>
<th>Attendees</th>
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<td>Program Area</td>
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<td>Hours per Session Instruction</td>
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<td>13</td>
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<tr>
<td>UPSTU</td>
<td>6.00</td>
<td>1.00</td>
<td>6.00</td>
<td>5</td>
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<tr>
<td>Intermediate EduLog</td>
<td>6.00</td>
<td>4.00</td>
<td>12.00</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Boundary Creation</td>
<td>6.00</td>
<td>1.00</td>
<td>6.00</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Run/Route Optimization</td>
<td>6.00</td>
<td>3.00</td>
<td>18.00</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>System Admin &amp; EMU</td>
<td>6.00</td>
<td>1.00</td>
<td>6.00</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>EXHIBIT VII TOTAL</strong></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9,238</td>
</tr>
</tbody>
</table>

| **Total**                    | 646.50                                                                                   | 950.00                        | 4,774.50         | 9,238       |
Student Support
ITRE projects continue to involve and support a large number of students from various disciplines and universities. The table below summarizes our record of accomplishments in student support, indicating continued graduate student participation in ITRE research.

<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>
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<td>1999-00</td>
<td>10</td>
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<td>2000-01</td>
<td>21</td>
<td>10</td>
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<tr>
<td>2001-02</td>
<td>14</td>
<td>9</td>
<td>23</td>
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<td>2002-03</td>
<td>11</td>
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<td>2003-04</td>
<td>11</td>
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<td>2004-05</td>
<td>11</td>
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<td>2005-06</td>
<td>15</td>
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<td>2006-07</td>
<td>14</td>
<td>11</td>
<td>25</td>
</tr>
<tr>
<td>2007-08</td>
<td>14</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>131</strong></td>
<td><strong>127</strong></td>
<td><strong>258</strong></td>
</tr>
</tbody>
</table>

In 2008, the students the Institute employed were enrolled in the following degree programs: Civil Engineering; Economics; Graphic Communications; International Affairs; Landscape Design; Machining Technology; Poultry Science; Social Work; Transportation Engineering; and Public Administration.

Post-Doctoral Fellows and Visiting Scholars

Margarida C. Coelho, Ph.D. — Post-Doctoral Fellow
Ms. Guilhermina Torrão — Visiting Scholar / PhD Student

ITRE and CTE have made a conscious effort to recruit, engage, and support post-doctoral fellows in its research activities. In 2008, ITRE also provided support for Dr. Margarida C. Coelho from the University of Aveiro in Portugal. Dr. Coelho is a Post-Doctoral Fellow in the field of Environmental Engineering.

During the Fall Semester 2008, ITRE hosted one visiting scholar: Ms. Guilhermina Torrão from the University of Aveiro in Portugal who is a doctoral student in the field of mechanical and environmental engineering being co-advised by Dr. Roupail, ITRE Director. Ms. Torrão also had the honor of being one of the first students involved in NC State University's new Global Training Initiative Program (GTI).
Marketing/ Public Relations

The ITRE Communications Office reorganized and refocused its efforts in 2008 to better meet the Institute's number one goal: Increase national visibility (see Page 3). Efforts to better position ITRE as a world-class transportation research center are bolstered by the staff's ongoing lectures and visits throughout North America, Europe, and Asia.

Targeting news releases to specific audiences based on research content is creating new avenues of academic, public, and private sector interest, not only for promotion but also to attract new projects.

In August, the Office began a complete redesign and restructuring of the ITRE Web site. The new site will reflect the progressive work of the Institute with a clean, twenty-first century feel and user-friendly interface. The estimated launch date is May 2009.

Contributing to ITRE’s funding, the Office also maintains the North Carolina Section of Institute of Transportation Engineers Website (www.ncsite.org).

Highlights from mid-year 2008 include:

• A story on ITRE’s post-doctoral and scholars program for Portuguese students was featured on NC State University’s Website home page throughout November 2008.

• To promote the Institute’s long-range study, “Working Concept of Accessibility: Performance Measures for the Usability of Crosswalks for Pedestrians with Vision Impairments,” a five-minute video summary was produced, shot, and edited in-house. The video and associated news release is posted on ITRE’s Web site.

Two staff members from CTE supported the work of the Communications Office with Web programming and video production expertise.
Appendix I - 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 it co-sponsors activities and makes its services available at the local, state, and regional levels as well. CTE has provided more than 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. It helps support each agency's needs in meeting the requirements in Section 134, Title 23, U.S. Code; NC General Statutes 136-66; and the federal 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.

- NextGen Air Transportation (NGAT) Center in Planning
  The NGAT Center in Planning, approved by NCSU in July 2008, is focusing on the development and evaluation of improvements to existing and anticipated air traffic control, airspace management, flightdeck technologies for safety, airport and airspace systems capacity, and surface traffic management. Over 25 partners are currently listed on the Center's Web site http://www.itre.ncsu.edu/ngat/index.html

Visual Analytics, Modeling and Simulation Group (VAMS)
VAMS continued its analysis and program evaluation support of the NCSHP Motor Carrier Enforcement (MCE) Program on funding from FHWA and FMCSA. The MCE program continue to provide the primary vehicle for our development of operational GIS capabilities. VAMS GIS products for NCDOT proved critical in North Carolina legislative debates on the issue of expanded access to longer commercial vehicles and their impact on infrastructure and safety.
The commercial vehicle work of VAMS will likely play a major role in North Carolina’s attempt to develop a statewide “logistics” plan in 2009.

VAMS also continued to develop and host ITRE-offered GIS training which included classes for NCDOT personnel. VAMS continued with its pavement survey efforts for local municipalities and acquired an additional staff member in this area. Eleven (11) Pavement Management System projects were completed and delivered to various North Carolina municipalities. These projects encompassed nearly 900 street miles.

Dr. Hughes continued as Principal Investigator on NCHRP 3-78, which completed field data collection in 2008 and is now in a final report-writing mode. Dr. Hughes also continued to provide support to the National Institutes of Health (NIH) project as well.

VAMS initiated collaborative visualization efforts with the University of North Carolina Renaissance Computing Initiative (SIGGRAPH and TRB presentations) and continues to take a lead role within TRB on the development of visualization research needs for ABJ95. VAMS continues to have a presence on the North Carolina Traffic Records Coordinating Committee, the GIS in Transit Conference Committee, as well as the North Carolina State Government (SGUC) GIS Users Group.

**NC Local Technical Assistance Program (LTAP)**
The Federal Highway Administration established the North Carolina Local Technical Assistance Program (LTAP) in 1982. The state 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. LTAP offers four (4) 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. The group provides Web site hosting and maintenance for three (3) nationally-recognized agencies: National Association for State Directors of Pupil Transportation Services (www.nasdpts.org); National Congress on School Transportation (www.ncstonline.org); National Carolina School Bus Safety (www.ncbussafety.org).

- 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 to help educators and public administrators make wise decisions in thoroughly evaluating policy alternatives, and to efficiently allocate resources.

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

- 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.
Appendix II - UNC Tomorrow Response - Phase II

AUGUST 2008

The Institute for Transportation Research and Education (ITRE) is an inter-institutional center of the UNC system. The Institute conducts research, education, and technical assistance projects on a wide variety of transportation issues with the goals of solving problems and creating new products, better services, and a smarter workforce. ITRE is located on NCSU's Centennial Campus.

I. System Role and Inter-institutional Collaborations

1. Describe the role of UNC General Administration in the functioning of your entity.

   - UNC-GA is ITRE’s ultimate authority.
   - The Director of ITRE is selected by a committee appointed and chaired by the UNC-GA Vice President for Research.
   - UNC-GA approves ITRE’s charter and substantive revisions to the charter.
   - UNC-GA appropriates a state budget to NCSU for ITRE administrative support (building space, telephone, and selected staff salaries).
   - UNC-GA approves the Director’s salary and terms at hiring and approves salary adjustments for professional staff above 15% or $10,000 within a fiscal year.

2. Describe the nature and extent of inter-institutional collaborations among the UNC Institutions involved in your entity in terms of the following (when possible, show figures to support):

   - NC A&T State University, ITRE provided support for a program on the application of core computer science principles to other education and research domains. NC A&T was a member of a broader research team consisting of Virginia Tech, Villanova, and Santa Clara University (2007 – present).
   - UNC-Chapel Hill, Center for Urban and Regional Studies. ITRE collaborated on and EPA-funded STARS project on the impact of land use on emissions (2005 – present).
• **UNC-Chapel Hill, Department of City and Regional Planning.** ITRE is listed as subcontractor on a proposal responding to Transportation Research Board National Cooperative Highway Research Program Project 20-65A, $300,000 budget (pending proposal).

• **UNC-Chapel Hill, Highway Safety Research Center (HSRC).** ITRE has collaborated on several safety-related projects including commercial motor vehicle crash data analysis for the NC State Highway Patrol; developing mapping capability for all truck-involved crashes in North Carolina; and motor carrier enforcement programs for the NC State Highway Patrol. ITRE has also collaborated with HSRC on Federal Highway Administration Broad Agency Announcement opportunities.

• **UNC-Chapel Hill, Highway Safety Research Center (HSRC).** ITRE provided contract services to present training workshops on pedestrian design and designing for accessibility (2004-2006).

• **UNC-Chapel Hill, Highway Safety Research Center (HSRC).** ITRE provided contract services to provide training for North Carolina-based Safe Routes to School facilitators (2006-2007).

• **UNC-Charlotte, Urban Institute.** The School Services program cooperates with ITRE on the Transportation Information Management System (TIMS) for school bus scheduling and routing in the western part of the State.

• **UNC-Charlotte, Center for Transportation Policy Studies.** ITRE acted as subcontractor to develop and conduct four Rural Planning Organization Training Workshops (2002 - 2003).

• **Renaissance Computing Institute (RENCI).** Through the NCSU Engagement Center for Visual Analytics, ITRE collaborated on a proposal to the Homeland Security Administration.

• **ITRE administers the North Carolina Department of Transportation’s research program to all UNC campuses, and executes pass-through grants for research work on selected proposals each year. The program includes about 15 new projects each year with about five (5) projects awarded to UNC campuses outside of NCSU; past projects have gone to UNC-Chapel Hill, UNC-W, ECU, UNC-C, NC A&T, ECSU, and UNC-A; annual value of research grants, both new and continuing, is about $2.5 M. ITRE also hosts an annual NCDOT proposal response forum to develop multi-institutional teams to bid on solicited and develop unsolicited pre-proposals to NCDOT.

• **ITRE Triangle Regional Model program managers have taught semester-long transportation planning courses at UNC-CH and Duke University.** Several ITRE staff members have been involved in degree program instruction at the Civil Engineering Construction and Environmental Engineering (CCEE) Department at NCSU.

• **ITRE recently collaborated with NCSU, UNC-Greensboro, NC A&T, and UNC-Charlotte on a project to develop a Statewide Logistics Plan for the N.C. Legislature (total grant was $707,450).**
Operating funds
- None

Personnel
- None

Facilities and Equipment
- None

Inclusion on advisory or other boards
- Both the Director of the Highway Safety Research Center (UNC-CH) and the Center for Transportation Policy Studies (UNC-Charlotte) serve on the ITRE Advisory Council. ITRE Director also served on the HSRC Advisory Board.

Other means of support and collaborative involvement
- None

3. What administrative or policy changes are needed to increase or enhance these areas of inter-institutional collaboration for your entity?

- Increase communication and coordination across UNC Inter-institutional Centers. The UNC General Administration increased emphasis on campus-wide oversight is to some extent diluting the inter-institutional nature of the Centers. Additionally, under this policy, ITRE under NCSU oversight, must compete with the ‘single-campus’ priorities of the NCSU administration, leading to conflicts with ITRE’s inter-institutional mission and the nature of the Institute’s activities. Projects and programs, especially when they involve faculty from other UNC institutions, cannot be seamlessly administrated under the current system, which further inhibits inter-institutional activities. Cost: Uncertain; anticipate 1 year for General Administration to respond and reorganize.

- Move toward a system of merit-based budgeting for inter-institutional centers to focus resources on centers that are most productive, generate positive return to the State for each dollar of support invested (e.g. overhead), and are best positioned to expand their current research programs.

- Support ‘value-added’ programs for all activities at inter-institutional centers. ITRE’s activities are predominantly project-based with funding constrained to the production of specific deliverables for a client or sponsor. Providing a higher level of institutional support (or return) would enable greater outreach and communication of research products, improve instructor-readiness, support proposal, grant, and publication writing activities, and support professional development. General Administration should support the center’s need to deliver research to citizens and decision-makers as repeatedly called for in the UNC Tomorrow recommendations. Cost: $200,000 to $300,000 per year (see also response to Question 6 [Page 41]).
II. Entity Mission and UNC Tomorrow

4. What existing programs, initiatives, and activities are already in place that effectively respond to the Commission’s recommendations?

Many of ITRE’s programs and projects respond to the various Findings of the UNC Tomorrow Report. The most relevant are organized in the following table along with the specific Finding(s) to which they respond. Although much of the language in the report recommendations and suggested strategies is targeted to students and faculty in academic programs, the central ideas are very applicable to much of ITRE’s work. Additional details are available on the ITRE Website: http://itre.ncsu.edu

Most cited training programs in the table include a student evaluation component. Responses to post-course surveys are included in course modifications. As an example, the ongoing CSS training program yielded sufficient data to develop a paper presented to the national Task Force on CSS for their consideration in evaluating the effectiveness of CSS training programs (2007).
<table>
<thead>
<tr>
<th>ITRE Program, Initiative, Activity</th>
<th>Correspondence to UNC-T Report Finding</th>
<th>Description</th>
</tr>
</thead>
</table>
| A. Over 10,000+ people reached annually through a range of technical assistance and training programs. | 4.1 Global readiness  
Keeping North Carolina’s transportation workforce skills up to date.  
4.7 Outreach and engagement  
Providing extensive professional development, continuing education and distance education opportunities | ITRE program groups have ongoing training programs for the transportation industry workforce, including civil engineers, local government managers, transit operators, safety flaggers, and Geographic Information Systems (GIS) users. Many programs are delivered electronically as webinars or through interactive distance education software. |
| B. Context Sensitive Solutions (CSS) | 4.1 Global readiness  
New skills, new decision-making frameworks to better fit with changing transportation needs  
4.6 Environment  
CSS promotes going beyond regulatory requirements for protecting the natural and human environment  
4.7 Outreach and engagement  
Training for NCDOT employees that directly relates to their work in delivering quality projects to the citizens of North Carolina | Context Sensitive Solutions (CSS) is an approach to planning, designing and building transportation projects to fit the physical setting and preserve scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. CSS emphasizes strong stakeholder involvement and multi-disciplinary approaches to finding the best outcomes. ITRE/The Center for Transportation and the Environment (CTE) has trained over 1,200 transportation professionals, most of them employees of NC Department of Transportation, during three-day CSS workshops held around the State. ITRE/CTE are also active at the national level with CSS initiatives, policy research and development of best practices guidelines. |
| C. Collaboration with Seoul National University (Korea) | 4.1 Global readiness  
Partnership with an international university. | Research partnership with SNL on the investigation of vehicle to vehicle communication systems designed to help vehicles detect and avoid collisions as well as mitigate urban traffic congestion. |
<table>
<thead>
<tr>
<th>ITRE Program, Initiative, Activity</th>
<th>Correspondence to UNC-T Report Finding</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D. Academic and research partnership with the University of Aveiro (Portugal)</td>
<td>4.1 Global readiness Partnership with an international university.</td>
<td>ITRE is a founding member of the Luso-American Transportation Impacts Study Group (LATIS-G). In June 2007, a Memorandum of Understanding (MOU) was established between NCSU and the University of Aveiro in Portugal that will facilitate graduate student and faculty exchanges as well as research collaboration between the two universities with a particular focus on transport and environmental impacts.</td>
</tr>
<tr>
<td>E. Operations Research / Education (OR/Ed) Lab</td>
<td>4.3 Public education Service to school districts and local planning agencies across the State to improve local access to public education</td>
<td>OR/Ed has developed a system which fully integrates community and regional data, ten-year economic and demographic forecasts, demographic and land use studies, digitized pupil and school location files, and mathematical optimization algorithms. The system assists school districts with issues of school capacity, school site selection, and attendance boundaries, enabling public administrators to make decisions wisely, to evaluate policy alternatives thoroughly, and to allocate resources efficiently.</td>
</tr>
<tr>
<td>F. Statewide logistics study</td>
<td>4.4 Economic transformation Planning for future capacity and movement in our freight system will play a major role in future economic development across the State.</td>
<td>ITRE’s Highway Systems Group was the team leader in developing a strategic plan for freight and logistics in North Carolina. The plan was mandated by the State legislature and delivered in early 2008 in collaboration with multiple UNC institutes and private partners.</td>
</tr>
<tr>
<td>G. Special Transit Advisory Commission (STAC)</td>
<td>4.4 Economic transformation Facilitated dialogue on important community issue. 4.7 Outreach and engagement Supported a major regional policy development initiative.</td>
<td>ITRE provided substantial support for a citizen advisory commission convened to develop recommendations for regional transit investments in the Triangle. The group released their report in spring 2008. ITRE partnered with regional planning agencies, NCDOT, the regional transit provider and a business group in the effort.</td>
</tr>
<tr>
<td>ITRE Program, Initiative, Activity</td>
<td>Correspondence to UNC-T Report Finding</td>
<td>Description</td>
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<tr>
<td>----------------------------------</td>
<td>----------------------------------------</td>
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</tr>
<tr>
<td>H. Triangle Regional Model Service Bureau</td>
<td>4.4 Economic Transformation</td>
<td>Supports the efforts of several major public agencies in planning a transportation system that will be critically important in the future economic development of the Triangle region.</td>
</tr>
<tr>
<td></td>
<td>4.7 Outreach and Engagement</td>
<td>Major technical assistance to local and regional transportation and transit planning agencies.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The TRM Service Bureau houses, supports, and enhances the regional travel demand model for the Triangle Region, which is a major component of regional transportation and transit planning in the region. It is jointly funded by the NCDOT, Triangle Transit and the region’s two Metropolitan Planning Organizations. The Bureau also participates in advanced transportation-related research endeavors and has invested significant technical improvements to the transportation model.</td>
</tr>
<tr>
<td>I. Pedestrian safety research</td>
<td>4.5 Health</td>
<td>Promoting safety for all users of our transportation system contributes to health and well being.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ITRE is part of a national consortium for a multi-million dollar, interdisciplinary research team studying the safety of visually impaired persons in accessing complex intersections and roundabouts and development of technologies to assist in those tasks.</td>
</tr>
<tr>
<td>J. Air quality research</td>
<td>4.6 Environment</td>
<td>Basic research into a critical energy and environmental issue.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ITRE collaborated with NCSU faculty researchers on a series of studies investigating transportation emissions, air quality and vehicle emissions monitoring systems.</td>
</tr>
<tr>
<td>K. Safe Routes to School</td>
<td>4.5 Health</td>
<td>Promoting regular physical activity, especially among our youth, can have far-reaching, positive health impacts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The ITRE Bike/Ped program administers the Safe Routes to School program for NC Department of Transportation. Under this program, local communities and schools can use federal transportation funds for infrastructure or programs that promote walking or cycling to school.</td>
</tr>
<tr>
<td>L. Rural Para-transit Technical Assistance</td>
<td>4.5 Health</td>
<td>Promoting better physical access to health care.</td>
</tr>
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<td></td>
<td></td>
<td>ITRE’s Public Transit Group provides technical assistance, management tools, and training to the 82 rural public transportation systems in North Carolina. These “on-demand” transit services provide service to elderly, disabled, or otherwise transit dependent populations, connecting them with vital services such as health care providers.</td>
</tr>
<tr>
<td>M. Flexible work schedules and telecommuting</td>
<td>4.6 Environment</td>
<td>Allows employees to adopt alternative commuting patterns and lessen their individual environmental impact.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ITRE offers the option of flexible work schedules and supports telecommuting for its employees.</td>
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</tbody>
</table>
5. **What new programs, initiatives, and activities are needed to respond to Commission recommendations?**

Looking forward, ITRE proposes the following new or expanded initiatives:

**Major Initiatives**

1. **Expand the delivery and range of non-degree educational programs in a distance learning environment.** This will require regular, consistent access to facilities (studio and equipment) to produce and deliver non-degree courses. Currently ITRE cannot gain regular and consistent access to NCSU campus studio facilities. ITRE proposes stronger support from UNC for non-degree programs including studio facilities for producing distance learning courses.

   - Responds to the recommendations on Global Readiness (4.1) and Outreach and Engagement (4.7).

   - Cost: $500,000 (estimated). This includes access to (and possibly a purchase or rental fee for) dedicated studio space for the non-degree students and professionals; acquisition of hardware and software technologies at both the instructor and student ends; course preparation management expenditures; registration, payment, communications and marketing fees. The system is expected to be self funded within 3 years of its inception.

2. **Provide funding needed to successfully complete the current planning stage of the NextGen Air Transportation (NGAT) Center in Planning.** “The Center’s mission is to discover, evaluate, implement, and disseminate advanced air transportation technologies at the regional, national, and international level to improve the capacity, safety, and environment surrounding air transportation. NGAT, approved by the NCSU Chancellor for planning in July of 2008, is currently focusing on expanding the use of satellite-based air traffic surveillance and control systems.”

   - Responds to the recommendations on Economic Transformation (4.4) and the Environment (4.6).

   - Cost: $500,000 for 5 years as matching funds (6 – 8 years) new positions plus research and outreach activities that match anticipated federal and industry partner funding of $500,000 per year with a goal of a $5M program for the first 5 years).
3. Include ITRE as an integral part of any UNC campus initiatives related to transportation, energy or the environment, especially on environmental sustainability or energy issues. Transportation accounts for 29% of U.S. energy consumption and 27% of U.S. greenhouse gas emissions. ITRE has the experience and access to faculty who can provide extensive research and practical input on campus sustainability initiatives, critical energy issues, and community outreach and awareness of transportation and the environment at the campus, state and national levels.

- Responds to recommendation on the Environment (4.6).
- Cost: Dependent on specific campus-wide initiatives.

**Other Initiatives**

4. Strengthen the collaborative relationship with LATIS-G in Portugal (see item D. in above table) to include more faculty and student exchanges as the group develops a joint research agenda.

- Responds to the recommendation on Global Readiness (4.1).
- Cost: $50,000 (estimated).

5. Participate in the new annual NCSU engineering faculty program at the Southeast University (China) ITRE staff is involved in developing a new Transportation Engineering Program Initiative. A policy obstacle has been to find ways to arrange compensation packages for involved EPA professional staff on 12-month positions.

- Responds to the recommendation on Global Readiness (4.1).
- Cost: $50,000 (estimated).

6. Establish a Transportation Visualization Center for research and development of technology and tools for visualization, analysis and simulation for use in the transportation industry.

- Responds to the recommendation on Economic Transformation (4.4).
- Cost: $200,000 (estimated).
6. Beyond your response to #3, are any additional administrative and policy changes needed to successfully implement response plans in ways that ensure efficiency, effectiveness, and relevance to both current and future challenges?

ITRE fulfills its mission funded mostly through grants and contracts. According to the latest biennial UNC General Administration (UNC-GA) report on inter-institutional centers published in October 2005, ITRE leads all 16 active centers in both annual expenditures ($5.8M) and in staff size (46). Close to 90% of our expenditures are from external funds. In fact, the ITRE ratio of external funding to state-appropriated funds is close to 14:1.

To put those figures in context, in FY 2007 our state appropriation of $464,549 covered the following: 4.5 positions; rent on Centennial Campus of about $115,000; and phone lines costing over $30,000 per year. To continue to support our mission and that of UNC-GA, ITRE is in dire need of additional institutional funding to enable staff development activities that would help with staff retention and further ITRE’s mission of becoming nationally and internationally recognized for our work.

ITRE’s management goal is to provide the equivalent of 10% release time to all EPA professionals for value-added activities beyond the conduct of contract research/technical assistance. These activities include paper/proposal writing, attending national and international conferences, registering for short courses to keep up with the state of the art in our field and for providing strategic advice to the director and senior staff. The estimated cost for this initiative is in the range of $200,000 to $300,000 per year. We anticipate the need for such support to decline over time (3 to 5 years) as our ability to develop and maintain new funded initiatives is enhanced.

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